ALASKA SYMPOSIUM
on the
SOCIAL, ECONOMIC, AND CULTURAL IMPACTS
of
NATURAL RESOURCE DEVELOPMENT

Alaska Pacific University
Anchorage
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Edited by Sally Yarie, M.Sc.
Department of Conferences and Institutes
University of Alaska, Fairbanks
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Proceedings of the Alaska Symposium on the Social, Economic, and Cultural Impacts of Natural Resource Development

(Alaska Pacific University, Anchorage: August 25-27, 1982)

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Contents

SIA Symposium Proceedings

FOREWORD

Sheila Helgath
Office of the Federal Inspector

Social, economic and cultural impact assessment identifies the human impacts resulting from natural resource development. During the summer of 1981, it became apparent to social scientists working in several State and Federal resources agencies in Alaska that no statewide focus on SIA issues had occurred in this or any other state, yet each of the social scientists was aware of Alaska and national SIA literature and research. These social scientists decided to convene a symposium to inform and guide those Alaskans interested in SIA.

The social scientists listed the following objectives for a symposium:

1. Presentation of conceptual frameworks, theoretical developments, analytical techniques, and methodologies for conducting socioeconomic impact assessment by academic and agency professionals, both from within Alaska and elsewhere
2. Discussion of potential modification of conceptual frameworks and analytical tools to tailor their application to the variety of resource use decisions within Alaska
3. Presentation and discussion of various strategies for mitigating negative socioeconomic impacts and enhancing postive socioeconomic impacts, including a discussion of service delivery planning, infrastructure planning, and institutional development and monitoring
4. Development of an informal professional network which is so important if social scientists and planners conducting socioeconomic impact assessment are to avoid the trial and error "reinvention of the wheel"
5. Identification and discussion of mutual problems and issues encountered by agency planners, analysts, and prog managers in conducting socioeconomic impact assessment in Alaska.

To achieve these objectives, a technical steering committee (TSC) of social scientists from the sponsoring agencies was formed. The TSC contracted with the Department of Conferences and Institutes of the University of Alaska, Fairbanks, to arrange the Symposium and selected Ron Inouye to be the coordinator. The Symposium was held at Alaska Pacific University in Anchorage on August 25, 26, and 27, 1982 with over 250 attendees.

Were the objectives of the Symposium accomplished? Yes and no. Those who attended the Symposium did not come away with **the** definitive social impact theory nor did they find answers to all their questions and concerns. However, the objectives and the conference did reflect the complexity and variability of those issues. Each theme of the conference, from facility siting to protecting cultural values, to mitigation responsibility may deserve a future, separate three-day conference and serious discussion by policymakers, planners, and the public. The emphasis on conceptual frameworks and analytical techniques of objectives one and two recognized the need for social scientists to provide policymakers with the ability to make decisions on resource development and an understanding of the consequences of those decisions. The final day was devoted to objective three, mitigation strategies

appropriate to Alaska with representation of the major actors in social impact—the local communities, state and Federal governments, and industry. Objectives four and five recognized the many Alaskan SIA practitioners who reside in communities ranging from Barrow to Ketchikan, and from Tok to Dutch Harbor, and in the largest Alaskan cities. Without the development of a cohesive practitioner's network to share information, ideas and solutions it is easy for individuals to be overwhelmed by the problems resulting from resource development.

The purpose of these proceedings is to summarize and document the Symposium. The proceedings are not intended to be an inclusive textbook on how to conduct social impact assessment, but rather to reflect the current SIA thinking and research. The proceedings contain selected papers presented during the Symposium and excludes papers which have been previously published.

Many people deserve credit for the success of the Symposium, particularly Technical Steering Committee members Marsha Bennett, Janice Cole, Gary Hennigh, Joe Mehrkens, Bob Muth, and Tom Warren. John Hickey and Ron Inouye of the UAF Department of Conferences and Institutes provided organizational assistance. Thanks are extended to Ester Wunnicke and Senator Ted Stevens for their remarks to the Symposium, to those who presented papers, and to those who attended the Symposium.

The overall message of the Symposium was this: Alaskans **can** maximize the benefits of resource development and minimize its negative consequences through systematic analysis of their communities, the development of legal mechanisms and public policy, and by learning from the efforts of others who have already tackled the human impact problems of resource development. The depth and variety of human and information resources shared during the "Alaska Symposium on the Social, Economic, and Cultural Impacts of Natural Resource Development" should be useful to Alaskans during the next decade of resource development.

Section I: Keynote Addresses

Introduction

Ron Inouye

The addresses in this section were presented during the "Alaska Symposium on the Social, Economic, and Cultural Impacts of Natural Resource Development." The papers derive from prepared texts or were rendered into these forms following audio tape transcription and editing of the original remarks.

The speakers were selected for diversity and the distinctive views and ideas each could present. Time and financial restrictions limited the number of addresses which could be prepared for inclusion in this section. As in the selection of papers in the following chapters, previously presented or published information was not included.

Schaeffer discusses the human impacts of resource development and change in Northwest Alaska. From his experiences with socioeconomic studies and researchers, he urges a greater reliance on traditional cultural, family, and human values to help people cope with changes.

Rogers presents an important perspective of socioeconomics in Alaska history and chides the Symposium organizers for not recognizing the early and yet continuing Alaskan socioeconomic research of the past 40 years.

Freudenburg builds the case for social and economic impact assessment. He discusses the development of theoretical frameworks to better understand events, which eventually lead to predictability.

Larminie discusses industry's efforts in oil exploration and production on the North Slope and the Shetland Islands. He cites the well defined work of scientists and engineers in understanding environmental and engineering impacts, but questions the notion of social impacts and the social scientist's role in that assessment.

Social and Cultural Impact Issues

John Schaeffer

It's a pleasure to be here to speak to you; I'm really not sure what you're here for or what I'm here to speak about but I'll try. Basically, it's just been a few years that we've known anything about socio-economic impact. I don't know who dreamed up the phrase but it isn't very old. I asked one of our elders what it was and he said, "Years ago they put us Eskimo people in the category of American Indians in some form or other, but now they have a new category of socio-economic impact and that's where we fit." What little I know of socio-economic impact I don't think he's too far off. Those of you who are professionals in this field know it's everything nobody wants to take care of jammed into one special category. I guess it's fortunate for us because we've been part of its development.

Unlike most of you, I'm involved on both sides and the first thing reporters ask me is, "Is there a conflict in what you do?" Of course there is a conflict. On the one hand I'm in there with a bulldozer trying to rip and rape the land and, on the other hand, I try to protect the culture that is thousands and thousands of years old and a way of life that is important to us and that we want to maintain. It's not an easy job but I think if I can leave anything with you it is that none of it is really important - absolutely none of it. It's my feeling that the work you do and the way you do it is wrong. It is wrong only because it doesn't work very well, not that what you do isn't good for people. I include other professionals who also work with people in that same category. One example of how good we are at this is our medical profession in the United States. As a profession, doctors have made a mint on dealing with and treating symptoms. Yet we look at doctors as some of our best people; we pay them the most, we build big institutions for them to work in yet they really don't solve problems. Most of you, I think, in your disciplines do the same thing: you deal with symptoms.

For the last fifteen years I've been in charge of the development of a group of people in Northwest Alaska, specifically a group of Inupiat people who are essentially shareholders of the corporation I run. Because it is a native corporation, and a separate, distinct, older cultural group, we've had to worry about things other than making money for our shareholders and corporate growth. We've had to worry about everything else in our peoples' lives. Some of you may have worked with us or we've gone to you, for assistance, We look at the problems we've had and we've gone to professionals and said, "We've got some problems, define them for us, and give us a solution." My job is to assist people in getting funding whether it comes from my corporation, the legislature or federal agencies. We provided the funding for professionals and para-professionals to go out and work on the problem. We did this for ten years. Then we made an assessment of how effective our work was and found we were failing. We went back to the professionals and asked them again, "What's the problem?" and they gave the same old answers. By then my eyes and ears started to open up and what I heard from the professionals was a justification of their jobs. So we went back to the only people we had left, our elders, and they said, "It's about time you started to listen to us, we've been telling you for several years now what the problem is" and they were right. I went back through some tapes of previous conferences we had with our elders and they were telling us the same thing: that in dealing with people you can't look on the surface. You have to look internally, and although we had trouble defining what they meant we called it a person's spirit. Our elders told us that what made us strong spiritually and physically was one's beliefs and human values. These ideas about beliefs and human values helped us in identifying the problem. Unfortunately, the American economy is a very easy one to understand if you really try. There aren't too

many hardships in America. It's easy to not do anything, or at least not do anything that is good for your soul. It's easy to sit in front of a television set and not communicate with your neighbor. It's easy to pay a professional who specializes in a certain area to go and try to solve the problem, which unfortunately is usually not solvable.

Because the solutions are very difficult, and we are really only dealing with the symptoms, our work seems doomed to fail. That is, if the people are not spiritually strong the impact is going to be negative or devastating, or something in-between. There is not a darn thing that you can do to really mitigate the impact. The only solution is to strengthen the peoples' spirit and that is not an easy thing to do. It takes a lifetime of learning and you can't learn it in school. The only place you can learn the kind of values that strengthen your spirit is in a family setting or some substitute for a family setting, and in the community. There may be ways of doing this, and there probably are communities and people who are trying to find these kinds of values. Everyday you see articles by prominent people, maybe not so prominent ones, like me, who talk about the problems they have. The causes are the same in that people are weak spiritually. If there are no solutions to the problems, such as setting up programs that would motivate people to want to improve their situation by learning and living a better set of human values than most of us live by today, then one way to mitigate impact is to avoid the people. But if the people are already strong and if they have a strong value system in place, I don't think any kind of development is going to bother them at all and they'll be strong enough to withstand the change. If they're already weak, all you're going to do is make them weaker. Unfortunately, it is impossible to not develop some of these resources. The rest of the country needs them, at least that's what we're told.

It may be easier to help people individually rather than in large groups. The reason programs like Alcoholics Anonymous works is that someone who really understands works directly with the person who has the problem. There is both a personal feeling and commitment that goes into the work and many times that fails when the professional and client are separated. What I've been talking about is that in order to learn and appreciate basic human values you have to be committed and the only place you usually find that is in an extended family. We're having problems in our small villages primarily because we modernized the village. For instance, we built new homes that relocated the grandparents in one end of town and their kids scattered all over town, and in order for them to communicate, everyone had to get telephones. They just didn't get together anymore and, in fact, we ended up really breaking down the whole social structure of the village. Our whole system in this country is directed toward the nuclear family.

In Alaska, we have essentially the same problems as anywhere else in the United States or any other industrial country. Every small community or village in Alaska has been impacted by the United States economy and western technology at least to some degree. If nothing else, people's values have been significantly changed. The primary impact of natural resource development in this state will occur in these rural areas and a lot of the people living in these areas are native - Indian, Aleut, Eskimo - and the difference in the impact on natives vs. non-natives is the amount of time, we as natives, have had to adjust to the change. You people (non-natives) had almost 2000 years; we missed both the Agricultural and Industrial Ages. We're going from harpoons to computers and skipping everything in-between. We're doing it in a very short time period and the impact of the changes are devastating to us, especially from a spiritual perspective.

In examining the issue of resource development and its impact on the native people of Alaska, let's look at the Prudhoe Bay oilfield as an impact situation. Basically, except for the construction phase, which produced a fairly significant impact, the Prudhoe project, with a little planning, didn't have to produce the negative impact that it did. For example, there are other developments we as a native corporation have and want to try. For the past two years we have been working to develop mineral rights (i.e. lead, zinc, and silver) in the NANA region and have run into several conflicts. We wanted to develop mineral rights in the middle of our hunting grounds and had a very difficult time. I wouldn't make the decision for my corporation but insisted it be made by the shareholders; I adopted the negative approach but unfortunately our people needed the jobs and the income and so they said to go ahead with it. We've tried to mitigate some of the impact, but it's taken months of hard work to develop the agreements with the mineral company. Essentially, there are instances where we can shut down the mine because of negative environmental or human impacts. No company wants to throw a half billion dollars into a project and have some Stone Age Eskimo be able to shut the project down. I can understand that feeling and we're trying to work out some compromise in these instances.

Our company provides 500 to 700 jobs in the state of Alaska but only about 125 or 130 are held by natives. The big problem now, though, is that our people want the jobs but will not always hold onto them. Again, the main difficulty is that our people do not have a value system strong enough to make the necessary adjustment to industrial-type jobs. The mining company we are working with understands the problems and is working closely with us to find solutions. We have initiated flexible work schedules to allow the people to maintain the subsistence lifestyles to which they are accustomed and although this somewhat minimizes the problem it doesn't resolve it. If we are going to take advantage of both the country we live in and the economy, we need to change our value systems. There is a lot of work to be done in the area of developing individual and community spirit before any type of impact should be forced on rural Alaskans.

I like some of the attempts that are being made in the cities; the neighborhood organizations that have been evolving are a good first attempt although they are a little superficial in what they are trying to accomplish. At least it is a beginning in terms of developing an extended family approach in their neighborhoods. The long term solutions to some of our problems here in Alaska lie in working with people at both the community and individual level.

We've got to realize that most of us put blinders on when looking at our total environment. The human element in relation to our total environment is very important. Almost anything can work for people if that's what they want.

I noticed you have in the schedule a session called Public Participation. This is a very important idea; sometimes you don't even have to do the right thing, as long as people are behind it, even if it's wrong, they'll make it work. So if you can't solve the problems by building the people up spiritually, then you can fool them. You can make them accept the development, make them want to have it and want to participate. Perhaps then the changes and the stress won't be quite so bad. If you can't do the right thing and make the long-term changes that are necessary for people to accept wide-scale developments, then you must face them and make them accept things anyway.

I hope the rest of your conference will deal with the real issues; these are the ones that impact people. So when you are dealing with your area of expertise, or someone else's, please remember that it's not statistics or a piece of paper we are dealing with; it is people that are being impacted by development and by your efforts to mitigate some of the impact.

Economic and Political Impact Issues in Alaska

George W. Rogers

Looking at the title of my assigned topic, we appear to have two ways to define the terms used in the title. Looking first at the two key words, according to my dictionary, 'impact' is a striking together or a collision communicating force while an 'issue' is an outcome or result. We can then assign the adjectives, 'economic' and 'political' to either or both words and come up with a predictable number of combinations. For example, a book I wrote in 1962 had as its subtitle *The Economic Consequences of Statehood.* According to the Preface, this book is concerned with the implications of this essentially political event for economic growth based upon natural resources utilization. The impact, 'communicating force' in this case was political and there were a host of, 'issues' or, 'consequences' such as the increase in local political and economic self-determination, a relocation of control over natural resources from the Federal to a regional level, and the shifting of the political control and management of economic changes. In my book, I had chosen to focus on economic issues or consequences as they were more precisely labeled and, more specifically, those associated with the utilization of Alaska's natural resources. In effect, this is simply a reversal or standing on its head of the title of this symposium.

What followed in Alaska revealed an important time dimension to any analysis of impacts. The "issues" were not necessarily automatically realized. The natural resources related economic issues or consequences of this political impact initially were relatively insignificant until combined with the economic impact of the Prudhoe discoveries and construction of the trans-Alaska pipeline. Then they were realized with a vengeance. There was a large employment impact (or was that an issue?), but this was confined primarily to the few years of pipeline construction. The largest and longest lasting consequence of this natural resource development was the overwhelming of the State treasury with a flood of petroleum dollars. Through the political process, this was diverted into several tributary flows: one creating more jobs in the State bureaucracy along with new and/or expanded State programs; another into a clutch of subsidized loans, local government grants, and other forms of more direct income distributions; another launching large public works or infra-structure projects; and finally a flow into a savings account for the future.

To get some idea of what would have happened to Alaska if this petroleum bonanza had occurred in the political environment of Territorial status rather than statehood, we have only to review the history of the Kennicott-Bonanza mine between 1911 and 1932. In his first address to the Legislature after becoming governor in 1939, Ernest Gruening eloquently presented this even as a means of launching his drive to enact a territorial income tax and eventually achieve statehood. While outside interests extracted milions of tons of ore and dollars in profits from this major copper lode, they paid not one penny in local taxes and in the process of following unregulated high-grading practices had, in the interest of maximum short-run gains, destroyed the opportunity of greater long-term yields from the resource.

In the end, the people of Alaska were left, in Gruening's words, with some giant holes in the ground, an abandoned railroad right-of-way and two ghost towns. (Actually, Cordova survived by converting itself from a rail terminus to a fishing port, but McCarthy became a true ghost town). The costs in human misery and individual private economic loss were external to the corporation and of no real consequence. The spectre of the copper boom-bust and similar cycles which punctuate Alaska's economic history still haunt us today, but thanks to the political institutions of a State of the Union and the power

to tax such developments, Alaskans have the ability today to at least prepare some mitigation for the time when the oil stops flowing.

Examining the same type of occurrence, the Prudhoe and pipeline developments, another chain of political reactions were set in motion which for Native Alaskans were as important as statehood was for all Alaskans. In combination with the earlier proposals of the Atomic Energy Commission to convert the Arctic into a nuclear testing grounds (under the euphemisms of Project Chariot and Plowshares) and the Corps of Engineers to convert the entire Yukon Flats into the largest man-made lake in the world (under the guise of hydro-electric power development), these petroleum development proposals united the Native people in the mid-1960s into a formidable political force. The issue or outcome of this impact was the enactment by the Congress of the Alaska Native Lands Claims Act of 1971.

However, there were additional complications associated with this economic impact (or rather this impact originating from primarily economic sources). Politically powerful national conservationist and environmentalist forces were also operating in Alaska and they immediately took steps to insure that nothing was done before all possible safeguards were taken regarding constructing of the line and port, and that while Alaska's lands were in the process of being divided up and parcelled out to State and private groups, there be some setting aside of lands to preserve wilderness and other unique intangible values in the National interest. Thanks not only to their efforts but their political clout, these interests were able to get the petroleum industry to design and construct a safe pipeline and the Congress to tack onto the Native lands legislation provisions for the creation of new reserves of public lands in the National interest.

There were many other impacts and issues associated with the Prudhoe event, but John Schaeffer will be going into some of these next. The point to be made here is that the Alaskan experience demonstrated that all of the relevant forces, impacts and issues are impossibly complex and their interrelationships difficult to recognize. As technicians, we must never lose sight of the nature of the reality with which we are working and remind ourselves that of necessity we are carrying out our technical work in terms of heroic simplifications. The layman's suspicions of the Ivory Tower have some basis in experience. A good example is the theory and practice of limited entry, to cite something close to my workshop.

There is one other matter I wish to comment on while on this soap box. Actually, it links the organization and topic of this symposium directly into the caution I have just expressed. Shortly after accepting the invitation to participate in this symposium on natural resource development impacts, I was sent a copy of the prospectus by the Interagency Committee of Social Scientists organizing this Symposium. The introduction made sense to me, but when I came to the first sentence at the top of the second page under, 'Need For a Symposium' I was brought up short. It read: "Socioeconomic impact assessment is a relatively new interdisciplinary field - less than 10 years old." The section went on to explain that recently there had developed a "network of professionals engaged in social impact analysis." Unfortunately, "Only a few Alaska social scientists have been involved in these networks" and the purpose of this symposium was to "help fill the gap."

Those of you who know me will understand why this section received my attention. It was as though I were an eighteenth century Native Alaskan being told by Vitus Bering that he had just discovered Alaska. My second reaction, however, was that what the writers of this statement really meant to say was that this field was new to them, not the rest of us who have been working in it for the past several decades, and that they would like to introduce us to their own new network of professionals. After a second reading of the prospectus it appeared that what the organizers of the symposium were primarily concerned with was a technical application of social science disciplines in serving the legal requirements of a specific piece of legislation, the 1969 Environmental Policy Act. This is a legitimate reason for having this symposium, but we must focus on broader issues if we are to avoid becoming trapped into a legally defined version of reality.

For those of us who have been in this business before the enactment of the National Environmental Policy Act of 1969, our assessments and analyses were concerned with the "effects" of natural resource development in a real world consisting of a complex of living systems - biological, ecological, economic, political, and social. Each of these systems have definable boundaries and purposes, but all interact with each other and are susceptible to change in differing degrees by the events which make up the process of development. It may sound inconsequential to discuss differences between, 'impacts' and 'effects' but from reading too many environmental impact statements (and too many isn't all that many)

I have found the term, 'impact' seems to bring with it a mind set which is predisposed to view the real world in mechanistic terms and the assessment process as the filling in of a predetermined set of data into a standardized format. This may meet the letter of the law, but what is lost is a concept of the real world as a complex of living systems.

It is not my intention, however, to push this too far and create a straw man which I can easily knock over for my own ego satisfaction. The organizers do go on to say, "in addition to legal requirements, however, policy-makers, planners and the general public are showing greater interest in the socioeconomic impacts which follow from natural resource developments. . .so that they may mitigate the adverse effects and enhance the possitive ones." To serve this recognized greater interest, however, we must depart from the bounds set by legal requirements and keep in constant touch with the blooming, buzzing confusion of the real world and its problems. In my more than four decades of practice I have found it all too easy to become seduced by the elegance of my little intellectual constructs of reality to the detriment of the ends I sought to serve.

Despite these warnings, I look forward in the course of this session to becoming better acquainted with your various networks and I hope to introduce you to my own. We are all attempting to deal with an impossibly complex task, but a critically important one.

Theoretical Developments in Social and Economic Impact Assessment*

William R. Freudenburg

This paper has three main purposes, and it seems only fair that I should give you some advance warning of what they are. The first is to provide an overview of theoretical developments in social and economic impact assessments. That's the topic I'm supposed to cover, so you're probably expecting something along those lines anyway. The second purpose is to de-mystify theory a bit at the outset, and to let you in on the closely guarded secret that it actually has quite a bit to do with what happens out in the real world. The third purpose is to include some very tentative thoughts on social and economic impact assessments, as well as some others that have already been more carefully developed.

The tentative thoughts are included for two main reasons. One is that theoretical development is an ongoing process, and the tentative thoughts are a sampling from some of the most recent of the ongoing developments. The other reason is that the people at this conference have an extraordinarily wide range of perspectives; those perspectives could be particularly helpful in turning some of the tentative thoughts into a clearer understanding of the issues at hand.

The De-Mystification of Theory

If anthropologists from another planet were to visit a series of these conferences, chances are they would notice an unusual ritual that took place whenever an academic started to talk about theoretical development. In the vast majority of cases, the speaker's tone of voice would become more serious, and the words would become unintelligible. The people in the audience, meanwhile, would also show a predictable pattern of behavior. About half of them would develop a glazed look in their eyes, while at the same time trying to maintain an expression on their faces as if Something Important were being said. The other half of the audience would soon be seen to be pursuing even more important activities, such as playing tic-tac-toe, or writing a letter to a mother-in-law.

If our extra-terrestrial anthropologists were to write up a report on these observations, they would probably conclude that the whole ordeal was part of some bizarre ritual--one that had no visible connections to any other activity, including the theme of the conference.

Proposing that the pattern is a common one, however, does not necessarily imply that it is a useful one. As far as I can tell, in fact, it really only accomplishes two things. One is to buy a small amount of academic respectability for a conference, since many people (presumably including the speakers) really do tend to believe that Something Important is being said, even if they're not quite sure what it is. The other is to reinforce the stereotype that academics are hopelessly out of touch with the real world.

Alternative approaches are possible, however, if we understand the real importance of theory. While whole conferences have been devoted to topics such as the precise definition of theory, and legitimately so, the basic nature and purpose of theory can be summarized fairly concisely. In fact, I'm about to argue that theory is not something that people try to develop because they want to avoid having anything to do with the real world. It's not just a game that's meant to let people know how many obscure words a theorist can toss around. To give you a simple one-sentence definition, a theory is a

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systematic way of trying to make sense out of what's going on in some part of the world. It's not a way of trying to ignore events, in short, but a way of trying to tie them together in a way that we can understand and even predict.

Within this perspective, it's even possible to state the difference between a good theory and one that's not as good. The better theories are not the ones that are most impractical, vague, or jargon-ridden: they're not the ones that take longest to describe. Better theories are the ones that are the most **accurate** and **useful.**

Accurate theories, as common sense would tell you, are the ones that have a good fit with reality. A theory cannot be very useful unless it is accurate, at least under the rules I'm using here; but usefulness also includes other considerations. The more useful theory is one that ties together information better than some other approach does--more clearly, for example, or in a way that is simpler, or helps us make better predictions.

If I'm getting my point across, you should be thinking by now that what I'm describing sounds a lot like plain old-fashioned common sense. It is a lot like common sense, and in fact most of us have little theories that we try out every day of our lives. The main difference between scientific theory and folk wisdom is that scientific theory is more systematic. Because it is more systematic, however, it is also more powerful.

This point deserves emphasis. You don't need to be a meteorologist to know when it's raining, and you don't need to be a doctor to know when you feel really terrible; yet there is a difference between science and common sense. The difference becomes particularly important when you try to explain **why** it's raining, or why you feel so bad, and to do so in a way that allows some prediction of what will happen next. The value of the theory will be shown by the two criteria I've already mentioned--accuracy and usefulness. Medical theories are what allow the doctor to know the difference between influenza, appendicitis, ulcers, and so on, and therefore to predict (accurately and usefully) what type of treatment is most likely to make you feel better. The point is not that systematic theories are always right while common sense is always wrong. It is instead that a good theory--a systematic attempt to make sense of some of the facts of the world, and one that is both useful and accurate--will greatly improve our odds.

Theory in Social Impact Assessment

Having said all that, what can we now say about theoretical development in social impact assessment (SIA)? A good place to start would be by giving a brief description of what SIA is all about.

The basic task of SIA can be described in fairly simple terms. At issue is the fact that some new development has been proposed, and that some community or area is likely to be affected by that project. The job of the SIA practitioner is to assess, or to try to measure in advance, the impacts the project is likely to create in that particular setting. The impacts, in a nutshell, are the differences between what would happen with the project and what would have happened otherwise.

Figure 1 provides a simplified picture to correspond with this simple explanation; it shows impacts as resulting from the effects of the given project, working through a particular community setting. Other people have drawn far more complicated pictures than this one; particularly important considerations are feedback loops, indicating that a community can have an effect on the proposed project (perhaps changing it in such a way that the impacts will be lessened, and the fact that outside forces are likely to have led to the project, and to be acting on the community at the same time (see especially the Cortese and Jones [1979] model, as modified by Weber and Howell [1982]). For our present purposes, however, the simple model is sufficient.

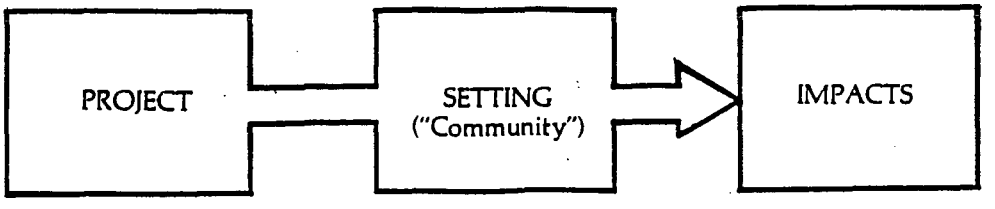

Figure 1. Simplified Model of Social Impacts

Even the simplest model indicates that the impacts depend in part on the nature of the project, and in part on the nature of the setting. And social impact assessments can be prepared for an incredible variety of projects and settings, ranging from pipelines in rural Alaska to public housing in New York City. Researchers have already assessed the impacts of highways and high-voltage lines, mines and military bases, dams and dumps, nuclear facilities and national parks--as well as a broad range of other developments. Moreover, when we look at the kinds of impacts that have been considered, the complexities are multiplied considerably. They include impacts on individuals and institutions, families and friendships, politics and prejudices, sewers and social systems, and so on; and they can take place in settings that range from the local through the regional to the national and international levels.

So what kinds of theories do we have for making sense of all these assessments? Some people seem to believe that we ought to be developing one theory to cover the entire range of social impact assessments. My own view, however, is that with such an incredible range of variation, trying to come up with one theory to cover them all would be premature at the very least.

As far as I can tell, there are really only three main approaches (none of them really deserve to be called theories) that we could even try to use to cover the whole area of social impact assessment. Since none of them seem extremely promising, I will deal with each of them only briefly.

(1) **The "growth is good" approach.** The first approach, to describe it simply, starts from the assumption that economic growth is generally beneficial--a form of progress. Since social impact assessments are often associated with projects that will lead to economic development, this line of reasoning leads to the prediction that the projects will generally have favorable consequences.

(2) **The "exploitation is bad" approach.** The second approach is as simple as the first one, but it leads to opposite conclusions. This approach starts from the assumption that corporations are heartless, if not evil, and are more concerned about corporate profits than about what their projects do to local people or to the physical environment. Since development projects tend to have been proposed by such corporations, the exploitation approach would predict that the projects' impacts would often or generally be bad.

(3) **The "it depends" approach.** The third approach is less simple-minded than either of the first two, but it is also less simple. Just as you don't need to be a weatherman to know when it's raining outside, you don't really need to be a social scientist to know that projects can sometimes have good effects and sometimes have bad ones, depending on the characteristics of the project, the setting, and a variety of other factors. If that's all you know, however, it won't do you much good; your predictions about the future could still be all wet. It's precisely at this point that systematic theory--or theories--start to become more important.

In my view that we're not likely to find any single theory to make sense out of the full range of SIA situations, it may be that I'm being too pessimistic. It may be that someone is currently on the verge of coming up with a grand theory that will lead to a coherence in SIA, just as Newton's Laws helped systematize a great deal of thought about the physical universe. That's possible, but I don't see it as being likely in the near future. Most of the global SIA theory efforts I've seen so far have been more akin to efforts to re-invent the wheel.

A more fruitful approach, I believe, is to try to build on the foundation already provided by the vast body of existing work in the social sciences. The new situations and needs we face in SIA may lead us to add to or to modify the theories already available from elsewhere, and in fact, I have sometimes attempted to do just that myself (see e.g., Freudenburg, 1980, 1982). We also need to have a very clear understanding of the ways in which social impact assessment differs from other kind of social science endeavors--a point that will be elaborated in the next section of this paper. The basic task of SIA, however, is to provide accurate and useful projections about what the future will look like under given situations, and the ability to make accurate projections is widely accepted as a distinguishing characteristic of any science. In our efforts to improve SIA projections, it would be foolish to ignore the many useful theories already in existence. What we need instead are intelligent and systematic efforts to build on that foundation in a way that meets our own particular purposes.

The Nature of Social Impact Assessment

If that's so, one of the first things we need is a very clear picture of just what our particular purposes are. To put it into other terms, what we need is a second kind of theory of SIA--not a grand theory, for

predicting all potential social impacts, but what some of my academic colleagues would call a "metatheory." We need a logical examination of what it is we do in SIA, and why it is we do it.

To the extent to which SIA is seen as being part of environmental impact statements, the requirements for social impact assessments are outlined in environmental laws and regulations--particularly the National Environmental Policy Act of 1969, or NEPA, and the Council on Environmental Quality's regulations for implementing the act. The regulations state that impact assessments

> . . .must insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken. The information must be of high quality. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing [the law]. Most important, [the assessments] must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail (U. S. Council on Environmental Quality, 1978:2).

Under these regulations, the goal of an impact assessment is to provide the most accurate possible projection of the significant impacts that are likely to take place under a given set of circumstances. That sounds straightforward enough, and it also sounds like the kind of situation where the sciences provide the kind of expertise that is necessary.

If you look at social assessments that have actually been made part of environmental impact statements, however, you will generally find a product that differs quite substantially from what the regulations describe. The problems are numerous (for a detailed discussion, see Freudenburg and Keating, 1982), but one difference particularly deserves our attention.

The relevant environmental laws and regulations, such as the one just cited, call for SIAs to assess significant social impacts (i.e., the social changes that are likely to occur because of a decision, or the ways in which people are likely to be affected). Most SIAs, however, focus less on what will happen than on what people are likely to think about it.

The difference may seem subtle at first, perhaps because there tends to be a relationship between the two. Yet impacts and attitudes are actually quite different from one another. It is one thing to go through an earthquake; it is quite another to be asked (beforehand or afterward) what you think about going through an earthquake. Odds are, if you were to go around Anchorage and ask today, many people will tell you that in some ways the devastating Alaska earthquake of 1964 may have been good for the community in the long run (because it helped people pull together for common goals, for example, led to newer and more sturdy construction, and so on). That really doesn't change the fact that the earthquake was a very expensive and destructive one. Most projects tend to be far less destructive for local communities than was the Anchorage earthquake, of course; the point to keep in mind is simply that social impacts created by a project can be very different from people's attitudes toward the project.

In some of the thoughts I've shared with strictly professional audiences, I've argued in print that a social impact assessment ought to focus primarily or even exclusively on social impacts. In practice, however, the attitudes and the impacts are very much interrelated; people's attitudes can have a good deal of influence on the impacts that are created, and the expected (or experienced) impacts can obviously have a great deal to do with people's attitudes toward a project. Moreover, it is an inescapable fact that social impact assessments are meant to provide input for political decision-making. In practice, if the SIA practitioner is listened to at all, she/he is generally asked (directly or indirectly) about attitudes, because political decision-makers tend to be concerned about the political feasibility or political cost of a given decision. For these and other reasons, the most reasonable approach would be to acknowledge that social impact assessment generally faces two tasks: one is to assess the likely reactions to the project, and the other is to assess the project's likely impacts (for further discussions of the interrelationships between attitudes and impacts, see Carley, 1981; Carley and Derrow, 1980; Cramer, et al., 1980; Freudenburg and Keating, 1982). With this discussion as a background, however, it's time to get a bit more specific. What kinds of social science expertise are likely to offer what kinds of help?

It is possible to speak of the social sciences as an undifferentiated whole, and it is also possible to divide that expertise into nearly an infinite number of categories. For the purposes of this discussion, perhaps the best mix between specificity and simplicity would be a relatively straightforward three-way division. Environmental law calls for impact statements to assess impacts upon the human environment; I'm about to suggest we'll find it useful to think in terms of three interrelated types of human

environments--the economic/demographic environment, the social/cultural environment, and the physical environment itself. Changes in any one of these environments can have direct consequences for human well-being, and can also be the source of favorable or unfavorable attitudes.

Figure 2 illustrates the typology I am suggesting here; it indicates that in each of the three types of human environments, it is possible to assess both the impacts created and people's attitudes toward those impacts. The figure is also intended to draw our attention to some of the most important omissions of SIAs produced to date. The demographic and economic impacts--the population changes and economic changes likely to be created by a proposed development, indicated in the top left cell of Figure 2--are usually discussed in reasonably thorough detail. The changes in the social and cultural environments, however, and the social consequences of changes in the physical environments, are generally discussed largely as matters of taste or esthetics (see discussion in Freudenburg and Keating, 1982). The middle and bottom cells in the left column of Figure 2, in other words, have frequently been ignored in past work, although the right-hand cells in each of the bottom two rows are considered a bit more frequently.

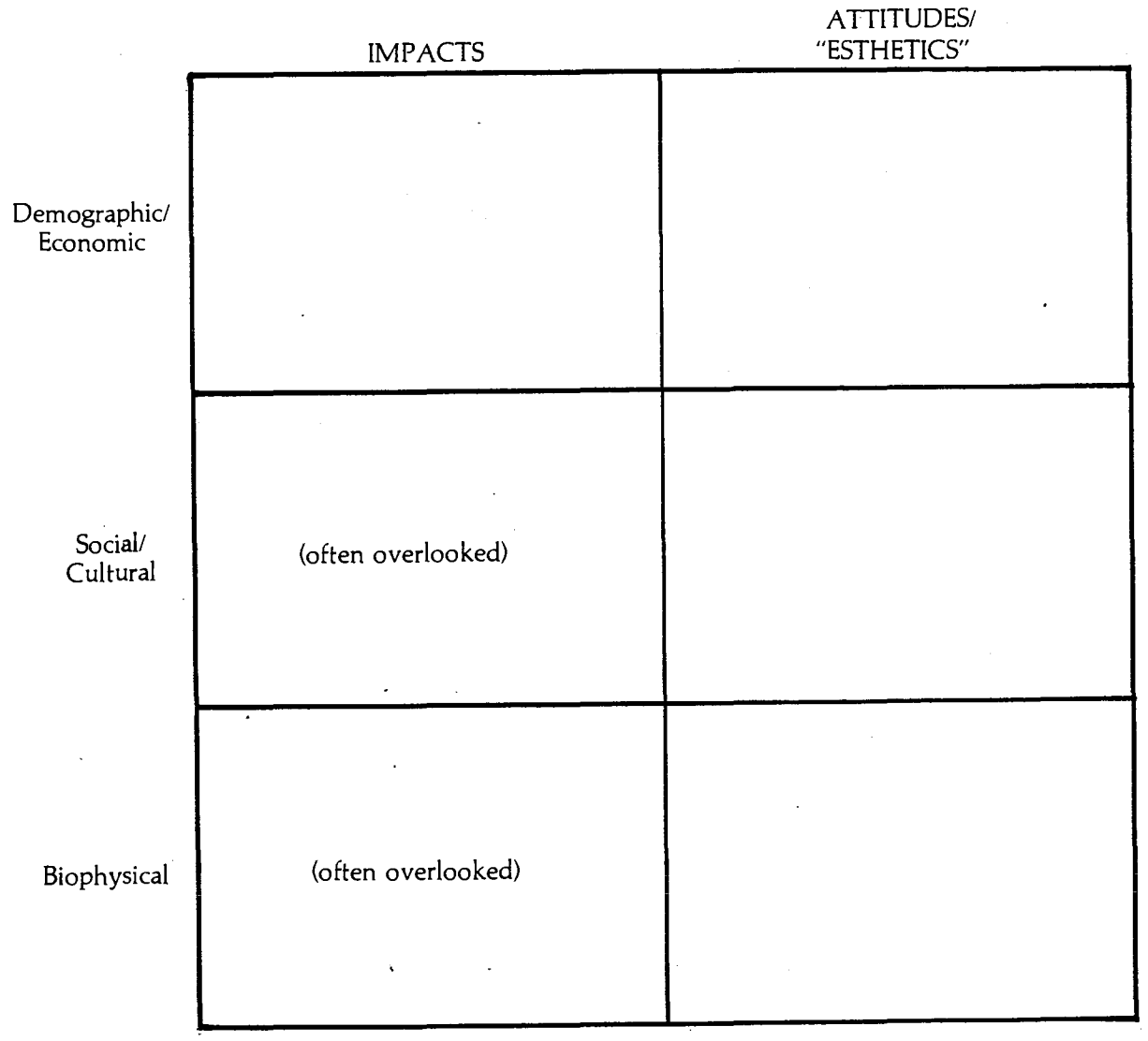

Figure 2. The Major Categories of Social Impact Topics

One of the ways in which social impacts in Alaska have been important for social impact assessments in the lower 48 states, in fact, is by helping to point out that these important categories have generally been overlooked in the past. Alaska native cultures are often so different from the Anglo cultures of the lower 48 states as to make it unavoidably clear that changes in social organization or cultural patterns constitute changes in the human environment that are deserving of attention in their own right. Similarly, if an oil spill interferes with subsistence fishing, or if pipeline construction disrupts game migration during a key hunting season, these are physical environmental changes that have a human significance in their own right--and not merely as matters of taste, preference, or esthetics. Figure 3 provides further examples of the kinds of questions to be asked in each of the three categories of impacts and of attitudes.

	IMPACTS	ATTITUDES/ "ESTHETICS"
Demographic/ Economic	*How many new people will there be? *Do we need to expand services? *What will happen to unemployment rates?	*Do present citizens want/mind growth? *Will local government officials (and citizens) be willing to do more planning, zoning, etc.?
Social/ Cultural	*Will stress be placed on families? *Will traditional religious practices be disrupted or prevented? *Will there be increases in delinquency, alcoholism, suicide, etc.?	*Will young people want to stay in a larger community? *Will locals feel the character of the town has been lost? *Will newcomers like old-timers lifestyles?
Biophysical	*Will subsistence hunting be disrupted? *Will the projects' resource use or environmental impacts preclude other developments in the future? *Will opportunities for solitude decline?	*Will the esthetic qualities of the environment decline? *How much would people be bothered if air pollution lowers visibility? *Will people mind if opportunities for solitude decline?

Figure 3. Examples of questions to be asked about different categories of impacts and attitudes

Figures 2 and 3 suggest that, in thinking about the impacts of major developments in Alaska, it would be useful to think about all three categories of impacts--economic/demographic impacts, social/cultural impacts, and direct physical environmental impacts--and that it would also be useful to think about the implications these impacts would have for human beings, whether or not the impacts are politically important or esthetically pleasing. These figures do not suggest, however, how to decide whether or not those impacts are likely to be significant. Accordingly, it is to the question of significance that I would like to turn next. I will deal only with the significance of actual impacts, however, it may be that the significance of esthetic considerations can best be dealt with by persons other than social scientists.

The purpose of NEPA, as the act itself tells us, includes the protection of environmental quality, and the improvement of "the health and welfare of man." Similarly, to the extent to which social scientists have dealt with the question of the significance of impacts, trying to separate important social impacts from negligible ones, they have tended to employ the concept of well-being (Freudenburg, 1982; Finsterbusch, 1980; Branch, et al., 1982). Well-being can be thought of as an overall or global measure of human "health and welfare," and it is often referred to as quality of life. Thus, while the question of significance is a complicated one, it may still be possible to suggest a rule of thumb: Significant impacts, perhaps, are those that have measurable consequences for human or social well-being, or for people's ability to function.

That's easy enough to say, but it requires a few extra words to explain. First, there could be some question about limiting the suggestion to measurable consequences; some authors would argue (e.g. Gold, 1982) that some of the most important aspects of human life have never been intelligently counted or quantified. Some of those authors might also warn us against falling into the simple-minded trap of assuming that if it can't be counted, it doesn't count. While we do need to avoid such simplistic assumptions, we also need to recognize that a previous inability to quantify certain phenomena may sometimes indicate a need to try harder, rather than proving that the phenomena are not quantifiable.

In the case of overall well-being, moreover, a number of researchers have had reasonably good success at quantifying people's own perceptions of their life quality--and through the "subjective" approach (see e.g., Campbell, et al., 1976; Andrews and Withey, 1976) as well as through the so-called "objective indicators" approach. Impacts on well-being could also be measured through a number of more creative approaches (cf. Webb, et al., 1966).

Saying that the consequences of an impact or change should ultimately be measurable, however, does not necessarily mean than an engineer or water quality expert will know how to do the measuring. Nor does it mean that the impact can be measured with whatever data already happen to be available. The available data have usually been kept for purposes of social bookkeeping, not for the measurement of well-being, even if the data do all deal with people. Saying that the bookkeeping data somehow ought to measure well-being--simply because all the measures have something to do with people--is about like saying a gasoline gauge ought to tell a driver how much air is in the tires, simply because both of those measures have something to do with automobiles. The efforts to measure effects need to be made by persons who know what they are doing, who have the tools they need for the task, and who know enough about existing social science theories and findings to know where to look, and to be able to make creative adaptions in response to unusual situations. It's not enough to try to make a mechanical application of some formula in Alaska, for example, simply because it seemed to come up with some sort of useful findings down in Alabama.

Questions might also arise about the suggestion that the changes in overall well-being merely be measurable, and not large. The reason here is that--at least when we are dealing with statistically reliable cross-sections of the population, and using the measures that are currently available to us--it sometimes takes a very significant change in people's life situations before any change is visible in their assessments of their overall life quality. For example, one of the most comprehensive surveys of life quality ever done in the United States found that, on a seven-point scale, persons with incomes between $12,000-17,000 rated themselves as being only about a quarter of a point better off, on average, than persons with incomes between $7,000-10,000 (Campbell, et al., 1976:45-57). Roughly a doubling of income, in other words, was associated with a difference of less than one-twentieth of the overall range of the scale. Most people would probably classify an impact as being "significant" well before it had as much influence on well-being as having an income doubled or cut in half.

The NEPA regulations also suggest several other criteria for identifying significant consequences. An impact would be significant if its effects were measurable immediately, in the long term, and/or in some

mid-range time frame. Impacts which are significant for some identifiable segment of the population--be they poor, young, old, non-white, government officials, unemployed persons, women, or any other identifiable portion of the population--would also be worthy of SIA attention. And finally, since social impact assessments are by definition done before projects take place, rather than afterward, it would be important to allow a prospective component in measurability--the likelihood, in other words, that an impact could have measurable consequences for well-being or human functioning. Such consequences could have been documented for similar projects in the past, for example, or they could be predictable through explicit and systematic logic that a significant portion of experts in relevant field(s) would agree to be worthy of consideration.

In summary: the field of social impact assessment is so broad and varied that we are not likely to see the emergence of a grand theory of SIA at any point in the near future. It is simply not reasonable to expect that any single theory will soon be able to provide accurate and useful projections of the social impacts likely to be created by all conceivable projects. This paper has focused instead on a different kind of SIA theory--systematic thinking about the nature and purpose of SIA, or what would more formally be called a metatheory of SIA.

I have argued that SIA calls for modifications of traditional social science approaches, not for a totally new set of activities. Social science expertise is important not just for methodological reasons, but because it provides a familiarity with findings from a broad range of other situations, and a familiarity with the theories that have been put forward to make sense of those findings. The special nature of SIA work does require some adaptations in social-science-as-usual, however, as well as an ability to think and write clearly. The legal and situational requirements for SIA seem to call for attention to three interrelated sets of impacts on the human environment--economic/demographic impacts, social/cultural impacts, and biophysical environmental impacts. In each of these three areas, moreover, a project's impacts can have a human significance that is not simply a matter of opinion or of esthetics.

Concluding Remarks

As indicated at the outset, this paper cannot be claimed to provide the definitive word on theoretical development in social impact assessment. It is intended rather to be a fair representation of the current state of the field, and to provide a basis for some discussion.

One objection that might be raised to this paper is that I seem to be calling for a higher level of expertise in the social sciences than many of the relevant agency personnel currently possess. This criticism may be reasonably accurate--but even if it is, it misses an important point.

I'm always amazed by the fact that people who are rational in other respects can actually lose a larger kind of common sense when it comes to dealing with human behavior. They wouldn't hire a biologist to analyze geology, or a nuclear physicist to study oil spills--even though there is physical science involved in all of those fields. Yet the very same people will often turn around and hire a civil engineer to "study" social impacts.

Most of us would find it inconceivable for a group of sociologists and psychologists to get together and decide on the technical details of building complicated projects such as the Alaska gas pipeline. A project of that magnitude requires a particular set of professional skills, and special kinds of professional expertise. The greatest psychoanalysts in the world--unless they had the relevant kinds of engineers and physical scientists to help--couldn't get the pipeline designed and built. It has only been in recent years, however, that we have begun to realize that limitations on specialization operate in more than one direction--that civil engineers are not sociologists, for example, and that physicists are not necessarily knowledgeable about psychology.

When I discussed an earlier version of this paper with an administrator, he objected that I was being unrealistic, and that the agency people who were "going to do the assessments anyway" simply didn't have the level of social science expertise I was advocating. My response was that--by the letter of the law, by the spirit of the law, or by simple old-fashioned common sense--I was being as realistic as possible. If I had a broken arm, I continued, I would want to have it set by a doctor, not a carpenter, even if the only people standing around me at the time were carpenters, and even though the carpenters and I might be able to splint something together if no doctors were available. Social scientists are available, however, and given the current unemployment rate in the social sciences, it is often possible to find people who not only have the relevant expertise, but who are willing to work at bargain-basement rates.

The reasonableness of these two points of view--the administrator's and my own--is something that you will obviously need to decide for yourself. In all likelihood, you'll find that it's necessary to make your decisions on a case-by-case basis. But it is possible to suggest a criterion to use in making those case-by-case decisions, and that criterion brings us back to questions about the role of theory in social impact assessment.

There can be little doubt that there are certain kinds of SIA situations that require the expertise of a professional social scientist, while there are others where almost any intelligent person could be trained to come up with answers that were almost as good--although there is likely to be a bit of disagreement about some situations that are between the end points. One of the key features of this continuum, I think, has to do with what is known about the situation (where "known" refers to relevant information that has been made understandable through appropriate theories). As any number of writers have pointed out (see e.g., Kaplan, 1964; Stinchcombe, 1968), it is this combination of information and theory that makes it possible for the high school student of today to solve mathematical problems that would have baffled Sir Isaac Newton himself. Even highly complicated problems, in other words, can be dealt with in a relatively routine manner if we can come to understand them well enough.

Before that can happen, however, we need both information and intelligence--both a body of relevant evidence or data, in other words, and a way of making sense of those findings through appropriate theories.

Ironically, one of the reasons that present-day projects sometimes require such a high level of social science expertise for proper assessments is the fact that, although we have had over a decade's worth of expertise with environmental impact statements, we have done very little to accumulate the kinds of evidence that could allow project-by-project impact assessments to be done on a more routinized basis.

What is called for here is essentially the same kind of data accumulation that already takes place regularly in other fields. Most of us would find it inconceivable for an engineer to be asked to build a bridge without having some basic information--documentation on the tensile strength of a certain kind of steel, for example, or measurements of the load-bearing capacity of the soil where the bridge is to be located. It would also be inconceivable for us to ask engineers to design bridges without ever checking back to find out whether or not their bridges actually stood up.

Yet something very much like this has been happening with many of the project-specific social impact assessments that have been done to date. Impact researchers are essentially asked to go into a given situation and to come up with an educated best guess about the types of impacts that are likely to be created by a proposed development. They generally have little more to go on than the accumulated best guesses of those who have gone on before. If they ask to do studies to develop the kinds of information they need--or even so that the actual impacts can be documented for the benefit of future assessments--they are often told that such studies are "impractical," and that they need to do the best they can with available data.

Such constraints on research can often be rational in the case of any single project; the project manager, after all, has an interest in keeping overall project costs down. The net result in the long run, however, has been distinctly irrational for all parties involved. The available data often have as little relevance to the questions that need to be asked as the available information about the average price of a gallon of gasoline has to do with the number of barrels of oil likely to be found in a given off-shore oil lease. Both kinds of social data have something to do with people, just as both kinds of oil data have something to do with petroleum, but that's often just about as far as the similarity goes. Nor is an effort to build a grand theory of social impact assessment much good in a vacuum. A theory is a way of **making sense of data**--it is not a **substitute** for data that a researcher needs but does not have.

As an example of this problem, we need look no further than the Trans-Alaska Pipeline System. It was one of the largest construction projects in the history of humanity, as well as being a major component of our national energy picture. In addition, although it was not necessarily planned that way, it was one of the largest social experiments in history. But because so little of the relevant research was done, we have very little way of knowing whether or not the experiment succeeded, nor of learning lessons that could be useful in dealing with other major projects in the future.

Estimates vary, but it appears that the overall cost of that pipeline was about $10 billion. The total cost of all research done on the actual social impacts created by that pipeline would be even harder to estimate, but my own impression is that the total cost could not have been much over $200,000. Even if the actual research cost five times that much--a million dollars--it would have amounted to one-

hundredth of a single percent of the total cost of the pipeline. For an additional amount of money that would have been so small as to disappear as rounding error in estimating the overall pipeline cost--provided that the funding would have been made available when and where it was needed--we would have been able to develop a far more thorough documentation of the social impacts that actually did and did not result from the construction of that pipeline.

We have now lost that opportunity. The major developments that Alaska may face in the near future will offer others. It will be interesting to see whether the new opportunities are taken or missed.

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An International Perspective on Resource Development and Impact Mitigation

Geoffrey Larminie

I'm always very happy to come back to Alaska. And it's a sobering thought, which occurred to me yesterday and got me reminded about it again just now. It's been 20 years since I first came to Alaska, and about this time in 1962 I had just come back from the end of a field survey, after being out for four months. In those days nobody ever thought of offering anyone field break. We went out for four months and we stayed out for four months. None of this business of a week on and a week off or coming in after two weeks for three weeks of R and R; and one has to ask oneself whether this is better. I think a great deal of what I will be saying to you will be attempting to force people to ask questions as to the objectivity of the judgments that we make once we stray into the field of social impact.

In reading the symposium schedule, I noticed the objectives of the symposium and they included the presentation of conceptual frameworks, theoretical developments and things like analytical techniques and methodologies for conducting socio-economic impact assessments. Of course I'm not, as you might have gathered from my biography, a sociologist. As a neophyte observing this interesting phenomena, one thing that did strike me in my innocence was that so far I hadn't seen any reference to historical studies. I'll return to this point, but for now I'll leave it with you to fester in the back of your minds while I'm talking.

In this field it's not very difficult to point out problems, either real or imagined, but is much more difficult to find solutions and to be confident that they are solutions; because until you have sufficient time and a reasonable historical perspective, almost by definition you are not going to know whether you've got it right or not. I think this is a very sobering thought in any area involved with the social aspect of man's activities. All my formal experience has been with environmental impact analysis, and, as you might have gathered by now, I have to confess that I'm suspicious of social impact analysis. This perhaps, is a consequence of a traditional scientific education which has left me with a somewhat jaundiced view of sociologists, particularly since it is not uncommon for the discipline to attract a disproportionate number of trendy left wingers. Now having laid down my prejudices and biases you can at least identify my position in all this. My status here is, I believe, more of a catalyst; and like all good catalysts one should participate in the reaction without getting involved with the details.

Today I want to talk about the general structure first by looking at environmental impact analysis and then social impact analysis. When I'm talking about environmental impact analysis my focus will be the actual practices and principles we developed in various parts of the world. I look at social impact analysis as something new that appeared over the horizon and can be identified with an established system of procedures.

In discussing environmental impact, I'm going to take most of my examples from the North Sea by looking at both the offshore and onshore impact of off shore activities. Forty Field was discovered the year after Prudhoe, but had less problems with legislation, Native Claims and a variety of other things; it was actually on stream three years before Prudhoe. It was, in many respects, a completely new environment 100 miles off shore in 500 feet of water, at depths greater than any oil field had ever been developed. In addition, it was a large volume oil field which required very large amounts of pipeline to bring it on shore. I suppose, in a sense, we were fortunate; in fact, it is one of those curious accidents about North Sea development, with regard to my own company as well as others, in that really an astonishing stroke of luck no major oil field which has been discovered in the North Sea has happened

to coincide with a fishing ground. So, up to this point, there has never been a conflict of interest in deciding between oil and fisheries.

Having discovered the oil, decided on a mode of development, and designed the whole system one starts on the program of impact assessment. The critical thing here is a good design in that modifications that are introduced at the design stage cost less and are more effective than those introduced at advanced stages. Management of the construction program is more efficient and so one must determine what to do in order to minimize or mitigate any possible impact. This involves, in the case of an offshore operation, a great deal of baseline work because, in actuality, nobody knows a great deal about the sea bed a 100 miles offshore in 500 feet of water. It's not something you go around investigating, as a routine matter. You, therefore, have to carry out a number of studies and surveys and, in so doing, you also find you have very little data on the physical oceanography. For example, you're not clear about the heights or lengths of the waves or you don't know a great deal about storm conditions, wind driven wave conditions or the boundary layer. You also find that you're very short on paleontological and meterological information. All of these factors, of course, are extremely relevant because they determine the sort of stresses the structure will have to stand up to and the safety and integrity of the structure is essential if you're going to protect the environment. At a very early stage, then, you become highly conscious of the inadequacy of your data; even much of the wave data is highly subjective because, until you actually start drilling in those depths, you don't have a fixed station. It is impossible to actually make observations of the movements of water, or observations on wave lengths. Ships make them, but when you're going like that on the wave the result is obviously going to be somewhat subjective because you're not measuring the same way as you are on a precisely fixed structure. It follows then that once you have got a fixed structure you begin to build a data base. In terms of limitations, you also find you know very little about composition of the sea water, which is something you need to know quite a lot about particularly if you want to use the water to inject into the reservoir to maintain reservoir pressure. Otherwise it can bungle the whole thing up and everything will grind to a halt. And so on it goes--the litany of things one doesn't know and must find out. One certainly knows virtually nothing about benthic organisms; the benthic eco-systems are the animals that live on, in, under and about the sea bed--trundle across it, bore holes in it, jump up and down on it, swim around adjacent to it. You therefore begin on the data collection phase with a whole series of baseline studies. However you must understand that it's not whole eco-system studies carried out enthusiastically under, shall we say, prodding from interested parties who've always wanted to find out about eco-systems, but couldn't find the sucker to pay for it. The critical thing is to identify exactly what you are doing and what data you need to enable you to a) understand the performance of what you have set up and b) monitor it by telling you whether your design conditions were adequate, unduly erroneous, or insufficient.

The first thing you have to do after you have designed the system, carried out the baseline studies, acquired the data, and fed that back into the design is to find out about the physical oceanography. You must be confident that this 20,000 ton, 600 foot tall dahlia can stand up to the stresses being hammered by seas; because, in a sense, that is almost what you've got--a large flower with a very heavy object on top and a thin stalk. The platform, although you are not aware of it, has in fact a dynamic response to all the marine forces that impinge on it.

We then set up a monitoring program using biological techniques, and physical and analytical chemistry to monitor the environment during construction. And so you set up a whole series of stations on the seabed where you collect samples. We have mathematical programs for modeling the base Atlantic eco-system; we have geochemical studies on the water column; and we carry out geochemical studies on the ground sediments to determine the percentage of existing hydrocarbons. From this data, you establish base levels. We continue with the monitoring program during operation and with Forty, for example, we have some five or six years of monitoring data in operation. This allows us, then, to determine that there has been no change; in other words there are no cumulation of hydrocarbons. There is no evidence of increases of levels of hydrocarbons either in the water column or in the water sediments. Now the function of the monitoring program is to detect change and I would ask you to remember that. Frequently people talk about detecting damage--these are emotional words and they involve a value judgment. Change is something you can identify and, logically you must, whether you are engaged in strict physical environment impact analysis or social impact analysis. Having identified change you then have to determine direction; for by definition change is neither favorable nor

unfavorable--it is mutual and the direction in which it is going is what you then have to determine. If the change is unfavorable you then have to decide what actions you must take to change the direction and to improve the situation and what remedial measures you have to apply to the system in order to bring it back to normal. There is far too much loose talk about things like damage in systems. What people actually mean are the detection of change, the identification of its direction, the determination of remedial measures, and the implementation of these remedial measures. I think these are very simple concepts but they are absolutely fundamental to any consideration. This is why I am starting from, if you like, the physical and biological sciences and moving through to the other disciplines.

The next stage in this process is to do an audit. We've completed an audit of Forty but have just started auditing some of our North Sea operations. We've virtually completed an audit of the Shetland terminal operation because that is, in fact, designed rather like a financial audit. You've designed the program, predicted effects, constructed the installation, and operated the installation; you then have to close the loop and ask yourself "Is the system in operation performing as predicted?" "Did we in fact get the right environmental perimeters?" "Were they too strict?" "Were they insufficiently strict?" "Has the system, in fact, not performed as predicted?" "What requirements may be necessary to upgrade it to the level of performance that was predicted?" You'd be surprised but this actually is a surprisingly low cost activity, if it is designed logically and carried out methodically. It's far less costly than rushing around collecting vast quantities of data and failing to digest them, which I regret to say is the feature of this sort of program that some government departments (in some countries) lay on industry and everybody else. The sheer ecstasy of data acquisition appears to be the end objective. And analysis and utilization of data and integration of sets of data get lost because budgets don't allow for adequate processing of the data. I think this comes back to rather poor planning and inaccurate identification of what is required in the first place.

Now when you come to onshore there are all sorts of problems such as: identifying landfill for a pipeline; where to bring a subsea pipeline ashore; how to minimize the impact of the pipeline; what remedial measures to acquire; what restoration has to be undertaken once you've installed the line; and what sort of supervision is required during operation. This is basically the sort of thing that I assume you're all familiar with having lived alongside the Transalaska pipeline for a year or two. That pipeline is designed to monitor the operation; once reinstatement has taken place of the disturbed ground, it's really largely a matter of patrolling. Though certain things, as you know, can never be reinstated after a pipeline; for example, you can never reinstate the trees over a pipeline.

In considering on shore facility sizing, you then get into a rather interesting area and Shetland is a good example of a society or a community that took the law into its own hands and decided it was going to look after its own destiny. This is probably something that is easier to do on an island than anywhere else and remote isolated communities are in a sense strictly analogous with islands. The Shetlanders decided they needed some sort of legislative act in order to control their affairs--of course oil and gas have not been traditionally a part of local governments in the UK. So they managed to get an act through Parliament that gave them really unique powers for a local council. It's rather entertaining, you see, because when you look at the act, their advisors were well-versed in Louisiana and Texas gas law. And what the Shetlanders obtained essentially puts them in an analogous position in relation to central governments in England, and to States in relation to the Federal government. Having accomplished this, they had unique powers to control the development of oil in Shetland. The first thing they did was to bring in planning consultants and give them the mandate to identify a common user terminal site. The reason they did this was because they could already see there were at least 34 companies that either had oil or prospects of oil east of Shetland. They had horrible thoughts about the proliferation of installations, and everybody arriving on their doorstep looking for terminals. So, essentially they found the grassiest spot they could--it was of no aesthetic distinction--and said that's where we'll build a terminal. Next they identified an overland route from the shore and designated it a common pipeline route, with all pipelines coming into Shetland moving into the common user terminal, which gave them a common user export facility. Their only choice left was the way the pipeline should be built from the oil fields at sea. Now this was a very sensible arrangement: it stopped land speculation; it stopped the proliferation of installations; it set down industry codes including negotiating arrangements for common user facility; and it identified the company that was going to be the constructor and operator of the terminal. Overall, it has been a highly successful exercise.

In carrying through this process in Shetland, we set up an advisory group at the design and construc-

tion stages of the terminal. This group has been composed of the technical representatives of the companies involved, as well as representatives from local interest groups including: Natural Environment and Research Council, the Countryside Commission, the Native Conservation Council and representatives from other local interest groups in Shetland. Representatives from all of these groups got together and they were sort of 'watchdogs' on the design perimeters and construction of the Sollenberg terminal. Once the terminal was completed, these representatives evolved into an organization called "SOTEAG" (Sollenberg Oil Terminal Environmental Advisory Group), whose job was to police the performance of the terminal once in operation, producing once again, a whole string of monitoring programs. The monitoring program in Shetland is run by a committee, which is, in turn, a subcommittee of the Environmental Advisory Group. It might sound strange, here, but the Department of Agriculture and Fisheries of Scotland are running one program while the National Environmental Research Council and several universities and research institutes are running other programs. This is a completely combined operation making use of the best laboratories and the best available scientists. It's an interesting mixture of industry, government, and academia and something which I commend. I do not believe that we ever are going to get anywhere as long as we have these suspicions, confrontations and separations that result from refusing to involve government, industry and academia in common causes.

Now so much for the practical aspects of environmental impact analysis and oil and gas projects in the North Sea. I'd like to take a look at social impact analysis. For those of you I haven't told, I apologize for what's going to happen next. I promise I haven't told this story in Alaska for at least 10 years. But those of you who were juniors in a local high school when I made a graduation address some 13 years ago, I apologize if you heard it on that occasion. This chap was driving along a country road in Gloucester in England and we have these astonishing roads which are 1.2 cars wide with hedges that are about 10 feet high. And the roads are never straight for more than a 100 yards at a time and they normally have a right angle bend at the end of that section. Anyway, this chap was driving along on an appalling night; rain was coming down in buckets and he could hardly see in front of him. The windshield wipers could barely keep pace with the thing, and he faintly became conscious of a flickering coming the other way. And he thought through the driving rain and lightening that this was probably someone trying to attract his attention by flashing their lights and so he slowed down. Sure enough it was a car coming the other way, and he pulled right over and squeezed past. The other car was still flickering its lights, so he realized that he did want to speak to him. So he rolled down his window, got deluged with rain and as the other car passed an extremely pretty woman put her head out the window and yelled "PIG". He rolled up the window, drenched, and brooding on women's inhumanity to man and the deplorable spread of women's liberation, he drove around the corner straight into an enormous pig. Now when you begin to think about this, you'll realize that quite a lot depends on your point of view.

Turning to social impact analysis, which I do believe is something that we do have to think very carefully about, we have to ask ourselves: "What sort of baseline data do we have compared to a biological or physical survey?" "How good is our demographic data?" "What do we know about movements of population and population changes?" "What do we know about the actual activities of the community?" "How good is our data?" "What sort of land utilization service do we have?" "Can we identify changes in land use?" "What sort of data do we have on growths or declines of settlements?" In other words, "What are the magnitudes between the natural fluctuations in animal populations?" "Has there been an attraction to an urban center from a rural hinterland?" "Has there been an urban find?" "Has there been a change in activity that has resulted in an inland movement?" "Has fishing given way to agriculture or a combination of fisheries and agriculture?" "What do we know about the history of subsistence hunting?" "What do you know about communication?" "What sort of data do we have on communication?" And that's the best example I can give you. We all, in Alaska, know the importance of the aircraft. We've all heard the stories and probably read the yarns of the old bush pilots: the Sig Wiens, the Bob Reeves, and all these legendary characters. But, actually, who has written a serious economic historical study of the significance of the aircraft in the development and sustenance of remote communities in Alaska? Something that has facts and figures and that can tell you the number of flights, the number of flying days, the weights of freight carried, the number of people moved, or the number of mercy rescue missions flown to evacuate people to hospitals? This is the stuff of proper objective decision-making, not that we all know that the aircraft is important and you leave it to a commercial operator and he's not going to fly unless there is money in it. And, of course, we then get into

areas like what do we know about economic geography; of traditional activity; and a detailed and sympathetic understanding and knowledge of all cultures. And having the knowledge of them, how do we make value judgments? How do we monitor social impact and social change? I submit that it is an extremely difficult task to do on an objective basis.

I would point out, of course, that I am guilty, perhaps, of making an artificial distinction because any form of environmental impact analysis, such as I've been talking about must include the impact of man's activities because man is a part of an eco-system. It's a fallacy lots of people fall into: thinking of them and us when looking at an eco-system--it's out there and I'm not part of it. But it's impossible to find a pristine eco-system, which is untouched by the hand of man in some way. (I defy any one to do it.) It's also ridiculous to think of an eco-system only in terms of the geological and topographical framework with the chemical, physical and biological components of the system as though it was somehow apart from man. We are a part of it and, of course, it's ridiculous to also think that in biological terms, and I'm using anatomical in a physiological sense, that man is the most generalized mammal. It's a rather sobering thought and now that this most generalized mammal has turned his mind to social impact analysis, I confess I'm a little bit worried because of some of his less pleasant traits (e.g., arrogance, conceit and prejudice) which could be set loose to do untold damage. I think we have to consider very carefully our role in all of this because when you think about the concept of social impact analysis man may be well intentioned; I frankly consider that we are all pretty blundering in our efforts to do good. We do have a fairly dangerous potential to assume god-like powers in our efforts to determine, or even worse, to dictate the future of societies or communities. I find this capacity to interfere or dictate the future profoundly disturbing, and I feel that the whole exercise has a flavor of 19th century missionary fervor: "We know what's best for you chaps and now we are going to tell you; we are going to set you up in such a fashion that you do it and find out 10 years later that we were right." These are harsh words, perhaps, but my particular purpose is to jolt all of us, myself included, into thinking very carefully about what we are doing and why. And if, having decided there is a social impact, is it deemed beneficial to the recipients to introduce change? Who's qualified to make such judgment and carry out the remedial action? You get a whiff of 1984 with Big Brother watching? Perhaps it's extreme, I'm not sure. But one has to accept that with change, education is also required. Who's going to educate whom? And I believe that one of the things that's required is less, for want of a better word, I'll call it evangelism, for social impact analysis. I think there has to be very careful observation of the successes and failures, which may someday provide workable guidelines for a future generation. And this will evolve through knowledge, and that means a lot of historical and economic research is an urgent requirement; through a lot of understanding and debate and discussion the results will eventually be accomplished. But I submit that it will never do if the results come from confrontation or polarization, nor by superimposition of solutions by well intentioned legislators (and of course if the lawyers get loose we are all doomed). The final remark that I will leave for your consideration is that whether in a democracy, or wherever, once you've identified the social impact, you can never actually impose a solution. Thank you very much.

Section II: Demographic and Economic Modeling and Analysis

Introduction

Thomas C. Warren

This chapter contains a series of six papers describing formal economic modeling approaches to assessing economic change. These papers, and others of comparable topical interest, were presented at a symposium workshop of the same title.

The reader is encouraged to review the full chapter text. Not included in these proceedings and perhaps most important would have been a synopsis of the workshop discussions of the papers.

Two of the more important workshop themes were the need to both verify and use as an initial data base primary field data, and the need to better integrate data and analysis of the "bottom up" and "top down" approaches in assessing economic change.

Notably, Steve McNabb's presentation, "Primary Social Field Research in Socioeconomic Monitoring" (in Chapter III, *Cultural, Social, and Family Concerns*) pointed out the need to assess the quality of the data base through primary field research and use of these data in formal economic modeling. This frequently requires an interdisciplinary team approach via integrating appropriate components of the structure "top down" and insightful "bottom up" approaches to both data gathering and analysis.

The following papers should be read in light of these themes, paying particular attention to the East Texas adaption strategies described in Murdock, et al. of a North Dakota economic-demographic model assessing the socioeconomic impacts of energy development described by Hertsgaard and Leistritz.

Warren outlines the Alaska Outer Continental Shelf (OCS) Socioeconomic Studies Program (SESP) which predicts and evaluates OCS petroleum development upon the physical, social, and economic environments at local, regional, and state levels. Banks presents the economic and demographic models of the SESP; Gibson analyzes potential commercial fishing industry changes due to OCS oil and gas exploration and development. Huskey and Knapp discuss modeling problems in the OCS economic impact projections for small, remote, rural communities.

Economic-Demographic Assessment Models: Adaptation and Validation

Steve H. Murdock, F. Larry Leistritz, Banoo Parpia, Sean-Shong Hwang and Rita R. Hamm

Computerized economic-demographic impact projection models have become increasingly popular as a means for completing: (a) environmental impact assessments; (b) a public facility planning preceding; (c) during a major resource development, analyses of the implications of alternative administrative or legislative policies; (d) and for examining the alternative conceptual and empirical premises underlying theories of economic development (Ford, 1976; Cluett et al., 1977; Hertsgaard et al., 1978; Mountain West Research, 1978; Murdock et al., 1979; Stenehjem, 1978; Denver Research Institute, 1979). Given such widespread use, and the wide range of outputs, flexibility, quick response times and user accessibility of such models, it seems likely that their use will continue to increase rapidly (Murdock and Leistritz, 1979; Leistritz and Murdock, 1981).

At the same time, as the number of examinations of the uses, forms and impacts of such modeling systems increases (Murdock and Leistritz, 1980; Leistritz et al., 1979; Ascher, 1978; Hoos, 1972; Greenberger et al., 1976), it becomes increasingly evident that such systems can be extremely expensive, can fail to achieve their intended purposes and have, in most cases, received insufficient validation. It is also apparent that the adaptability of such models to settings other than the areas for which they were originally designed has received relatively little attention. The questions surrounding model adaptability and model validation, however, are particularly crucial ones for several reasons. Model developments have become increasingly expensive and increasingly difficult to justify to sponsoring agencies. As the number of models has increased and as familiarity with them has led to more realistic assessments of their weaknesses as well as their strengths, there is increasing administrative pressure for professionals to pursue less expensive model adaptation efforts and, in many cases, funding levels simply prevent anything but an adaptation effort. The number of model adaptations, then, seems likely to increase.

In addition, because the development of complex models requires efforts that often combine professionals from diverse disciplines and are often performed under severe time limitations and with limited resources, many conceptual and methodological compromises are required in initial development efforts. Adaptation efforts thus provide an opportunity to expand and refine a model's structure and capabilities that is seldom possible in an initial model development effort. In many regards, in fact, a model adaptation effort provides a means to pursue the crescive and replicative principles basic to science. Given the number of already existing models, such adaptations may be more important in determining what are the most and least effective modeling techniques, and hence in improving modeling methodologies, than additional new modeling efforts. Both pragmatically and analytically, then, model adaptation efforts may be informative and increasingly necessary.

Model validation is also extremely important in determining the utility and the relative strengths and weaknesses of such modeling efforts. Analyses of the validity of such models must be performed to evaluate their accuracy, relative to alternative methodological techniques, for various levels of analyses and forms of model use, and to determine those conditions under which models are likely to be most and least accurate. Until such validation analyses are completed, the pursuit of more complex (and expensive) modeling efforts will remain an activity rooted as much in faith in specific methodologies, academic aesthetics, and the desire for quantitative estimates for addressing administrative and technical

EIS (Environmental Impact Statement) and other requirements, as in scientific knowledge of the validity and reliability of such models. Analyses of the validity of such models is thus absolutely critical for techincal modelers and policy makers who desire to use such models.

The purpose of this paper is thus to address two critical issues related to economic-demographic models: that is, how readily adaptable are economic-demographic models and how accurately do they project changes in key socioeconomic factors. Specifically, we describe one model adaptation effort—the adaptation of the Texas Assessment Modeling System (TAMS) from the North Dakota Regional Environmental Assessment Program's (REAP) economic-demographic models (RED I and RED II) and examine the accuracy of the TAMS and RED II models for predicting 1970 to 1980 population changes for 106 counties and 553 places in two very economically, demographically and socioculturally different states (North Dakota and Texas).

Our intent in describing the adaptation effect is to identify those factors that should be evaluated before an attempt to adapt a complex computerized model is made and thus to provide a realistic appraisal of the advantages and disadvantages entailed in a model adaptation effort. Although our experiences are based on only one adaptation effort with one model and may thus be only partially applicable to other geographical areas or types of models, we believe, that, given the small number of adaptation efforts completed to date, an examination of even one case study is informative and beneficial. By examining the accuracy of these models in projecting population, we present the results of one of the first attempts to examine the validity of such models and to determine the conditions under which such models are most and least accurate. We also examine how accurate such models are relative to alternative project procedures. Although the validation analysis is, as with the adaptation discussion, limited to an examination of only two such models and to an assessment of the accuracy of only one of the parameters (population) of the many (e.g., income, employment, public service requirements, fiscal impacts, etc.) that should be examined and to that parameter for only one period of time (1980), we believe the analysis may provide valuable insights concerning such models for social scientists and policy makers involved in socioeconomic impact assessments.

This paper is organized into three sections. The first section describes the model adaptation effort and delineates factors that should be considered in an adaptation effort. The second section examines the accuracy of the TAMS and RED systems in projecting 1980 populations in North Dakota and Texas counties and cities given 1970 data inputs. The accuracy is assessed for areas of different sizes and for areas undergoing different rates of change. Finally, in the conclusion, some generalizations about the use of socioeconomic impact projection systems are presented.

The TAMS Adaptation Effort

The adaptation of the RED (or REAP) models to the Texas environment began in September of 1978. An operational form of the TAMS model was in place by September of 1979. The adaptation effort required an extensive time frame that was roughly 50 percent as long as that in the REAP model development efforts. The relatively long adaptation period resulted, in large part from the fact that the REAP effort was initiated with a fully operational input/output model already in place while, in the TAMS system, the development of the I/O component of the model required extensive development. Although it is difficult to fully account for all costs associated with the adaptation because many were absorbed as part of the operational costs of other ongoing projects, we estimate that the adaptation effort involved costs in the range of $80,000, roughly one-third the cost of the two REAP modeling efforts. Thus, the time and cost savings were extensive.

The actual adaptation effort, however, involved a number of crucial considerations at each step in the adaptation process. These considerations are described below in terms of the dimensions of:

1) Computer System Compatibility
2) Model Structure
3) Date Acquisition
4) Model Implementation
5) Model Validation

Computer System Compatibility

The computerization of assessment models is, of course, the key to their attractiveness and their utility. The specifics of such computerization, however, may be problematic in an adaptation effort and should be carefully considered prior to the initiation of an adaptation effort. They should, in fact, be as carefully considered in the choice of a model for adaptation as its conceptual or computational bases.

In the TAMS adaptation effort the major evaluations made prior to the selection of the model for adaptation were done in terms of the economic and demographic structures of the model and its range of outputs. We assessed the availability of the model's computer code language, APL, at our computer facility but because no computer analysts with expertise in APL were initially included in the model adaptation team, we failed to consider this factor in sufficient detail. As a result, we encountered difficulties and extensive time delays due to computer language and work space difficulties.

APL, the initials serving as an abbreviation for **A** Programming **L**anguage, was developed by IBM and is a very efficient language for completing iterative calculations (such as those in the TAMS model). However, as a result of numerous syntax revisions and attempts to adapt APL for use with widely different hardware and operating systems, several versions of APL (APL+, VSAPL, APLSV, and others) have been developed that are largely incompatible. After an initial copy of the language code was provided by the North Dakota REAP program, we learned that the version of APL at their facility was VSAPL, and was not compatible with our APLSV. In addition, when we obtained yet a second version from the REAP program's time-sharing group, we found that the APL+ language used in this version of the model was also incompatible with our version of APL. Because of both the languages and operating systems differences we were forced to manually input the model code into our system and convert incompatible symbols between our version of APL and the REAP version. These processes caused roughly a two month delay in the project.

Other difficulties were encountered because of the limitations of our own computer facility and the differences in the development environment in North Dakota and that at the Texas A&M computer facility. Because of the availability of large computer storage capacity in the North Dakota development effort, many model functions in the REAP model were allowed to consume as much as 500K. Our data processing center limited us to a workspace of 64K. Nearly three months of negotiation and restructuring of the model were required to allow the model to run at a new core limit of 96K.

In adapting a complex computerized model, then, careful consideration must be given to computer compatibility in specific and detailed terms. Although we eventually obtained personnel with excellent expertise in APL, we would have avoided several time delays had we obtained such expertise during the evaluation phase of the project.

Model Structure

In the adaptation of the model's structure, the most important consideration should be the extent of congruence between the structure of the model and the local environment to which the model is to be adapted. The evaluation of such congruence was central in the consideration of each major model component.

In the economic module, for example, it was clear that the 13-sector input/output model used in North Dakota was not sufficiently detailed for the Texas environment and required expansion. An evaluation of the level of detail necessary to properly characterize the East Texas economy was thus necessary. This resulted in the regionalization of a 27-sector model. This evaluation also suggested the desirability of creating two new sectors, a lignite-fired electric generating sector and an imported coal-fired electric generating sector. This latter alteration was deemed necessary to more effectively capture subsequent rounds of expenditures and to reduce the burden of obtaining information on the location of expenditures for each project added to the model.

The adaptation of the demographic module provided relatively few difficulties because the model had been structured for detailed inputs and outputs for use in North Dakota. Only one limitation was encountered. The Texas environment made the use of "special population" procedures much more desirable than in North Dakota because of the number of ethnically diverse, retirement and recreational areas in Texas. An evaluation of the ramifications of such a change indicated that the additional computer core requirements necessary to store the data required to implement such procedures (such as age-sex data for 75 single year age groups for a 25 year period for each sex for each area for each special population) could not be accommodated at our computer center. We were forced to compromise our

desires to the limitations of the available computer system.

The interface module has received relatively little alteration in its adaptation to Texas, but its congruence to the Texas environment remains an area of some concern. We had originally intended to replace the data on worker characteristics that are used to estimate population from data on number of in-migrating or out-migrating workers in the model with data collected from the Texas environment. Although the data we have collected on the Texas environment to date indicates that the use of the North Dakota data has resulted in few errors, the lack of Texas data to more fully validate the congruence of worker characteristics in the two settings remains problematic.

The allocation module involves concerns similar to those for the interface procedure. That is, no extensive changes have been made in the computational procedures, although we deem it essential that data on worker commuting patterns in Texas be obtained to evaluate the assumptions underlying this module. One structural change that was required, however, serves to demonstrate how subtly differences in the development and adaptation contexts may affect model results and how carefully such potential differences must be examined.

The allocation of baseline employment in the REAP model employs a function that provides employment to communities on the basis of each community's projected share of regional employment. These shares, in turn, were derived by using population as a proxy for employment because no data on employment at the community level were available. This procedure allocates two types of employment, agricultural and nonagricultural. Because North Dakota is very rural, the agricultural emphasis was desirable, and it was possible simply to sum populations for all cities in a region and obtain shares to be used in allocating regional nonagricultural employment. We could then determine the sum of the residuals derived by taking the difference between a county's population and the sum of city populations for the county to approximate the shares to be used in estimating agricultural employment in each county.

In Texas, however, there is a very significant proportion of employed persons in many counties that are not agricultural employees and are not located in existing incorporated communities. In addition, total agricultural employment is relatively small in any given region. These differences between the Texas and North Dakota environments led to an important computational error. An example will demonstrate the problem.

Given a county of 15,000 people with one community of 1,000 people and a regional population of 100,000, regional agricultural employment of 3,000 and nonagricultural employment of 30,000, the RED procedure first determines the county's share of regional nonagricultural employment. This would be 1 percent (1,000 of 100,000). It then computes the county's share of agricultural employment (14 percent or 14,000 of 100,000). The result is an estimate of total county employment of 300 nonagricultural workers (1 percent of 30,000) and 420 agricultural workers (14 percent of 3,000), a total of 720 employees for a county of 15,000 people. This procedure led to computational difficulties for East Texas where commuting to large urban centers is prevalent and the proportion of workers living in rural areas that are employed in nonagricultural jobs is large. The necessity of changing this procedure in the model was not obvious until our first data on total employment by county were produced. We subsequently developed a county residual share function to better account for rural nonagricultural employment.

In the service module we have made no basic changes, although this is largely due to the fact that national estimators are used in this module. The module is likely to be altered with further development of the model.

The fiscal module received the most extensive alterations primarily because tax structures are quite different in the two areas. For example, Texas has no severance tax or state income tax while North Dakota has both. Although the basic structure of the North Dakota version of this module was useful, the reprogramming involved in the adaptation was extensive. In general, the adaptation of fiscal components of such models is likely to be much less beneficial than that of other model components.

In general, then, numerous alterations in several model components were required due to differences in the Texas and North Dakota environments and several others are likely to be required as our data bases accumulate. There is little doubt, however, that the REAP model structure expedited the TAMS adaptation effort. The REAP computer code saved hours of original programming, and its conceptual approach gave us a base to work from and a base for comparing possible alternative approaches. Although the time involved in our adaptation effort was extensive, the development period for our

effort was markedly decreased because of the availability of the REAP code. Furthermore, our effort was able to build several linkages and refinements because we had the REAP structure as a comparative base.

Data Acquisition

The difficulty of obtaining the necessary data to adapt a model, such as the REAP model, to a different environment varies greatly depending on the type of data item required. Acquisition of demographic data provides few difficulties because of its centralized source (the U.S. Census), and much of the fiscal data is also available from secondary sources, though local level data may be less accessible but desirable. Economic data are more difficult to obtain, especially for a relatively complex economy. If a state I/O model had not been available for aggregation and regionalization, we would have been forced to make major alterations in the economic model and to have more carefully evaluated the feasibility of the adaptation effort. The major area of difficulty, however, was in terms of the data on Texas workers and power plant expenditures. We have simply been unable to obtain much of the necessary information. Those of us who had been involved in the North Dakota effort where this information was available have come to appreciate the very special relationship that exists between universities, private enterprise and state agencies in North Dakota.

In evaluating the feasibility of an adaptation effort, careful consideration should be given to the question of data availability and the implication of failing to obtain specific data items. If the model is data intensive, and one is quite sure that data values in the initial model will not accurately reflect conditions in the area to which the data is to be adapted, and such data is unlikely to be available, then a less intensive modeling scheme should be examined. On the other hand, if data are unavailable for adapting the model but values in the base model appear applicable to the adaptation area, then an adaptation effort may, in fact, allow you to obtain an applicable model that you would not otherwise have been able to develop from your own data sources. Before an adaptation effort is initiated, then, it is essential to evaluate the importance and potential availability of all data items and the model's capability to overcome such limitations.

Model Implementation

By model implementation, we refer to those activities involved in the computerization of the conceptual structure of a model. Although such considerations are clearly dependent on system compatibility, the factors referred to under model implementation relate to the processes rather than to the structural characteristics of establishing a computerized modeling system.

In implementing an adapted version of a model, several considerations must be taken into account. Foremost among these is simple the necessity to become fully acquainted with model computational procedures and the exact interactions between model components. The level of familiarity referred to is not just an overall familiarity with what the model is doing conceptually but exactly how it computes each model step and how each step relates to every other. This, in other words, is the same level of familiarity that would have been obtained in programming the original model. Although this may seem obvious, it is quite tempting, given the existing computer code, to avoid learning the specific computational procedures used in the model assuming that the model must certainly take "that" into account. Whether the model code for an item aggregates subunit totals to get larger area totals or allocates from a larger area to subunits, or whether units are in hundreds, thousands, and so on may seem like burdensome "details" to know, but they are vitally important details, particularly when necessary alterations in the model code must be made.

In many cases, in fact, the highly interactive nature of such models may place extensive demands on the computer analyst. The ramifications of each change in model code must be traced throughout the model. If a concise and powerful computer language, such as APL, is used this tracing is especially important. If this is not done, it will inevitably result in difficulties at some other phase of the modeling project.

The major point is that computer expertise is as essential in an adaptation effort as it is in the initial development of a model. Illusions, whether self-imposed or structurally imposed, that less sophisticated computer expertise will be necessary because it is an adaptation rather than an initial development effort, are just that, illusions.

Having been involved in both a development and an adaptation effort, we would assert that the type of expertise necessary to alter an existing model code and to trace the ramifications of such alterations throughout the model may be at least as extensive as that necessary to write the original code.

Model Validation

Efforts to validate a complex economic-demographic model are difficult under any circumstances. With an adapted model the process is, in some ways, actually made more difficult. The difficulties arise because of the need to take differences in the development and the adaptation contexts into account. Again, an example may demonstrate the type of difficulties that may be encountered.

In the adaptation of the fiscal model, we were extremely careful to insure that the changes implemented were carefully traced to all other parts of the model, but several initial results showed patterns of fiscal surpluses unlike any that had been found in model results for the Northern Plains. Although these results were subsequently found to result from a very subtle error in a report printing routine, there were also several factors that argued for the possible accuracy of the results. Although fiscal balances were more likely to be positive than we had anticipated, they showed the differences between jurisdictions that we had anticipated. They were most positive for the jurisdictions with direct taxation authority over the facility and very marginal for other areas. In addition, because of the large number of communities in East Texas, project-related workers tend to be distributed to a large number of communities such that individual communities seldom receive the type of "boomtown" growth often experienced in the Northern Plains. Finally, the Texas taxation system is such that the plant facility is taxable in Texas while it is not in North Dakota, and local city sales taxes and other similar taxes that exist in Texas, but not in North Dakota, seemed likely to be offsetting many negative fiscal impacts. After our experience with the allocation problem, noted above, we were quite aware of the potential effects of differences in contexts, and perhaps too ready to attribute differences in results that were actually due to model code errors to differences in contexts. The presence of an alternative to admitting one's own errors becomes tempting when errors are difficult to locate.

On the other hand, the fact that the results of an existing model are available for comparison may lead to the discovery of errors that might not otherwise have been detected. It was the fact that our fiscal results differed from those from the REAP model that, in fact, kept us searching for the errors in our model's structure. In validating an adapted model, we would maintain that the results from the original model should thus be taken as the guiding force in evaluating an adapted model's results unless deviations from the original model have been validated computationally as well as conceptually.

General Considerations in Model Adaptations

Although it is unwise to generalize from a sample size of one, in this section, we wish simply to point out some retrospective general considerations that we believe should be included in the design of a model adaptation effort. In so doing, we have tried to separate our unique experiences from what we believe are general considerations and discuss only those likely to be applicable to other settings. It is perhaps necessary to point out, however, that such a process is likely to be only partially successful because of the difficulty encountered in separating the general and the specific and because model developers tend to find it difficult to develop objectivity concerning their own products.

One essential consideration is that entailed in the preliminary process of evaluating a model for possible adaptation. Although all of the difficulties that will be encountered in an adaptation effort can never be fully anticipated, in many cases preliminary evaluations are completed too hurriedly and less systematically than desirable. The desire to "get started" may prevent the careful assessment that is necessary. It is particularly important in this initial evaluation not only to evaluate the probability that a given parameter can be estimated or a given data item obtained, but as noted above, the implications of failing to obtain such items or being unable to estimate a given parameter must be considered as well. One significant missing data item or inappropriate procedure may be sufficient cause for reappraising the use of a given model. In nearly all cases the time spent in evaluating a model will not be wasted. If the model is chosen for adaptation, the effort expended in evaluating data sources and alternative estimation techniques is likely to expedite the adaptation effort once it is initiated.

Central to the evaluation effort and to the adaptation effort itself is the use of a truly interdisciplinary team representing all of the skills necessary for completion of the project. In the case of a model with the capabilities of the REAP or TAMS models this entails a computer systems analyst (not just a programmer), an economist, a demographer, a public service analyst, and a fiscal impact analyst. Although more than one of these areas of expertise may be represented by a single team member, it is unlikely that all of such a model's components can be adequately evaluated and adapted by persons from a single discipline. Although an economist or a demographer may be capable of doing many different types of analysis, it is a mistake to think that either can do the tasks of the other or that either can substitute his skills for those of the systems analyst. Finally, it is important from the standpoint of social dynamics that these persons interact as openly and as equitably as possible. Each discipline's point of view must be forcefully presented and integrated with the perspectives of other disciplines. This is best expedited by open discussion.

Model adaptations, however, also require a more structured organization than many standard academic efforts. In fact, the standard principles and procedures of good administration are especially important in such an effort. Although the open discussion referred to above is essential, there must be a management structure such that final decisions are made and acted upon. In a modeling effort, compromises between the ideal conceptual design, the most efficient computer system's design or the most desirable economic, demographic or other estimation procedure must be made, and in some cases these compromises cannot be made on a consensual basis. In addition, general administrative procedures such as establishing fixed schedules for the completion of certain tasks and procedures for coordinating diverse modeling tasks are essential.

It is also essential not to oversell an adaptation effort to sponsoring agencies. In most cases, the cost differential between an adapted and an initial model development will be a strong point but the time frame differences between an adaptation and a development effort may not be substantial and this should be made apparent to potential sponsoring agencies. Unfulfilled expectations inevitably lead to sponsor dissatisfaction.

It is also important that the administrative structure supporting an effort include those from whom data are required and who shall likely use the modeling product. Whereas the REAP development effort included an advisory group from state agencies and industry, in Texas simply the large number of similar efforts in the state and the size of the state prohibited such an arrangement and the model adaptation effort was largely an academicians effort. Although the North Dakota advisory group system placed a greater communication burden on the development team, it also provided essential guidance and access to needed data items. Such advisory groups thus seem desirable whenever a policy-oriented modeling development or adaptation is to be undertaken.

We would also suggest that an adaptation effort involve, whenever possible, someone from the initial development team or that access to the initial developers be achieved in some manner. Even the most thoroughly documented models will contain procedures for which available descriptions are ambiguous. The time savings involved by having access to the person who originally designed the conceptual and systems structure of such a model are extensive, and the number of errors avoided is likely to be substantial.

Finally, we suggest that an adaptation effort is unlikely to succeed if the level of enthusiasm in an adaptation effort is less than that in an initial development effort. Such efforts do require a different type of creativity than that required in an initial development effort, but not less dedication. More persistence and less innovation are demanded of the modelers in adapting a model. It is unlikely, then, that an adaptation effort can be completed by a staff that simply adds the adaptation effort to its existing duties. In sum, such an effort must be seen as a major one, be managed as such and involve persons with a major commitment to the effort.

In looking back at our adaptation effort, we can enumerate a large number of factors both positive and negative that expedited and impeded the adaptation process. Perhaps the most important to note however, is that the effort has been successful. The TAMS system is functional and being used by local agencies for impact planning purposes. It is unlikely that the financial resources necessary for the initial development of such an elaborate and complex model could have been obtained from a Texas model, and we believe that the State of Texas has a more complete planning model than it would have obtained by other means, because we were able to adapt the REAP model.

An Assessment of Model Validity

In this section, we examine the accuracy of the RED and TAMS models for projecting 1980 populations in North Dakota and Texas counties and cities. Before examining these projections and their accuracy, however, it is essential to understand the general state of knowledge related to small area estimates and projections. This knowledge is essential because any assessment of the validity of a methodological technique requires a relative as well as an absolute evaluation of accuracy. It is important to know not only how accurately a small area projection technique projects variables of interest, but also how accurate one might expect it to be given the state of the art in small area projections and how it compares to other available methodologies commonly used for small-area projections.

The completion of population estimates and projections and the evaluation of the accuracy of estimates and particularly population projections represent extremely difficult tasks. Although an ever-increasing body of literature describes alternative methodological approaches to population projection (Morrison, 1971; Pittenger, 1976; Irwin, 1977; Greenburg, 1978; Pittenger, 1980) and estimation (National Center for Health Statistics, 1968; 1977; Erickson, 1974; 1975; Fay and Herriot, 1979; Gonzalez and Hoza, 1978; National Institute of Drug Abuse, 1979; Lee and Goldsmith, 1982), the accuracy of even short-term estimates remains such that many demographic scholars recommend that estimates for small areas (with populations of less than 5,000 to 10,000) should not be made (National Academy of Sciences, 1980). The history of population projections is even less encouraging and clearly suggests that population projections for small areas are particularly subject to large errors (Ascher, 1978) and should thus be avoided.

In addition, as the recent National Academy of Science Committee on Small Area Estimates has noted (National Academy of Sciences, 1980) such estimates can be evaluated on a variety of criteria (low average error, low average relative error, few extreme relative errors, absence of bias for subgroups, etc.), but accuracy in terms of one criteria will not insure accuracy in terms of other criteria (i.e., a set of estimates with a low mean absolute percentage error may be unacceptable from the standpoint of the number of areas with exceptionally high estimation errors). Even when a set of criteria for the evaluation of such estimates or projections has been agreed upon, difficulty may be encountered in determining a basis for the evaluation. Most estimates have been evaluated, either against infrequently occurring special censuses (Zitter and Cavanaugh, 1980; National Academy of Sciences, 1980) or against the most recently available census (Zitter et al., 1968; U.S. Bureau of the Census, 1973). As a result, systematic comparisons of estimates can only be made on an infrequent basis.

Evaluations of population projections are even more difficult to complete because of their future emphases. Evaluations of projections thus occur infrequently and are usually limited to either an evaluation of several projections relative to one another (Bjornstad et al., 1975) or of evaluations for ten-year periods between the two most recent decennial census (Isserman, 1977).

The results of evaluations of estimates and projections are seldom encouraging for the user of small area data. Thus, although Zitter and Cavanaugh (1980) note errors for state estimates of less than 2 percent and average absolute errors for counties of 5 percent or less, they also note mean absolute percentage errors of over 23 percent for places under 500 population and errors of over 26 percent for places that had grown or declined by more than ten percent in the past 4 to 6 years. Isserman (1977) in an evaluation of 8 small area projection techniques found mean percentage errors of over 10 percent for all methods and errors of over 25 percent for even the most accurate methods for the most rapidly growing and smallest townships. In addition, an evaluation of the most recent U.S. Census Bureau projections in comparison to 1980 census counts indicates errors of over 5 percent for at least 8 states.*

In light of these factors, a number of recent discussions of projection modeling and simulation techniques (Ascher, 1978; Alonso, 1968; Boster and Martin, 1972; Fromm et al., 1975; House and McLeod, 1977; Murdock and Leistritz, 1980; Pindyck and Rubinfeld, 1976; Sanderson, 1978) suggest that projection methodologies should be viewed as having multiple objectives. Given the constraints on their accuracy (as noted above) these authors suggest that projections should be used to sensitize data users to the implications of alternative policy decisions and that projections should be evaluated on the range of factors for which projections are provided (i.e., their overall utility to the user) as well as on their accuracy. New population projection techniques that are as accurate as prevailing techniques and provide additional advantages should thus be further evaluated to assess their relative degree of integration with other informational components (i.e., economic, social and other dimensions) and in terms of their information utility). New projection methods that are as accurate as present procedures and, in

**John Long and Signe Wetrogan. 1981, personal communication.*

addition, integrate demographic with other dimensions should thus be carefully considered for potential use.

In sum it is essential in examining the validation analyses presented below to realize that the project of small area populations is an area fraught with difficulties and one in which extensive methodological refinement is critical. Impact projections which involve the completion of projections under conditions (e.g., in small and rapidly growing areas) that are even more difficult than those that prevail in the completion of standard projections may thus be expected to reflect, and must be evaluated in terms of, the overall state of the art of small area projections.

Evaluation Procedures

In order to assess the relative accuracy of the models' projections, 1970 economic and demographic inputs were used to project 1980 populations for counties and cities included in the TAMS and RED models for Texas and North Dakota. These models were run in a baseline mode using total fertility rates of 2.1 births per female to be comparable with the rates underlying alternative projections. The accuracy of these projections was then evaluated on the basis of measures of error commonly used in evaluating estimates and projections (Zitter and Cavanaugh, 1980; National Academy of Science, 1980; Isserman, 1977) and in comparison to the most widely used alternative projections for North Dakota (Murdock and Ostenson, 1976) and Texas (Texas Water Development Board, 1976). The criteria used in these evaluations include low average error (mean percent error or MPE), low relative error (mean absolute percentage error or MAPE), the number of extreme errors, as well as variations in errors by size of place and rate of population growth. Finally, because the most widely used error measure (MAPE) does not adequately weight percentage error differences by size of place but rather computationally gives equal weight to all places regardless of size, the mean percent absolute difference (MPAD) measure, which corrects for this problem, is also reported (Cavanaugh, 1980).

The 106 counties and 553 cities to which the RED and TAMS models have been adapted and for which results are evaluated represent widely different contexts that promise to provide an excellent evaluation of the models' accuracy under widely varying conditions. The 53 counties in North Dakota represent some of the most sparsely settled areas in the nation. The 318 incorporated places in North Dakota are generally small (256 had less than 1,000 population in 1970) with only 3 places—Bismarck/Mandan, Fargo and Grand Forks—with populations over 50,000. Although North Dakota grew by 5.6 percent from 1970-1980, this was largely due to growth in only a small number of counties. In fact, of the state's 53 counties, 36 experienced population declines from 1970 to 1980. North Dakota is thus a state with a relatively small population, declining populations in many counties and a large number of small incorporated places. On the other hand, the 53 county area in East Texas covered by the TAMS model (Murdock, et al., 1979) is the most rapidly growing region in one of the most rapidly growing states in the nation. All 53 counties included in the TAMS model experienced growth from 1970 to 1980. The median rate of growth from 1970 to 1980 for places in the area was over 17 percent, the mean rate of growth was over 48 percent (Murdock et al., 1981), and the area's 235 places include numerous relatively large places, including one place (San Antonio) with a population of nearly one million. In contrast to North Dakota, then, the Texas area is a rapidly growing area with numerous relatively large places. The contrast and variation in these areas thus reflect the key factors (size and growth rate) likely to affect the accuracy of projections, and the examination of the models' results for these areas should provide a good evaluation of the models' accuracy.

Tables 1 through 5 provide comparisons of 1980 TAMS and RED population projections to 1980 census counts for counties and cities. Overall differences between TAMS, RED and census values are shown in Table 1. The range of errors for counties and cities are shown in Table 2, and the mean percent error (MPE), mean absolute percent error (MAPE) and mean percentage absolute difference (MPAD) for county and city projections are shown by the size of the county's or city's population in 1970 in Table 3, and by percent population change 1970 to 1980 in Table 4. Table 5 provides mean percent error and mean percent absolute difference measures for places that were overestimated and underestimated by the TAMS and RED models. Tables 6 through 10 present comparisons of the accuracy of the TAMS and RED projections for counties to those for the most widely used alternative projection systems (alternative projections for places were not available). In addition, comparisons of projections for TAMS, RED and alternative projection systems for counties grouped by the same

qualifiers as those used in Tables 1 through 5 (population size in 1970, percent 1970 to 1980 population change) are presented.

The data in Table 1 and 2 suggest that the TAMS and RED models performed moderately well in projection 1980 population, particularly for North Dakota counties where the mean percent absolute difference was only 6 percent. The data in these tables also point out the importance of using multiple measures of accuracy. Thus, in Table 1 for North Dakota counties, the mean percentage error was -21.4 percent, the mean absolute percentage error was over 33 percent, while the mean percent absolute difference was 13.3 percent. Multiple measures should clearly be used in assessing the accuracy of model projections.

The data in Table 2 provide an indication of the distribution of errors in TAMS and RED projections. The data in this table indicate that over 65 percent of the projections for counties were within 10 percent of the actual 1980 census counts, but only 28 percent of the projections for places were within 10 percent. For both Texas and North Dakota, county projections were generally more accurate than those for places. The projections for counties and places in both states, however, showed a bipolar distribution with the populations for a relatively large number of counties and cities being projected very accurately (within 10 percent), but with a nearly equally large percentage being projected quite inaccurately (over 25 percent error). The results are particularly disappointing for North Dakota places, where projections for nearly 50 percent of the counties differed from 1980 census values by over 30 percent. However, this result is largely due to the acknowledged difficulty entailed in projecting populations in very small places and the preponderance of such places in North Dakota.

Tables 3, 4 and 5 examine the accuracy of TAMS and RED model projections in terms of the variability of the accuracy of such projections for units of various geographical sizes (Table 3), rates of population growth (Table 4), and in terms of the models' tendencies to underestimate or overestimate the 1980 populations of counties and places (Table 5). In general, the data in Tables 3 and 4 suggest that the accuracy of the models' projections follow the expected pattern (National Academy of Science, 1980) in that projections for larger areas and more stable areas tend to be more accurate than those for smaller and rapidly growing or declining areas. An examination of the data in Table 5 indicates that although the models tend to overestimate county populations, they tend to underestimate the populations of places. This is the result of quite different patterns in the two states. Thus, although the model was nearly equally likely to overestimate or underestimate county and place populations in Texas, it showed a marked tendency to overestimte county populations and underestimate place populations in North Dakota. The tendency for bias was more evident in North Dakota because of the underestimation of populations for very small counties and places and the preponderance of such places in North Dakota.

Overall the data in Tables 1 through 5 suggest that the TAMS and RED models provided moderately accurate projections of 1980 populations in North Dakota and Texas counties and cities. It is evident, however, that their accuracy was substantially less for places than for counties, particularly for the smallest size places. In general, the data in these tables suggest that such models may be generally useful, if cautiously applied, but their use for projecting the populations of the very smallest areas may be questionable.

An equally important factor in evaluating models' accuracy, of course, is how accurate their projections are relative to those for alternative projection systems. Tables 6 through 10 examine this dimension by comparing the accuracy of the TAMS and RED county population projections to those for the alternative projection system in each state that received the most extensive use by state and local entities during the 1970s.

An examination of the data in Table 6 suggests that the TAMS and RED projections are neither substantially less nor more accurate than the alternative projections. In fact, the level of accuracy of the TAMS and RED and alternative models are nearly identical. The data in Table 7, however, suggest that the TAMS and RED model's projections are more accurate than the alternative projection models in that the number of counties and places projected within 10 percent of the 1980 census values is larger for the models than for the alternative projection systems. In addition, the data in Tables 8 and 9 suggest that the TAMS and RED models are less affected (i.e., less biased) by population size (Table 8) and no more affected by varying levels of population growth (Table 9) than the alternative models. Finally, the data in Table 10 suggest that the TAMS and RED models were nearly equally likely to underestimate and overestimate 1981 populations as the alternative models (though in the opposite directions). The

data in Tables 6 through 10 thus suggest that the RED and TAMS models are generally as accurate as alternative population projection models and perhaps somewhat less affected (biased) by population size.

In sum the validation analyses presented here suggests that, at least for population projections, computerized economic-demographic assessment models appear to provide projections that are moderately accurate and stable. They display similar limitations to other systems in projecting population changes for small and rapidly changing areas but they are at least as accurate and perhaps less biased than alternative systems. These results thus suggest general utility and validity for these economic-demographic projection systems.

Conclusions

The determination of the need for, the development of, and the initial use and validation of computerized economic-demographic assessment models is clearly a formidable undertaking and the work performed by Hertsgaard et al. (1978) and others clearly suggests the likely magnitude and complexity of such efforts. The value of such modeling efforts is increased to the extent that they are applicable to other settings and to the extent that they provide, through the provision of timely and accurate information, useful inputs to the decision making process. This paper has attempted to address such issues by examining the adaptability and validity of one such modeling system.

In general, the results in this paper suggest that such modeling systems are adaptable and produce moderately accurate projections. Any adaptation effort will require a substantial commitment of resources and the validity of the model developed may be expected to be comparable, but limited in similar ways to, other projection systems. These conditions and limitations thus suggest that the key to the feasibility and desirability of developing or adapting such models should continue to be the needs of the user. If timeliness, flexibility, and ease of use in evaluating alternative development scenarios are desired, then the results of the efforts reported here suggest that an economic-demographic modeling development or adaptation effort may be justified. If on the other hand, a single assessment is to be completed for a single project, then, such systems do not appear to be sufficiently superior in technical accuracy to alternative, less complex, projection systems, to merit the effort necessary to develop or adapt them.

The development, adaptation, and validation of economic-demographic assessment models is a developing, but yet severely limited, art. Additional adaptation experience and substantially more complex validation efforts than presented here must be completed before the potential and limitations of such models can be adequately assessed. The experience to date, however, suggests that the development and refinement of such models should be pursued, but only with full knowledge of the limitations of such models, adequate awareness of the level of effort and factors essential to the successful completion of a modeling effort, and with realistic expectations about the likely utility and validity of such models' projections.

Table 1. TAMS and RED 1980 Population Projections and 1980 Census Counts for North Dakota and Texas Counties and Places

Area	N	1980 Census Population	1980 TAMS and RED Projections	Mean % Error	Mean Absolute % Error	Mean Percent Absolute Difference
All Counties	106	3,760,455	3,695,539	1.6	11.0	10.6
All Places	553	2,689,975	2,726,423	-11.7	27.9	14.5
Texas Counties	53	3,108,235	3,006,286	-3.7	13.8	11.4
N. Dakota Counties	53	652,220	689,253	6.9	8.1	6.4
Texas Places	235	2,253,965	2,281,302	1.3	20.3	14.8
N. Dakota Places	318	436,010	455,121	-21.4	33.5	13.3

Table 2. Percentage Differences Between 1980 TAMS and RED Projections and 1980 Census Counts for Counties and Places

	All Counties (N=106)		All Places (N=553)		TX Counties (N=53)		ND Counties (N=53)		TX Places (N=235)		ND Places (N=318)	
Range of Error	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
0 - 5.0	39	36.8	80	14.5	16	30.2	23	43.4	41	17.4	39	12.3
5.1-10.0	30	28.3	75	13.6	8	15.1	22	41.5	43	18.3	32	10.1
10.1-15.0	13	12.2	57	10.3	9	17.0	4	7.5	25	10.6	32	10.1
15.1-20.0	7	6.6	56	10.1	6	11.3	1	1.9	37	15.7	19	6.0
20.1-25.0	3	2.8	35	6.3	3	5.6	0	0	19	8.1	16	5.0
25.1-30.0	5	4.7	42	7.6	4	7.6	1	1.9	18	7.7	24	7.5
30.1+	9	8.5	208	37.6	7	13.2	2	3.8	52	22.1	156	49.0

Table 3. Mean Percent Error (MPE), Mean Absolute Percent Error (MAPE) and Mean Percent Absolute Difference (MPAD) Between 1980 TAMS and RED Projections and 1980 Census Counts by Population Size of Area in 1970.

Population Size 1970	All Counties				All Places				Texas Counties			
	N	MPE	MAPE	MPAD	N	MPE	MAPE	MPAD	N	MPE	MAPE	MPAD
0- 500	0	NA	NA	NA	273	-27.5	36.5	32.2	0	NA	NA	NA
501- 1,000	0	NA	NA	NA	80	6	26.5	29.1	0	NA	NA	NA
1,000- 2,500	3	2.0	4.5	4.3	101	4.3	18.1	17.7	0	NA	NA	NA
2,501- 10,000	48	3.5	11.2	10.9	70	2.3	17.2	16.8	13	-6.9	18.0	16.1
10,001- 25,000	34	2.9	10.3	9.3	13	7.7	12.1	13.3	23	0.5	10.9	11.4
25,001	17	-4.7	11.7	11.4	10	-4.3	13.9	14.3	13	-7.5	14.1	13.9
100,000+	4	-4.8	16.0	10.1	2	1.0	11.2	11.5	4	-4.8	16.0	10.1

N.D. Counties				Texas Places				N.D. Places			
N	MPE	MAPE	MPAD	N	MPE	MAPE	MPAD	N	MPE	MAPE	MPAD
0	NA	NA	NA	60	-0.8	25.9	29.3	213	-34.4	38.8	33.9
0	NA	NA	NA	37	-4.2	20.3	27.7	43	14.8	31.8	30.7
3	2.0	4.5	4.3	59	7.9	18.6	18.5	42	-0.8	17.4	16.2
35	7.4	8.6	7.8	62	2.4	17.9	17.5	8	1.8	11.9	11.4
11	7.7	8.9	7.9	9	-3.7	13.7	14.9	4	8.5	8.5	8.4
4	4.2	4.2	4.4	6	-10.8	19.2	18.1	4	5.6	5.6	0.2
0	NA	NA	NA	2	1.0	11.2	11.5	0	NA	NA	NA

Table 4. Mean Percent Error (MPE), Mean Absolute Percent Error (MAPE) and Mean Percent Absolute Difference (MPAD) Between 1980 TAMS and RED Projections and 1980 Census Counts by Percent Population Change 1970-80.

Percent Population Change, 1970-80	All Counties				All Places				Texas Counties			
	N	MPE	MAPE	MPAD	N	MPE	MAPE	MPAD	N	MPE	MAPE	MPAD
- -10.1	19	9.8	11.2	13.6	111	-25.7	38.3	25.1	2	29.8	29.8	26.9
-10.0- 0	18	8.5	9.5	7.5	96	-8.2	26.8	23.2	0	NA	NA	NA
0.1- 10.0	18	1.4	9.7	7.7	91	-7.6	25.3	14.2	7	-3.6	14.7	12.9
10.1- 20.0	15	18.5	10.8	7.4	92	1.6	26.2	10.8	13	1.6	11.9	7.4
20.1- 30.0	12	-1.4	12.6	16.8	61	-7.3	17.8	12.3	9	-3.8	14.8	22.1
30.1- 40.0	12	-4.0	7.3	5.2	26	-12.8	21.5	12.0	11	-4.9	7.4	5.2
40.1- 50.0	4	-3.9	13.5	11.6	22	-14.3	20.4	10.8	4	-3.9	13.5	11.6
50.1+	8	-17.5	18.9	25.5	54	-24.6	33.4	31.8	7	-20.8	20.8	26.1

N.D. Counties				Texas Places				N.D. Places			
N	MPE	MAPE	MPAD	N	MPE	MAPE	MPAD	N	MPE	MAPE	MPAD
17	7.5	9.0	9.0	7	35.3	43.0	21.4	104	-28.6	38.0	26.7
18	8.5	9.5	7.5	24	22.2	25.2	30.1	72	-18.3	27.3	17.0
11	4.6	6.5	5.2	35	9.6	22.0	20.7	56	-18.3	27.4	13.3
2	3.4	3.4	3.6	53	10.4	15.5	10.2	39	-10.3	40.7	11.7
3	5.9	5.9	6.1	42	-1.0	12.6	12.7	19	-21.1	29.1	6.7
1	5.7	5.7	5.7	18	-10.5	13.6	11.8	8	-18.7	39.3	16.6
0	NA	NA	NA	17	-7.1	15.1	10.6	5	-38.6	38.6	27.6
1	5.9	5.9	5.9	39	-25.7	31.9	33.5	15	-21.8	37.4	20.3

Table 5. Number, Percent, Mean Percent Error and Mean Percent Absolute Difference for Counties and Places with 1980 TAMS and RED Projections Above and Below 1980 Census Counts.

	All Counties		All Places		TX Counties		ND Counties		TX Places		ND Places	
	Above	Below	Above	Below	Above	Below	Above	Below	Above	Below	Above	Below
Number	72	34	198	355	26	27	46	7	124	111	74	244
Percent	67.9	32.1	35.8	64.2	49	51	86.8	13.2	52.8	47.2	23.3	76.7
Mean Percent Error	9.3	-14.6	22.6	-30.9	10.3	-17.2	8.7	-4.6	40.5	-20.1	26.1	-35.8
Mean Percent Absolute Difference	7.0	16.8	13.7	15.7	7.2	17.1	6.4	5.3	14.1	15.7	12.0	15.7

Table 6. TAMS and RED Model 1980 Population Projections and Alternative Projections Compared to 1980 Census Counts for Counties.

					TAMS and RED Projections			Alternative Projections		
Area	N	1980 Census Counts	1980 TAMS and RED Projections	1980 Alternative Projections	Mean % Error	Mean Absolute % Error	Mean % Absolute Difference	Mean % Error	Mean Absolute % Error	Mean % Absolute Difference
All Counties	106	3,700,455	3,695,539	3,633,037	1.6	11.00	10.6	-3.5	11.6	10.5
Texas Counties	53	3,108,235	2,726,423	2,989,900	-3.7	13.8	11.4	-10.1	13.4	10.5
North Dakota Counties	53	652,220	689,253	643,137	6.9	8.1	6.4	3.1	9.8	10.4

Table 7. Percentage Difference Between 1980 Census Counts and TAMS, RED, and Alternative 1980 Projections.

	TAMS and RED All Counties		Alternative All Counties		TAMS TX Counties		Alternative TX Counties		RED ND Counties		Alternative ND Counties	
Range of Error	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
0 - 5.0	39	36.8	23	21.7	16	30.2	7	13.2	23	43.4	16	30.2
5.1-10.0	30	28.3	25	23.6	8	15.1	9	17.0	22	41.5	16	30.2
10.1-15.0	13	12.2	29	27.3	9	17.0	18	34.0	4	7.5	11	20.8
15.1-20.0	7	6.6	18	17.0	6	11.3	11	20.7	1	1.9	7	13.2
20.1-25.0	3	2.8	6	5.6	3	5.6	5	9.4	0	0.0	1	1.9
25.1-30.0	5	4.7	2	1.9	4	7.6	2	3.8	1	1.9	0	0
30.1+	9	8.5	3	2.8	7	13.2	1	1.9	2	3.8	2	3.7

Table 8. Mean Percent Error (MPE), Mean Absolute Percent Error (MAPE) and Mean Percent Absolute Difference (MPAD) for TAMS, RED and Alternative 1980 Projections by Population Size of Area in 1970.

Population Size 1970	TAMS and RED All Counties				Alternative All Counties				TAMS TX Counties			
	N	MPE	MAPE	MPAD	N	MPE	MAPE	MPAD	N	MPE	MAPE	MPAD
2,500 or less	3	2.0	4.5	4.3	3	22.0	25.1	19.2	0	NA	NA	NA
2,500- 10,000	48	3.5	11.2	10.9	48	0.3	10.1	11.1	13	-6.9	18.0	16.1
10,000- 25,000	34	2.9	10.3	9.3	34	-10.3	11.2	11.6	23	0.5	10.9	11.4
25,501-100,00	17	-4.7	11.7	11.4	17	-7.9	14.4	14.3	13	-7.5	14.1	13.9
100,000+	4	-4.8	16.0	10.1	4	3.7	9.4	7.6	4	-4.8	16.0	10.1

	Alternative TX Counties				RED ND Counties				Alternative ND Counties			
	N	MPE	MAPE	MPAD	N	MPE	MAPE	MPAD	N	MPE	MAPE	MPAD
	0	NA	NA	NA	3	2.0	4.5	4.3	3	22.0	25.1	19.2
	13	-9.5	14.0	14.7	35	7.4	8.6	7.8	35	4.4	8.7	8.9
	23	-12.7	12.9	12.7	11	7.7	8.9	7.9	11	-5.1	7.8	8.7
	13	-10.4	14.9	14.9	4	4.2	4.2	4.4	4	0.1	13.0	12.5
	4	3.7	9.4	7.6	0	NA	NA	NA	0	NA	NA	NA

Table 9. Mean Percent Error (MPE), Mean Absolute Percent Error (MAPE) and Mean Percent Absolute Difference (MPAD) for TAMS, RED and Alternative 1980 Projections by Percent Population Change 1970-80.

Percent Population Change, 1970-80	TAMS and RED All Counties				Alternative All Counties				TAMS Texas Counties			
	N	MPE	MAPE	MPAD	N	MPE	MAPE	MPAD	N	MPE	MAPE	MPAD
- -10.1	19	9.8	11.2	13.6	19	14.4	14.4	13.4	2	28.8	29.8	26.9
-10.0- 0	18	8.5	9.5	7.5	18	3.5	4.6	7.6	0	NA	NA	NA
0.1- 10.0	18	1.4	9.7	7.7	18	-3.7	8.2	8.5	7	-3.6	14.7	12.9
10.1- 20.0	15	1.8	10.8	7.4	15	-8.4	9.5	6.7	13	1.6	11.9	7.4
20.1- 30.0	12	-1.4	12.6	16.8	12	-9.7	13.9	15.6	9	-3.8	14.8	22.1
30.1- 40.0	12	-4.0	7.3	5.2	12	-7258	17.5	14.5	11	-4.9	7.4	5.2
40.1- 50.0	4	-3.9	13.5	11.6	4	-7.6	11.9	8.5	4	-3.9	13.5	11.6
50.1+	8	-17.5	18.9	25.5	8	-19.3	19.3	19.1	7	-20.8	20.8	26.1

Percent Population Change, 1970-80	Alternative Texas Counties				RED North Dakota Counties				Alternative North Dakota Counties			
	N	MPE	MAPE	MPAD	N	MPE	MAPE	MPAD	N	MPE	MAPE	MPAD
- -10.1	2	22.3	22.3	21.1	17	7.5	9.0	9.0	17	13.5	13.5	10.8
-10.0- 0	0	NA	NA	NA	18	8.5	9.5	7.5	18	3.5	4.6	7.6
0.1- 10.0	7	-8.3	8.3	8.5	11	4.6	6.5	5.2	11	-1.0	8.1	8.5
10.1- 20.0	13	-7.8	9.0	6.5	2	3.4	3.4	3.6	2	-12.5	12.5	13.8
20.1- 30.0	9	-8.7	14.2	17.7	3	5.9	5.9	6.1	3	-12.9	12.9	11.3
30.1- 40.0	11	-17.7	17.7	14.3	1	5.7	5.7	5.7	1	-16.1	16.1	16.1
40.1- 50.0	4	-7.6	11.9	8.5	0	NA	NA	NA	0	NA	NA	NA
50.1+	1	-16.9	16.9	18.6	1	5.9	5.9	5.9	1	-36.2	36.2	36.2

Table 10. Number, Percent, Mean Percent Error and Mean Percent Absolute Difference for TAMS, RED and Alternative Projections Above and Below 1980 Census Counts.

	TAMS and RED All Counties		Alternative All Counties		TAMS TX Counties		Alternative TX Counties		RED ND Counties		Alternative ND Counties	
	Above	Below	Above	Below	Above	Below	Above	Below	Above	Below	Above	Below
Number	72	34	40	66	26	27	7	46	46	7	33	20
Percent	67.9	32.1	37.7	62.3	49	51	13.2	86.8	86.8	13.2	62.3	37.7
Mean Percent Error	9.3	-14.6	10.7	-12.1	10.3	-17.2	12.2	-13.5	8.7	-4.6	10.4	-8.8
Mean Percent Absolute Difference	7.0	16.8	8.6	11.7	7.2	17.1	8.3	11.9	6.4	5.3	10.1	10.6

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Adjusting to the Socioeconomic Impacts of Energy Development in North Dakota

Thor A. Hertsgaard and F. Larry Leistritz

Historical Setting

Agriculture has always been the principal component of the economic base in North Dakota. Grain crops, which are produced all across the state, are the major source of farm income, with specialty crops (such as sugarbeets and potatoes) accounting for significant farm income in eastern North Dakota. Livestock production (principally cow-calf operations) is concentrated in the southwestern third of the state.

The number of farms in the state decreased substantially due to farm consolidation in the fifties and sixties. The decrease has continued since then but at a much lower rate. There are now about 38,000 farms in the state. The decline in farm numbers and farm population contributed to a decline in the number of firms and employment in small towns serving rural areas. Declining populations of farms and small towns resulted in a decrease in the state's population from 632,446 in 1960 to 617,792 in 1970 but its population increased to 652,717 in 1980. Energy resource development (coal and oil) was a major factor in the population increase between 1970 and 1980.

Discovery of oil and natural gas in western North Dakota in 1951 resulted in a flurry of exploration activity in subsequent years. Williston (whose population increased from 7,378 in 1950 to 11,866 in 1960) served as the center for those operations. Exploration activity declined in the sixties and Williston's 1970 population decreased to 11,280. The energy crisis in the early seventies, together with the discovery of additional oil and gas reserves at deeper levels in the Williston Basin, led to a massive increase in petroleum exploration and extraction activities. Williston's 1980 population increased to 13,336; Dickinson's population increased from 12,405 in 1970 to 15,924 in 1980; and other communities in western North Dakota also had large increases in their population in that period.

North Dakota has an estimated 350 billion tons of lignite (of which 35 billion tons are presently considered to be recoverable) in the Fort Union formation.[1] This coal has been mined, both from underground and surface mines, since the turn of the century. Coal mining decreased until the early sixties and no underground mining has occurred since the mid-twenties. The Btu content of North Dakota lignite averages 6,000-7,200 Btu per ton (compared to about 8,000-10,000 Btu for Montana-Wyoming coal), so it is not economically feasible to ship the lignite very far from the mine site.

Although there had previously been lignite-fired thermal-electric generating plants in the state, large-scale generating plants began to be constructed in the state in the sixties. Basin Electric Power Cooperative began construction of a 212 megawatt (MW) plant at Stanton in 1963. The next year United Power Association (UPA) began construction of a 172 MW plant, also at Stanton. In 1967 Minnkota Power Cooperative began construction of a 235 MW plant at Center. Basin Electric began construction in 1971 of a 440 MW addition to their Stanton plant and Square Butte Power Cooperative began construction of a 440 MW plant near Center in 1973. UPA and Cooperative Power Association (CPA) began construction of the first 550 MW unit of a plant near Underwood in 1975 and began the second 550 MW unit the next year. A five-firm consortium began construction of a 410 MW plant near

[1] *The source of this estimate is Douglas W. Stone, Director of Public Affairs, North American Coal Corporation, Bismarck, North Dakota.*

Beulah in 1977. Basin Electric began constructing the first 438 MW unit of the Antelope Valley plant near Beulah in 1978 and a second such unit in 1980. All of these plants have a construction period of three to four years.

In 1980 American Natural Resources and Associates began construction of a plant to convert lignite to pipeline quality gas. This plant, the first such plant in North America, will be operational in 1984 and will produce 137.5 million cubic feet of gas per day. A second unit (also 137.5 million cubic feet per day) is in the planning stage.

In 1965 the Department of Agricultural Economics at North Dakota State University collected primary data from a sample of firms, households, and units of local government in southwestern North Dakota that provided information on their expenditure patterns. These data were used to compute input-output technical coefficients and interdependence coefficients. Input-output technical coefficients indicate the amount of inputs that a given economic sector (type of business) must purchase from each other sector per dollar of output by that sector. Input-output interdependence coefficients indicate the total requirements (direct requirements as measured by the technical coefficients plus indirect requirements that occur as a result of the multiplier effect associated with the spending and respending of a fraction of the income of firms in the local economy) for inputs from each sector per dollar of output for final demand by a given sector. The interdependence coefficients are frequently referred to as gross receipts multipliers because they indicate the number of times a dollar received by a particular sector "turns over" or is respent before it leaves the area economy. These multipliers vary by economic sector but range from about 1.5 to 4.5. In general, the higher the fraction of locally purchased inputs of a sector, the greater is its multiplier.

The data that were collected and analyzed in 1965 were intended to be used primarily for the purpose of estimating the economic impacts of irrigation development associated with the Garrison Diversion Project of the Missouri River. As it turned out, the irrigation component of the project has proceeded far behind the original schedule and may never be completed as originally planned. However, the results have been used to evaluate the economic impacts of many other kinds of developments over the years, especially energy resource development.

The energy crisis associated with the mid-East petroleum embargo in 1973 gave rise to prospects for a "crash program" of energy resource development in North Dakota. In 1973 Michigan-Wisconsin Pipeline Company applied for water permits for 22 substitute natural gas (SNG) plants to convert North Dakota lignite to pipeline quality gas. Natural Gas Pipeline Company (a subsidiary of People's Gas Company of Chicago) also applied for water permits for four SNG plants and El Paso Natural Gas was considering construction of multiple SNG plants. During that same time frame, there were a number of mine-mouth lignite-fired thermal-electric generating plants for which construction schedules were announced.

The direct and indirect employment and associated population resulting from the construction and operation of these plants could have resulted in several hundred thousand people moving to the areas where the plants would be located; this would have been a several fold increase in the population of those areas. The possibility of this kind of population increase, together with widespread reports of the socio-economic impact problems in such areas as Gillette and Rock Springs, Wyoming caused considerable concern in North Dakota regarding the problems that might emerge in the state.

In 1973 the Department of Agricultural Economics became involved in the Northern Great Plains Resources Program (NGPRP). This program was a cooperative effort among states of the Northern Great Plains and a number of federal agencies that evaluated the nation's future needs for energy, alternative scenarios for energy resource development in the Northern Plains States, and the impacts on the area of these kinds of development.

Battelle Memorial Institute, based in Columbus, Ohio, had proposed a regional environmental assessment model for the Powder River Basin in Wyoming. A similar computerized information storage, retrieval, and analysis system was proposed to the North Dakota Legislative Council in 1974.[2] The Legislative council accepted the concept proposed by Battelle-Columbus for a North Dakota Regional

[2]*The North Dakota Legislative Assembly convenes only in odd-numbered years and then for only 60 days. The Legislative Council is a group of 15 legislators that meets periodically during the interim between sessions. There are also standing committees and special committees of the Legislative Council that meet one or more times in between legislative sessions.*

Environmental Assessment Program (ND-REAP), but not the proposal presented for a contract for Battelle-Columbus to implement the program. Instead, the 1975 Legislative Assembly appropriated $2 million to implement the program as a new agency within the framework of the North Dakota Legislative Council. The 1977 Legislative Assembly again appropriated $2 million for ND-REAP for the next biennium but the bill to appropriate funds to continue REAP beyond June 30, 1979 was vetoed by the governor.

During its four-year life, ND-REAP contracted with a number of entities to assemble baseline data (prior to development projects) and project-related data (associated with development), to store these data in a readily accessible manner, and to develop analyses systems to provide information across a broad range of subject matter areas. One such effort was a cooperative undertaking for the construction of an economic-demographic-fiscal impact projection model for evaluating alternative energy resource development scenarios in North Dakota. Development of the conceptual framework was a cooperative undertaking of the Department of Agricultural Economics and the Department of Sociology and Anthropology at North Dakota State University and the Department of Economics and the Department of Sociology at the University of North Dakota. Arthur D. Little, Inc. of Cambridge, Massachusetts was engaged to computerize the model.

The REAP Economic-Demographic Model 1 (REA-1) was developed during the period March 1976 to November 1976. It is a user-interactive computer model that was used extensively in the period January 1977 to March 1979 by the North Dakota Legislature and Legislative Council, state and federal agencies, local units of government, and private users to assist in impact evaluation.

During 1976 through 1978, a project funded by REAP collected economic and demographic data for monitoring the socioeconomic impacts of energy resource development in the state. A field survey team was assembled to collect primary data that would be useful for monitoring socioeconomic changes in energy development areas as they occurred. A part of this effort involved collection of additional economic input-output data for the sectors contained in RED-1, as well as for four energy sectors not included in RED-1.

REAP funded the development of an expanded economic-demographic-fiscal impact model (RED-2) during the period May 1977 to August 1978. This model included the entire state (rather than only the 15-county energy development area of RED-1) and permitted the evaluation of the impacts of projects other than energy resource development projects.

The North Dakota REAP E-D models have been adapted for use in other states. The Texas Assessment Model System (TAMS) was developed as an adaptation of RED-2 from September 1978 to July 1979 and has been used extensively since then in Texas. RED-2 was adapted to uses in Wisconsin in the period September 1979 to July 1980. Work on RED-2 enhancement took place at North Dakota State University from November 1979 to February 1982 and the model that evolved from that work has been called the North Dakota Economic-Development Assessment Model (NEDAM). NEDAM has been adapted by North Dakota State University during the period August 1981 to February 1982 for use in Montana by the U.S. Bureau of Land Management (BLM) to evaluate the economic-demographic-fiscal impacts of energy resource development in Montana.

Other related work at North Dakota State University included the collection and analysis of data on coal project construction and operating work force characteristics (including housing) in 1974 (such work is currently in progress for oil project workers). In 1976 population projections to the year 2000 for North Dakota and its regions were developed at North Dakota State University. These projections have been recently revised by using the updated NEDAM model. North Dakota State University has also, for several biennia, been asked by the North Dakota Legislative Council to provide biennial tax revenue estimates for personal and corporate income taxes and the sales and use tax.

Institutional Setting in North Dakota

The North Dakota Legislature has taken a number of steps to mitigate the impacts of energy resource development in the state. These include the passage of statutes governing the reclamation of mined land, the siting of energy conversion and transmission facilities and the distribution of coal severance tax funds to counties, cities, and school districts in coal producing areas to mitigate the adverse impacts of development in those areas.

Reclamation Statutes in North Dakota[3]

The first surface mining reclamation act in North Dakota took effect January 1, 1970 although efforts to pass such legislation had begun as early as 1965. The first act was very primitive, but it was a beginning. Another act was passed by the 1973 Legislative Assembly and it provided for the return of mined land to "approximate original contour," as well as the salvage of the preexisting topsoil up to two feet. There were minor changes made to these laws by the 1975 and the 1977 Legislative Assemblies.

The Federal Surface Mine Control and Reclamation Act, signed by President Carter on August 3, 1977, provided for federal control of mine land reclamation in those states that did not develop new programs or modify existing ones so as to meet the provisions of federal reclamation statutes. That act also provided for 50 percent cost sharing by the federal government of the state's costs of administering the regulatory program.

The 1979 North Dakota Legislative Assembly enacted a new reclamation law that took effect July 1, 1979 and conforms in all important respects to the federal act. It provided environmental protection of the land, including soil, topography, wildlife and habitat, and archeological sites. It has comprehensive inspection, enforcement, and penalty provisions. The North Dakota program received federal conditional approval on December 15, 1980 and it is expected that all deficiencies will have been removed by the end of 1982, except for one change that will require legislative approval in 1983. Changes in the North Dakota regulations since 1979 have followed those in the federal regulations.

Siting Statutes in North Dakota[4]

The 1973 North Dakota Legislative Assembly passed a study resolution to address the need for the regulation of the siting of transmission facilities. The 1975 Legislative Assembly enacted the "Energy Conversion and Transmision Facility Siting Act" which took effect when signed by the Governor on April 9, 1975. Its statement of policy is as follows:

> "The legislative assembly finds that the construction of energy conversion facilities and transmission facilities affects the environment and the welfare of the citizens of this state. Therefore, it is necessary to ensure that the location, construction, and operation of energy conversion facilities and transmission facilities will produce minimal adverse effects on the environment and upon the welfare of the citizens of this state by providing that no energy conversion facility or transmission facility shall be located, constructed, and operated within this state without a certificate of site compatibility or a route permit acquired pursuant to this chapter. The legislative assembly hereby declares it to be the policy of this state to site energy conversion facilities and to route transmission facilities in an orderly manner compatible with environmental preservation and the efficient use of resources. In accordance with this policy, sites and routes shall be chosen which minimize adverse human and environmental impact while ensuring continuing system reliability and integrity and ensuring that energy needs are met and fulfilled in an orderly and timely fashion."

The North Dakota Public Service Commission conducted a series of hearings throughout North Dakota in 1975 to inventory the state and to identify areas of exclusion and avoidance for energy facilities. Firms requesting permits were required to present information for alternative sites and routes.

Changes enacted in 1977 required the applicant to provide information for the proposed site or corridor and to indicate that alternative sites or corridors were considered and also allowed for the waiver of some of the procedures for small projects.

[3]*The authors are indebted to Dr. Ed Englerth, Director of the Reclamation Division, North Dakota Public Service Commission; and Jay Buringrud, Assistant Director, North Dakota Legislative Council, for providing much of the information in this section.*

[4]*The authors are indebted to Wallace Owen, Chief Engineer of the Public Utility and Siting Division, North Dakota Public Service Commission; Ray Walton, Commerce Counsel of the North Dakota Public Service Commission; and Jay Buringrud, Assistant Director, North Dakota Legislative Council, for providing much of the information in this section.*

Energy Development Impact Mitigation in North Dakota[5]

The coal severance tax, the coal conversion tax, and the oil and gas production tax all are levied "in lieu of" property taxes on production. This sets North Dakota apart from Montana and Wyoming, for instance, where the state taxes are in addition to property taxes levied by local subdivisions on coal and oil companies.

The 1975 Legislative Assembly passed an act that levied a coal severance tax of 50 cents per ton plus one additional cent for each three-point rise in the wholesale price index. The act also created the North Dakota Coal Development Impact Office, with the director to be appointed by the governor.

Table I indicates the distribution of revenues from the coal severance tax, by year of the legislative assembly.

Table I: Distribution of coal revenues by year of legislative assembly

	1975	1977
Coal Impact Office	35%	35%
Special Trust Fund	30	15
Coal Producing County General Fund	5	8
Cities in Coal Producing County	—	6
School Districts in Coal Producing County	—	6
State General Fund	30	30
	100%	100%

Under the 1975 act, the trust fund was placed under the State Board of University and School lands to be held and managed by it. In 1977 the legislature created the loan program. The loans are issued by the Land Board and administered by the Land Department. The loan requests for specific impact-related projects must, by law, receive a recommendation of approval or disapproval from the Director of the Impact Office before the Land Board takes action.

The 1975 Legislative Session also established a "coal conversion tax" on coal-fired power plants and other coal conversion facilities. The tax rate for power plants is 0.25 mills per kilowatt hour of electricity produced. This tax is in lieu of all ad valorem property taxes on the plants, except for taxes on the land on which they are located. The revenues are divided between state and local governments with the state general fund receiving 65 percent and local governments in the county where the plant is located receiving 35 percent. The coal conversion tax is levied at 2.5 percent of gross receipts or 10 cents for every 1,000 cubic feet produced (whichever is greater) for coal gasification plants at 2.5 percent of gross receipts for other coal conversion facilities. The oil and gas production tax is levied at 5 percent of the gross value of production at the well head.

The coal severance tax returns 70 percent of the revenue in one form or another to the local subdivisions, as follows:

20% — Direct Payment
35 — Grants
15 — Loans
70%

The coal conversion tax returns 35 percent to the producing subdivisions and the oil and gas production tax returns about 25 percent to the producing subdivisions.

The 1977 Legislative Assembly changed the distribution formula for the coal severance tax funds and also changed the tax rate to 65 cents per ton base rate plus one cent for each one-point rise in the wholesale price index.

The 1979 session again changed the tax rate to a base rate of 85 cents plus one cent per four-point increase in the wholesale price index. It also provided for the director to be appointed by the State Land

[5]*The authors are indebted to James Lupiak, Deputy Director, North Dakota Energy Development Impact Office; and Jay Buringrud, Assistant Director, North Dakota Legislative Council, for providing much of the information in this section.*

Board. The director was authorized to set guidelines, subject to Land Board approval, for awarding of grants and loans, and appeals of his decisions were to be heard by the Land Board. Also in 1979 the act was changed to allow counties that did not produce coal but which were within 15 miles of a tipple to share in formula funds. County general fund share for those counties is based on the assessed valuation of land within a 15-mile radius. School districts and cities also share in the fund, based on the number of school age children and the population within 15 miles of the tipple.

The 1979 Legislative Assembly also put a constitutional amendment on the 1980 election ballot to preserve coal trust funds in perpetuity as well as to allow the Land Board to approve recommendations of the director regarding loans of trust funds to subdivisions that qualify. This amendment was approved by the voters.

The 1981 assembly changed the name of the office to Energy Development Impact Office and appropriated $10 million for the following biennium with which the office could distribute grant funds to political subdivisions adversely impacted by oil resource development activities.

Aid to political subdivisions (in the form of grants and loans) in North Dakota (unlike some other states) for impact mitigation comes from severance taxes on the coal rather than on substantial reliance on grants and loans directly from the energy resource firms.

Description of the North Dakota E-D Model

The original North Dakota REAP Economic-Demographic Model (RED-1) was designed to provide economic-demographic-fiscal impact projections for alternative combinations of energy resource development projects in a 15-county area in southwestern North Dakota. The projection was the 25-year period 1976-2000.

RED-2 provided such projections for the entire state and for both energy and other types of development projects. The North Dakota Economic-Demographic Assessment Model (NEDAM) framework contains enhancements that were made on the RED-2 model.

This section of the paper will provide a brief description of the essential elements of the NEDAM structure although, unless otherwise indicated, this description applies to RED-1 and RED-2 as well. The description will be from a conceptual perspective, rather than from a computational algorithm perspective.

The model consists of five principal modules: the economic module, the demographic module, the interface module, the residential choice module, and the fiscal impact module. Each of these modules will be described in the subsections that follow. The coneptual relationships among components are presented in Figure 1.

The Economic Module

A major component of the economic module is the set of input-output interdependence coefficients (or gross receipts multipliers). Each coefficient in this table indicates the amount of output that must be produced by the row sector per dollar of output for final demand by the column sector.

In essence, this component of the model applies the interdependence coefficients (multipliers) to the number of dollars that are injected into the region's economy (either by the preexisting baseline sectors or by the site-specific development projects) to provide estimates of the number of dollars of gross business volume generated in each sector as a result of those economic activities. These gross business volumes for each sector are then translated to estimated employments in each sector by means of productivity coefficients (gross business volume per worker) in each sector. The result is a set of estimates of baseline employment and project-related (construction, energy operating, nonenergy operating, and indirect) employment in the region.

The state of North Dakota is divided into eight planning regions. The model contains a set of baseline final demand vectors (dollar value of projected exports from the region by the livestock, crops, mining, and manufacturing sectors plus projected tourism receipts of the retail trade and business and personal services sectors, as well as projected outlays of the federal government for contract construction and for federal payrolls) for each year in the 25-year projection period. (In the case of the RED-1 model, there is only one set of baseline final demand vectors, which is for the 15-county area in southwestern North Dakota for which the model was designed. The RED-2 and NEDAM versions contain a set of baseline final demand vectors for each of the state's eight planning regions.)

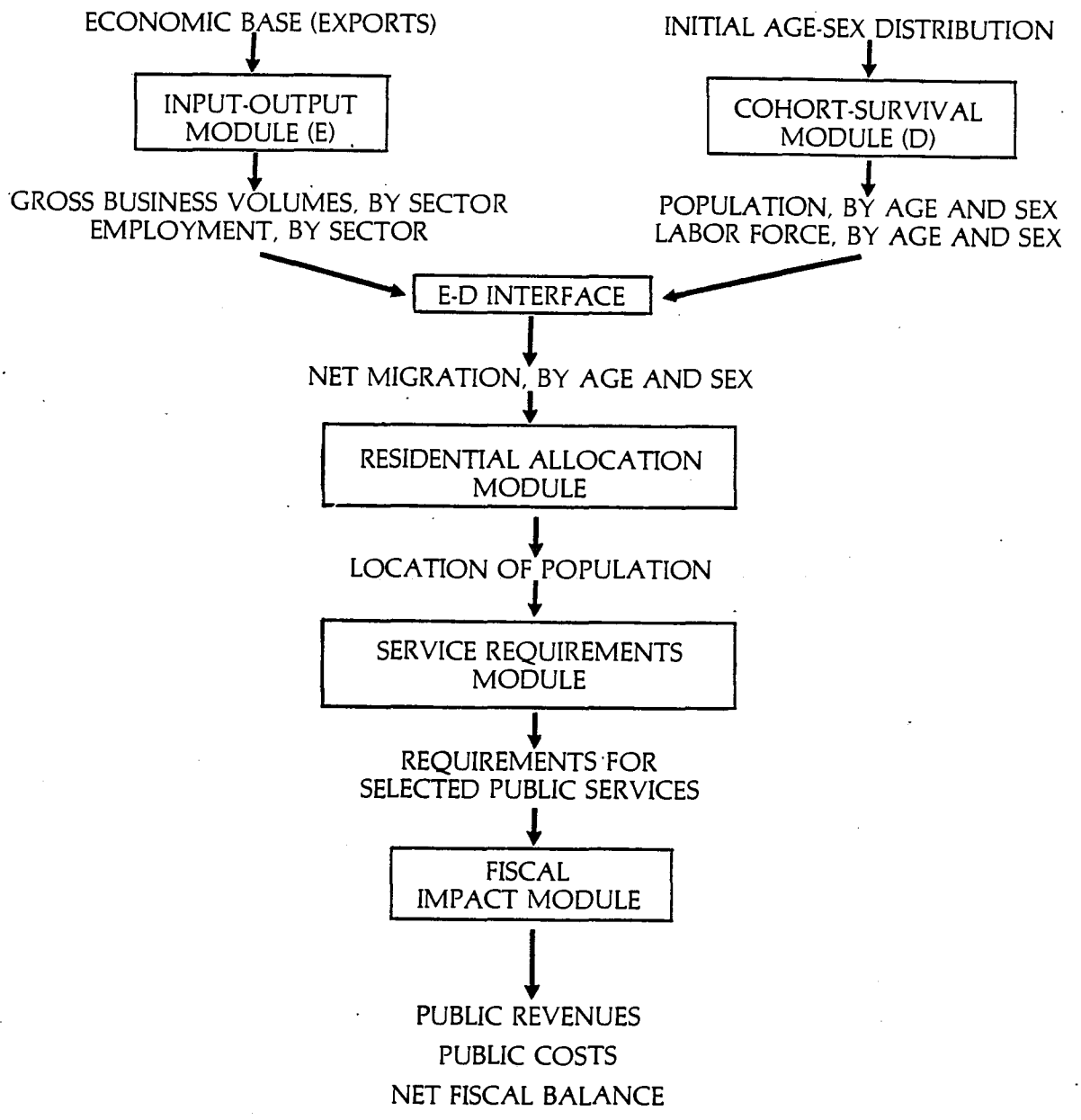

Figure 1. Data and Output Flows of NEDAM Model

The model also contains a set of final demand vectors for each development project for which impacts are to be evaluated. The final demand vector for each project that is stored in the model includes annual direct expenditures to the local contract construction and retail trade sectors and payroll expenditures to local employees of the firm that is the development project. It also contains the annual direct construction and operating employment for the project.

The economic module provides estimates of the regional business activity (gross business volume of all business sectors) and personal income associated with the region's baseline final demand vectors; the project related (for all site-specific development projects considered in that particular scenario) business activity and personal income; and the total (sum of baseline and project related) business activity, personal income, and per capita personal income in the region (population estimates for computing per capita personal income are obtained from another module of the model). The economic module also

computes the change from the last year shown (both absolute and percentage) in business activity, personal income, and per capita income.

Another output produced by the economic module is annual baseline (nonagricultural and agricultural) employment and project related (construction, energy operating, nonenergy operating, and indirect) employment, as well as total employment and the change (from the last year shown) in employment (both absolute and percentage). These employment estimates are computed at the regional, county, and municipal level.

The Demographic Module

The demographic module is basically a cohort-survival model. NEDAM has a file stored for each county in the state that is the age/gender distribution for each 5-year cohort for the year 1980 (There are 15 age cohorts: 0-4 years of age, 5-9, . . ., 65-69, and 70 years of age and older. However, internal computations within the model are for single year age cohorts for all ages except those 75 years and older, which is a single cohort). The model ages each person one year each year, computes a given fraction of each cohort that die each year, computes the number of children born to women of childbearing age (15-44 years of age) each year, and allows a given fraction of people 65 years of age or older to migrate in or out of the county. (Contrary to the conventional cohort-survival model, migration of people less than 65 years of age is an endogenous variable that is computed in the interface module, to be described later.) The cohort-survival model thus calculates a new age/gender distribution for each county for each year of the projection period.

The module contains a set of age/gender-specific labor pool membership rates (similar to labor force participation rates) for each category (baseline, construction, energy operating, nonenergy operating, and indirect) of employment. These rates are applied to each year's age/gender distribution in the county to yield the number of available workers, by category of employment, in each county.

The Interface Module

The interface module subtracts the number of required workers (computed in the economic module) associated with baseline and project related economic activity from the number of available workers (computed in the demographic module). If the percentage difference is less than some limit, the model estimates the number of in-migrating workers and their dependents to keep the percentage at the lower limit. Conversely, if the percentage difference exceeds some upper limit, the model estimates the number of out-migrating workers and their dependents to keep the percentage difference at the upper limit. The user may select the upper and lower limits (called maximum and minimum values of the "unallocated labor pool"). The percentage difference between required workers and available workers is free to vary between the two limits before migration is triggered.

There is a given sequence in which the respective jobs (baseline, construction, energy operating, nonenergy operating, and indirect) are filled. The labor pool membership rates (the counterpart of labor force participation rates) in the demographic module determine the fraction of each age/gender cohort for each worker type (indigenous or baseline, construction, energy operating, nonenergy operating, and indirect) that can fill each type job (baseline, construction, energy operating, nonenergy operating, and indirect). However, the workers and their dependents are assumed to retain the characteristics of their original worker category (even though the workers or their dependents fill a job in some other job type) throughout the projection period. In other words, data for the indigenous (or baseline), construction, and each other worker type population are stored separately and retain such characteristics as average family size typical for the worker type population.

The model requires that a certain fraction of both construction workers and operating workers must be members of that worker type population. This is due to the fact that a certain fraction of these jobs requires skills that are highly technical and cannot be filled by workers from some other worker type population. In other words, before any development projects begin, there are only baseline jobs and baseline (or indigenous) workers. When construction on a project begins, a certain fraction of the construction workers must in-migrate (together with their dependents) so there are now two worker type populations in the area (indigenous and construction). The remainder of the construction jobs can be filled from the indigenous population until the unallocated labor pool reaches its lower limit, at which

time additional construction workers (and their dependents) must in-migrate to fill the remaining jobs. When operation of the plant commences, a certain fraction of the operating jobs must be filled by in-migrating operating workers. The remainder are filled by workers from the indigenous population and then the construction population. If additional operating workers are required, further in-migration of operating workers and dependents occurs. A similar procedure exists for indirect workers except no fraction of indirect jobs must be filled by in-migrants. The sequence in which indirect jobs are filled is from the indigenous (or baseline) population, energy operating population, nonenergy operating population, construction population, and (if required) from in-migrating indirect workers population.

For all but a few of the least rural counties in North Dakota, the projection of baseline economic activity only (no development projects) implies persistent out-migration of population (mostly young people). This has been the situation in the state in recent decades and it would likely continue because of increased productivity of workers associated with the adoption of improved technology (especially in agriculture). For a county having no economic activity associated with development projects (so that out-migration would result), the model would assume out-migration of baseline population (having the characteristics of historic out-migrants) in equal percentage amounts from all municipalities in the county, as well as from the farm population.

When in-migration is estimated by the model (as for filling jobs associated with development projects in an area), the workers and their dependents are assigned to one of the municipalities within a 100-mile radius of the project site. The municipality to which this population is assigned is computed in the residential choice module described in the following section.

The Residential Choice Module

A form of the widely used gravity model can allow for the estimate of settlement patterns of in-migrating workers and their dependents among the muncipalities that are within 100 miles of the plant site. The standard form of the gravity model is:

$$G_i = \frac{P_i}{D_{ij}^{a}}$$

where: G_i is the gravity coefficient that is computed for municipality i,
P_i is the population of municipality i,
D_{ij} is the distance between municipality i and plant site j, and
a is the power to which distance is raised.

The value of the power to which distance is raised may be selected by the user. The greater this power, the greater will be the value of the denominator of the fraction and the lower the computed value of the gravity coefficient. The distance exponent is 1.5 for construction workers, 2.5 for both types of operating workers, and 1.6 for indirect workers. These values are based on analysis of empirical data for these types of workers and the values imply that construction workers will commute the greatest distances and operating workers the least distances. If the user wishes to test other values, the model affords that capability.

In RED-2 and NEDAM, the population of municipality i (the numerator on the right-hand side of the equation) is replaced by the sum of the baseline, construction, energy operating, nonenergy operating, and indirect workers that lived in municipality i in the preceding year (except for construction workers, which is for the second preceding year). The model also multiplies the right-hand side of the equation by a coefficient that is known as the "community attractiveness index." The value of this coefficient is 1.0 unless the user selects some other value. For example, if the user selects a value of 2.0 as the index for a certain community (because for some reason it is believed to be twice as attractive as other cities of that size and distance), that municipality will have a gravity coefficient twice the value it would otherwise have. Muncipalities within 100 miles of the plant site will be assigned in-migrating workers and their dependents in proportion to the value of the gravity coefficient for each municipality.

The Fiscal Impact Module

The purpose of the fiscal impact module is to estimate tax revenues, governmental costs, and net fiscal balance (tax revenues minus governmental costs) at the state, county, municipal, and school district level for each year of the projection period. The tax revenues and governmental costs that are estimated are those attributable to the in-migrating populations associated with the set of development projects selected by the user.

The model contains algorithms for estimating the following state revenues: sales and use tax, personal income tax, corporate income tax, federal coal royalties, highway tax, cigarette-tobacco-liquor-beer tax, equalization tax, coal conversion tax, and severance tax (both general fund and impact fund). Estimates of expenditures (or transfers) by state government include: education transfers, property tax replacement, highway fund, cigarette and tobacco tax, coal conversion tax, severance tax, highway operation, highway construction, and general government functions.

Estimates are made of the following county revenues: property tax, federal revenue sharing, highway fund, conversion tax, and severance tax. County government cost estimates are made for law enforcement, social services, and "other" government functions.

Receipts of municipalities are estimated for property tax, federal revenue sharing, users' fees, special assessments, highway fund, cigarette and tobacco tax, and coal conversion and severance tax. Expenditure items include costs for streets, police and fire protection, general city government, and debt service.

Revenue items estimated for school districts are property tax, education transfer funds, and coal severance and conversion taxes. Estimates are made of costs of debt service and operating expenses.

Other Modules of the Model

Algorithms within the model permit the computation and reporting of additional details other than those previously described in the sections for the five principal modules of the model. These include a criminal justice module and a social services module. The criminal justice module provides annual estimates at the county level of the number of offenses (total as well as juvenile, violent, property, and "all others") and the number of officers and vehicles required. The social services module provides annual estimates of the number of physician visits, persons hospitalized, patient days, doctors required, and hospital beds required, by county.

Other reports that are available from the model include an impact housing report, by type (single family housing, apartment, mobile home, and "other"), by county and municipality; a school enrollment report, by county and school district; regional reports on employment, by industry and year; and components of population change (birth, death, and migration, by type of worker category) at the county level.

User Options

The user has a number of alternatives that may be selected in the use of the economic module, the demographic module, and the fiscal impact module, which must be run in that order. The user can run any number of years up to the year 2005. The user will be asked to indicate whether the run is for baseline only and, if not, which projects are to be included. The user can change the location and the starting date of any of the projects. The user may also select the value of the distance powers and community attractiveness index for the gravity equation. The user will also be asked to specify the regions or counties for which the computations are to be performed.

Once the economic module has been run, the demographic module can be run and the user will be allowed to select the regions or counties to be included and to change values for birthrates, unallocated labor pool percentages, family size, county level participation rates (male and/or female), percent of city workers who can work on farms, and percent of rural workers who can work in cities.

After the economic module and the demographic module have been completed, the user may run the fiscal impact module. Any years and areas for which the economic module and demographic module were run may be run with the fiscal impact module. The user may choose the years and areas to be run and may select the rate of inflation to assume and (as appropriate) rates for the sales and use tax, coal electricity conversion tax, coal conversion tax, and severance tax. The rate of inflation is relevant because all estimates of dollar values in the projection period (such as gross business volumes and per-

sonal incomes) in the model are in terms of constant dollars (1980 prices). In the fiscal module, some costs of political subdivisions (such as salaries of employees) are subject to inflation while others (such as interest and principle payments on bonded indebtedness) are not. Those values that are subject to inflation during the projection period are discounted by the inflation rate to convert them to constant dollar equivalents.

Once the modules have been run, the user can select the years for which results are to be printed as well as the geographic level of detail desired.

Use of the Model

During the period 1977-1979, more than 50 different entities used the RED-1 model for various aspects of planning and policy development. User groups included state legislative committees, state agencies, local governments, federal agencies, and private development firms. Beginning early in 1982 an enhanced, statewide version of the model (known as NEDAM) was made available for general use. The NEDAM version has been utilized by the U.S. Bureau of Land Management (as the basis for EIS preparation), by the State of North Dakota (to develop population projections for all counties in the state to the year 2000), and by a variety of community-based organizations and private firms. Of the many policy and planning applications of the model, the following three utilizations are discussed: 1) in evaluating alternative state energy resource taxation and impact finance programs, 2) as a guide in the distribution of grants and loans to growth impacted areas, and 3) as an aid to local governments in public facility planning.

Use in Tax Policy Development

During the period 1975-1979, taxation of North Dakota's growing lignite coal industry was one of the state's most hotly debated public issues. The two polar positions with respect to coal taxes can be simplified as: a) the coal industry should be taxed no differently than any other industry except to compensate for specific and extraordinary costs associated with its activities and b) because the coal industry involves a "one-time harvest" of a natural resource and because the environmental costs associated with its development may be very great, a correspondingly high tax should be levied on this industry. Naturally "position a" was attractive to those who favored development and feared the depressing effects of a high tax while "position b" found great favor with groups that would prefer little or no development of the state's coal resources.

The state established its first coal severance tax in 1975. As mentioned earlier, 40 percent of the severance tax revenues were made available to local governments affected by the development projects. Initial analyses of the implications of this tax, however, indicated that these revenues generally would be inadequate to meet the needs of affected local jurisdictions. As a result of these analyses and, taken together with a very high level of public interest in coal development issues, the severance tax assumed a prominent position on the agenda of the 1977 Legislative Session.

The Senate Finance and Taxation Committee attempted to develop a severance tax rate and distribution formula which would provide fiscal resources adequate to meet the needs of jurisdictions affected by coal development. The criterion of adequacy was generally interpreted to mean that: 1) the severance tax revenues returned to local jurisdictions should be sufficient to cover additional development-related costs, after considering the effect of other development-related revenues and 2) grant or loan funds available to these jurisdictions must be sufficient to supplement local bonding such that local governments could meet the front-end capital costs associated with necessary new facilities. Because major increases in coal production and conversion activities were expected to occur during the period 1977-1985, the attention of legislative leaders was focused on this period and projections of the costs and revenues of affected jurisdictions under different taxation and distribution formulas were deemed essential.

The RED-1 model became the principal framework for analyzing the implications of various tax rates and distribution formulas during the 1977 Legislative Session. Early in the session, projections from the model were used extensively by a lobbying group representing the coal development counties to impress upon legislators the seriousness of potential local fiscal problems. It is also likely that the involvement of key policymakers in the model development process and their exposure to the initial

analyses of the 1975 tax law increased their awareness of the local fiscal implications of rapid development. During the session (January-April 1977), REAP personnel worked closely with the staff and members of the Senate Finance and Taxation Committee and with individual legislators in evaluating alternative taxation/distribution programs. The principal use of the RED-1 projections by the committee was to evaluate the local government implications of each alternative in terms of the adequacy criterion discussed above. These evaluations led to adjustments in the distribution formula originally proposed.

Other legislators who adhered to "tax position a," however, also used the governmental cost projections from the model in floor debate to support their position that the present tax was adequate to cover the costs associated with development and hence that no major increase in the tax could be justified. Legislators whose beliefs were more aligned with "position b" challenged this conclusion and charged that the model was inadequate because it did not incorporate the costs associated with environmental degradation, social disruption, and loss of a natural resource. The REAP staff agreed that such costs were not included, but pointed out that the model had not been designed to address the issue of optimum tax rate or to perform a comprehensive cost/benefit analysis of coal development and that its structure was appropriate for assessing the implications of alternative tax formulas for local governments (one of the purposes for which it was intended).

The resulting legislation had the effect of making 70 percent of the severance tax proceeds available to local governments. When the effects of both the tax rate and distribution formula changes are considered, the fiscal resources available to local governments (per ton of coal mined) more than doubled. Subsequent analyses suggest that this tax formula is reasonably adequate to meet local government needs.

The coal severance tax was again a major issue in the 1979 Legislative Session. By this time the level of sophistication regarding computer models and their uses had increased somewhat and champions of both taxation philosophies made use of projections from the RED-1 model in bolstering their cases. Each group developed substantially different assumptions concerning the construction schedule of a major coal gasification complex and the availability of federal matching funds for highway construction. Depending on the assumptions used, coal development was projected to result in a fiscal deficit for state and local governments combined of $30 million during the period 1979-1983 or, alternatively, a surplus of $20 million over the same period. The substantial differences between these two projections confused some legislators and led them to question both the credibility of the model and the value of its parent organization. In the end, the 1979 Legislative Session made only modest adjustments in the coal severance tax.[6] The distributional features of the 1977 legislation were retained intact except for a provision to allow some distribution of revenues to counties whose borders are within 15 miles of a mine tipple.

In retrospect, then, the RED-1 model was useful in defining the implications of alternative taxation proposals for local jurisdictions and was a substantial aid in evaluating alternative proposals relative to the criterion of providing adequate fiscal resources to local governments. It had little effect, however, in resolving the deeper philosphical differences between the two taxation positions.

Use in Impact Assistance Administration

The severance tax/impact assistance program developed by the State of North Dakota relied heavily on grants to local governments. The effective administration of this grant program, then, was critical to the overall success of the effort. The legislation provided considerable flexibility for the administrator as grants could be made to any local political subdivision which "demonstrates actual or anticipated extra-ordinary expenditures caused by coal development and the growth incident thereto." The Coal Impact Office made substantial use of the RED-1 model during the period 1977-1979. Projected changes in population and school enrollments were utilized in conjunction with information on capacities of existing infrastructure in assessing the need for various proposed facilities. Grants for new public facilities were often made a year or more before actual population growth created a need for expanded capacity. Many observers feel that the ability of the Coal Impact Office to anticipate such

[6] *The base rate for the tax was established at $0.85 per ton as of July 1, 1979 with an inflation adjustment of $0.01 for each four point increase in the Wholesale Price Index. This legislation actually resulted in a slight decrease in the effective tax rate as inflation adjustments over the 1977-1979 period had resulted in a tax rate exceeding $0.90 per ton by mid-1979.*

needs and provide funding in a timely manner enabled these communities to cope with the problems of rapid growth much more effectively than has been the case in many other areas.

The simulation model was particularly useful as an administrative tool because it allowed rapid responses to changes in the development outlook. During the period 1977-1979, three major power plant construction projects were underway in Mercer and McLean counties of North Dakota. These projects experienced frequent changes in construction schedules and labor requirements. The model allowed state and local decision makers to obtain updated impact projections soon after a change in schedule was announced. Further, initial evaluations of the model's reliability indicate a high degree of correspondence between predicted and actual changes in key socio-economic indicators.

Use in Local Facility Planning

A number of counties, cities, and school districts utilized the RED-1 model during the period 1977-1979 in developing capital budgets and in various other planning activities. One example is provided by the City of Beulah which used the model as an aid in its capital facilities planning. Beulah, located in Mercer County, had a population of 1,344 in 1970. By early 1977 the prospect of rapid growth was apparent as construction of a 440 megawatt (MW) electric generating plant was scheduled to begin a few miles south of Beulah in late 1977 and construction of an 880 MW plant and a 5.2 million ton per year (MTPY) coal mine was to begin a few miles north of the town in 1978. Further, a 250 million cubic foot per day (MCFD) coal gasification complex was being planned for construction a few miles from Beulah. This facility also would require an additional 9.4 MTPY of coal mining capacity, but its construction schedule was uncertain.

Beulah officials readily perceived that growth resulting from these developments might require substantial expansion of a number of the community's facilities and services. The wide range of possible outcomes, however, made their planning task extremely difficult. For example, if only one 440 MW plant were built, the county could anticipate a peak construction period population influx of about 1,400 and a permanent population increase of about 300. Development of both electric generating facilities would likely lead to a construction period growth of about 4,200 and a permanent increase of about 2,000. If the gasification plant were developed on schedule, the prospective population increases could be on the order of 9,000 at the peak of construction activity and 7,000 on a permanent basis. Necessary assumptions regarding the distribution of population growth within the country added to the uncertainty for local officials.

The potential magnitude of growth was a concern not only with respect to the necessary capacity but also for the basic design of some facilities. For example, in early 1977 the most immediate concern of Beulah officials was planning for a new sewage treatment facility. If only a few hundred new residents were anticipated, the most cost-effective alternative would have been to add one more cell to the existing lagoon facility. On the other hand, if population growth were expected to be several thousand, the most appropriate solution might have been to build a new treatment facility as no more than one cell could be added to the existing one.

After a preliminary meeting with members of the REAP staff, the Beulah City Commission requested a series of population projections, incorporating several alternative assumptions regarding the extent and timing of development coupled with alternative assumptions concerning Beulah's capture rate for the in-migrating population. After reviewing these projections and assessing the relative likelihood of the development scenarios on which they were based, the Commission decided to design the treatment facility to meet the needs of a population increase of 2,000-3,000 (a level consistent with construction of the two electric generating plants) but with potential for expansion to meet the needs of up to several thousand additional residents (in case the gasification complex were developed). It appears in retrospect that this was a wise decision as both generating plants are being developed and the status of the gasification plant was not clarified until August of 1981.

Summary and Conclusions

North Dakota is a rural state whose economy has been largely based on agriculture. The discovery of oil in western North Dakota in 1951 resulted in substantial exploration and production activity in the fifties. There was some lignite coal resource development in the sixties, but the energy crisis of the early seventies resulted in a significant increase in energy resource development (both coal and petroleum) in

western North Dakota. There was considerable concern in the state as to the adverse effects that might be associated with this development.

The state has reclamation statutes to restore mined land to its "approximate original contour" and productivity and siting statutes to "minimize adverse human and environmental impact" of energy conversion and transmission facilities. It has also enacted statutes to provide for energy development impact mitigation.

The 1975 Legislative Assembly funded the North Dakota Regional Environmental Assessment Program (ND-REAP) to assemble baseline and project-related data, store these data in a readily accessible manner, and develop analyses systems to provide information across a broad range of subject matter areas. One such analysis system was an economic-demographic-fiscal impact simulation model to evaluate likely impacts of energy (and other) resource development projects.

This model has been widely used in North Dakota and has been adapted to uses in other states. Although there have been some problems associated with energy resource development in North Dakota, many believe these problems have not been as serious as in other areas.

Socioeconomic Studies Program and Approach

Thomas C. Warren

Introduction

The Alaska Outer Continental Shelf (OCS) Socioeconomic Studies Program (SESP) was created in 1976 by the Department of the Interior, Bureau of Land Management (now the Minerals Management Service (MMS)) in response to their own and the State of Alaska's concerns of the effects of OCS exploration and development on the people of the State. Its purpose is the prediction and evaluation of Alaska OCS petroleum development upon the physical, social, and economic environments within Alaska at the State, regional, and local community levels.

As stated in the original study plan ". . .(given) the various degrees of subsistence living in the rural regions of Alaska, the social and economic impact of OCS petroleum development takes on a much higher significance than in the 'Lower 48'." Populations in the major urban areas of the State (Fairbanks and Anchorage) and in the "Lower 48" OCS development areas have most of the social and cultural traditions and characteristics of contemporary Western industrial society. In these areas, development will impact man's use of the land, the natural physical environment, and alter local economic and social structures, but those who are subjected to the consequences of these events will at least end up in a still familiar cultural setting. Under these circumstances, the costs and benefits of the dislocation can be calculated, for the most part, in common economic and social accounting terms.

The study plan also states "Rural Alaska differs culturally not only from the dominant Western industrial society, but regions and areas within the state present a wide diversity among themselves. . . " This diversity is rooted deeply in the local physical setting of the communities, the land and natural resource base, patterns of local use (both commercial exploitation and subsistence) and inherited cultural traditions. Not only is there lack of uniformity in the cultural and social structures of these areas, but their paths and their stages of evolution differ. "Outer Continental Shelf petroleum development poses possible changes in the existing rural communities and their societies. This development could affect these communities by changes in their current support systems (e.g. use of land and ocean space, resource use), or by their submergence through an influx of immigrants with different lifestyles and cultural values. Depending upon the goals of these communities, such change could be considered as positive or negative. If the nature and magnitude of these possible changes are known in advance, then these communities may take appropriate action to mitigate unfavorable changes or to enhance favorable changes. These changes, however, go beyond conventional economic considerations and are of deeper social and cultural significance. The ultimate objective of this research program is to arrive at a basis for prediction and evaluation of the changes."

Program and Approach

Given the nature of the research task, the study program was, and is, an applied program. Within the bureaucracy, our goal is the timely provision of social, cultural and economic information to adequately inform the Secretary of the Interior of the consequences of specific OCS leasing and OCS management decisions.

Simplistically portrayed. Figure 1 shows the leasing and lease management (operations) process consists of two major components - the pre-sale phase and the post-sale phase.

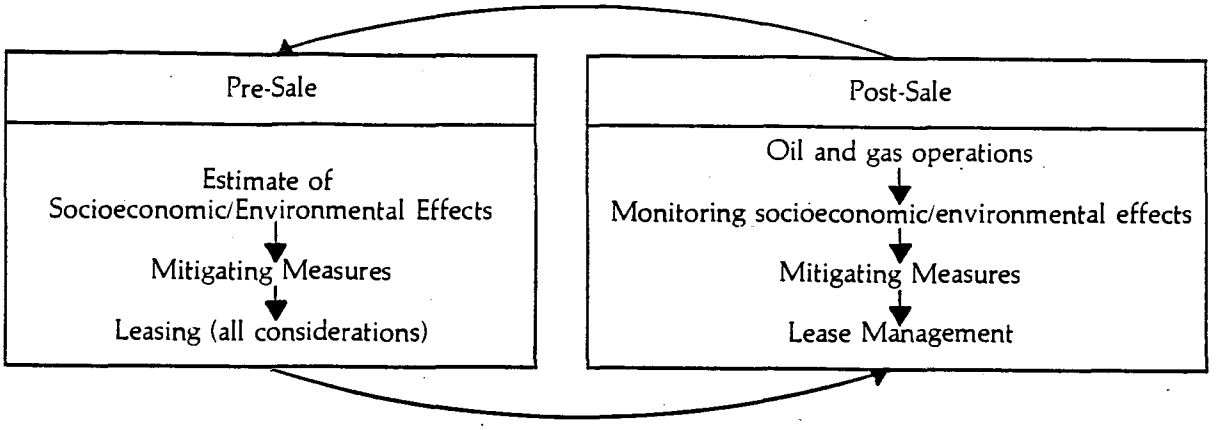

Figure 1. Leasing and Operations Process, OCS

In brief, the major pre- and post-sale program components are: estimation of socioeconomic/ environmental effects; mitigating measures; leasing and lease management; and monitoring. While the Socioeconomic Studies Program is not the entity responsible for identifying possible mitigating measures, we do contribute information to those who do recommend such measures. Monitoring provides the information feedback for both pre-sale and post-sale decisions.

The general approach followed in all studies of program impact evaluations is based on a comparative analysis of hypothetical changes likely to occur at the State, regional or local level. Although the impact evaluation process is complex, due to the large number of studies and the need for coordination among them, generalizations can be made about the process. The evaluation proceeds in six basic steps:

1) Project OCS petroleum development activities
2) Describe baseline conditions
3. Forecast conditions likely to occur if present and forecasted trends continue and the proposed sale did not occur
4) Forecast conditions likely to occur if the proposed sale did occur
5) Analyze state and regional level impacts
6) Analyze local level impacts

Projection of OCS petroleum development activities (referred to as "scenarios") constitutes the oil and gas development hypotheses driving the impact analysis. A scenario is defined as the sequence of petroleum development events (employment, timing, location, investment, and technology) in a proposed sale area corresponding to a given level of potential recoverable oil and gas resources. Oil and gas development takes place through private sector investments, which in turn, are influenced by resource development economics. On this basis, a technology assessment model of OCS development activity is necessary for the particular lease sale. The analysis attempts to model private sector policy regarding development of the oil and gas resources.

Based on the estimated distribution and size of potential finds, the following factors affecting the efficiency of recovery are analyzed: 1) probable technologies; 2) economic characteristics (e.g. unit costs, timing and manpower); 3) environmental constraints.

Resource data for the specific lease area is analyzed at three levels: a low estimate corresponding to a 95 percent probability that there is at least that amount; a high estimate with a 5 percent probability that there is at least that amount; and a statistical mean. This information is combined with the petroleum technology assessment, converting likely equipment and locational characteristics for each

scenario to employment, cost, and scheduling characteristics.

One scenario is constructed for the high, low, and mean resource estimates and a fourth is constructed assuming that exploration takes place, but that no commercial quantities of oil and/or gas are found. In order of increasing magnitude of activities, the four scenarios are labeled the exploration, 95 percent, mean, and 5 percent cases, respectively, and each is mutually exclusive of the other. These provide a range of potential direct employment and equipment characteristics together with the likely location of both in the lease sale area.

We have performed two post-sale monitoring studies of exploration activity, one in the Gulf of Alaska (sale 39) and one in the Lower Cook Inlet (sale CI). To date, no commercial quantities of hydrocarbons have been discovered in either area, with only exploration activity occurring. While pre-sale activities and expectations may generate important effects, post-sale events have generated no identifiable significant effects under these circumstances. For this reason, the exploration only case is no longer analyzed in any detail. Similarly, the 95 percent case is often the same as the exploration only case, and has been dropped from analysis.

The purpose of baseline investigations are to develop an understanding of baseline conditions and directions of change in potentially affected human activities. Of particular interest is the identification and analysis of:

—Those elements or systems of human activity that are affected by OCS development.
—Current trends within these elements of systems.
—Changes or the susceptibility for change within identified trends.

The scale of human activities varies at the State, regional, and local levels. The types of impacts are different at each level and consequently, the questions to be answered and the techniques for answering these questions are necessarily different. At the State level, the focus is on describing Federal and State government policies and patterns, interstate and intrastate economic relationships and employment migration patterns, plus many other factors that influence broad economic and demographic characteristics. At the regional level, the program focuses on broad economic, social and demographic characteristics, but only in the social and economic regions which may be directly affected by the particular lease sale. Population and economic conditions in the other regions of the State are researched, but are analyzed only from a contextual perspective unless a significant relationship to the directly affected region is discovered. A separate study of regional transportation systems is conducted because this activity is likely to have a greater areal distribution than OCS development and, because of this fact, is more likely to spread potential impacts over a greater geographic area.

The program addresses a different set of problems at the local level, where oil and gas activities are most likely to have a physical presence and, thereby, a more direct effect on human activities. Onshore oil industry activities tend to locate in or near coastal villages and communities that have some or all of the needed infrastructure services. A large influx of new people in these small communities could overburden available housing and community services and facilities, and in general cause potential social conflicts. In light of such potential problems, the local level analysis looks at the effects on socioeconomic characteristics of the communities and at the effects on sociocultural characteristics of the people likely to be impacted. Within each identified community, the analysis focuses on changes likely to occur in the following categories: population; the economy, including employment and fiscal characteristics; housing; governance, and the political climate; land use and land status; community infrastructure activities, including utilities, community facilities, education, public safety, health, and social services; and other activities that might be significantly impacted.

The information developed in the technology and baseline assessments, particularly that of baseline pertaining to existing trends and their susceptibility to change, allows the forecasting activities to proceed. Forecasts seek to develop economic and demographic projections for the year 2010. The primary focus of the impact analysis and the forecasts is to discover the incremental effects or changes likely to be caused by the proposed lease sale, assuming different OCS development scenarios. At the local level, because of the stage of OCS development in Alaska generally, conditions are changing from a base that is, in general, devoid of any prior OCS influences. Thus, at the local level, straightforward forecasting techniques will usually account for the incremental effects of the planned site. In some instances, successive sales are geographically proximate and local level forecasts must take into account

the events resulting from a prior sale, if the prior sale affected, or is assumed to affect, the community under study. This complicates the local forecast because the prior sale is likely to follow any number of development scenarios. The specific forecasting technique used depends largely on availability of local data, and the ability of the contractor to accurately substitute knowledgeable assumptions.

At the regional level and, particularly at the State level, the forecast method must change. This change must not only account for the difference in issues at these levels, but also for the cumulative effect of all prior lease sales, whose collective development activities over the forecasting period form the context for evaluating the incremental effects of the planned sale. In regional/State level forecasts, the need to account for the events of prior sales requires a different approach, one in which incremental changes are derived from the difference between cumulative effects with and without the planned lease sale. The development of such a forecast requires a replicable process (i.e. a model). The SESP uses the Man-in-the-Arctic Program (MAP) econometric model, which has both statewide and regional sub-models.

The fact that each sale can be characterized by several scenario, or development, cases is an important consideration in constructing the cumulative cases for analysis. The number of possible combinations of cases increases exponentially as the studies move from one lease sale to the next. Because of the hypothetical nature of the scenarios and because the SESP seeks only to bracket the range of significant impacts, cumulative cases are constructed using a "pure" accumulation of mean lease sale scenarios. That is, the mean scenario case is used to represent each lease sale being included in the analysis prior to the subject sale. The weight of analysis of the subject sale is also focused on the mean development case, assuming all prior sales held at the mean level.

The "base" case component generally represents an extension of existing conditions and known, or estimated, trends without consideration of any additional future lease sales. At the regional and statewide level there are several planned and ongoing oil and gas activities, as well as other resource development activities, which influence the infrastructure characteristics, expenditure patterns, and migration patterns of the various regions and the State as a whole, thereby affecting the cumulative forecasts. For the most part, the base case is likely to vary only slightly from one lease sale to the next.

By way of example, assume we are evaluating the Navarin lease sale 83, which is the next proposed sale after the St. George Basin sale 70. By definition, the evaluation of incremental effects associated with sale 83 must be derived by a comparison of forecasted conditions with and without the lease sale. Concentrating first on the incremental effects of the mean scenario case, and using the same manner in which the components of the cumulative case were defined, the components of the cumulative mean case for sale 83 are composed of all prior Alaska OCS leasing. When the component characteristics of the St. George Basin cumulative mean case are run in the MAP model, the employment and population characteristics of scenarios representing each lease sale are collectively integrated and combined over the forecasting period. The resultant forecasts become the cumulative conditions **without** the lease sale being studied. When the component characteristics of the Navarin lease sale mean case are run in the MAP model, the resultant forecasts become the cumulative mean condition **with** lease sale being studied. Comparing the forecasts, the difference represents the incremental changes due to the mean scenario case developed for the Navarin lease sale. Significant parts of our transportation, local socioeconomic, commercial fishing, and Anchorage impacts analyses are similarly treated.

Changes resulting from oil and gas development are viewed from both their beneficial and adverse characteristics in the impact analysis process. As stated earlier, the analysis compares hypothetical future conditions that might occur with OCS development to a hypothetical future condition that might exist if the lease does not take place.

The logic used to explain impacts begins with the description of baseline conditions and proceeds to describe forecasted conditions without the planned sale. Sequentially, for each scenario, the explanation continues by describing OCS activities that might occur between each specified horizon year and the changes that are likely to be brought about as a result of those activities.

Though the basic approach as described has been followed since the inception of SESP, the direction and emphasis has changed considerably. Our case study program is constituted of first describing the impact-causing agent, then the existing socio-economic conditions and anticipated changes without OCS, and, finally, the impacts assessment in the categories previously described, with the emphasis on methodologies.

By 1980, most OCS leasing regions of the State had been analyzed in this manner at least once. This

significant information and methodological base was used in redirecting the program studies now under way reflect these changes. Generally, these changes recognize the integration of cash and subsistence economies in rural Alaska, the potential for structural change in both social and economic systems, and the reflection of a much higher degree of sophistication in the analytical tools employed.

The papers which follow describe the evolution of these studies in their methods, applications, and findings in the local socioeconomic and sociocultural environments, economic/demographic and fiscal developments, and commercial fishing industries in the Anchorage area.

Economic and Demographic Modeling
Alaska OCS Social and Economic Studies Program

Kevin R. Banks

We have heard that the objective of the Alaska OCS Office's Social and Economic Studies Program (SESP) is to assess the potential impacts likely to occur as a result of offshore petroleum development. To this end, the SESP has adopted modeling techniques of the Institute of Social and Economic Research (ISER) of the University of Alaska. These models form the basis of much of SESP's economic and demographic analyses, which serve as input to Federal OCS decisions. ISER's work is also at the center of other related studies conducted by the SESP: work which is intended, in some instances, to improve our knowledge of model assumptions and inputs and work which utilizes model outputs to analyze the broader effects of OCS development on infrastructure, transportation, and the society and culture of the region.

A quantitative evaluation of economic, fiscal, and demographic impacts associated with large scale offshore operations serves to put issues into focus. Extraneous or miniscule effects can be sorted out and essential information may be displayed in some clear order or context. Modeling does not foretell the future, but it can permit the policymaker to test different assumptions about future events and how these events may be altered by specific policies. If the model is structured well, its users can assign some degree of confidence to their projections. It is because of this structure that regional modeling is so alluring to resource managers.

The Map Model

The ISER Man-in-the-Arctic Program (MAP) statewide and regional model was selected for the SESP early on in the program. It was recognized that the circumstances which determine economic change in Alaska were very different than the lower 48, and that national models (i.e., those that depend upon data collected nationwide), would be unsuitable to the Alaska situation.[1] The Alaskan economy is marked by tremendous instability and a sparse population living in very remote locations. Linkages among industries that we would expect to find in the lower 48 are very different or, more likely, non-existent in Alaska. There is also a fundamental lack of comparable data between what may be available here and the rest of the country. Because of these differences, several state-specific economic, demographic, and fiscal models were examined. Some of these depend on national economic relationships; other are specified for only one or two regions of the state. Theoretical approaches were examined and discarded because they failed to account for the tremendous structural changes associated with rapid economic growth and contraction. The MAP model was designed specifically to analyze the impact of OCS development and is largely dependent on Alaskan data sources. More importantly, the model includes policy variables which are unique to Alaska, (i.e., transfer payments resulting from the Alaska Native Claims Settlement Act (ANCSA)), fiscal responses to petroleum development and local

[1]*For a discussion of other economic and demographic models, see Huskey, Lee, William Serow, and Ted Volin, Design of a Population Distribution Model, Technical Report No. 24, Alaska OCS Socioeconomic Studies Program, June 1979. Also, Regli, Leland D. and Lay James Gibson, Socioeconomic Forecasting Methodologies: A "State-of-the-Art" Review, draft final report, U.S. Geological Survey, May 1982. A succinct overview of the Harris Model used by other OCS studies programs may be found in Krutilla, John V., and Anthony Fisher with Richard E. Rice, Economic and Fiscal Impacts of Coal Development Northern Great Plains, Resources for the Future, John Hopkins University Press, 1978.*

and state taxation. This gives the model the added power to structure different "futures" for the state economy which are based on various political decisions.

The MAP Economic Model

The MAP Model is actually a system of sub-models which are interdependent. Each sub-model in turn is a system of simultaneous equations whose parameters are determined by econometric techniques. The economic model illustrated in Figure 1, is technically a disaggregate economic base model. The model determines industrial output, and then proceeds sequentially to estimate employment in each industry, wages and salaries, and real disposable personal income. The level of production for endogenous (or non-basic) industries is determined as a function of the level of personal income while basic industries, such as mining, federal government, agricultural-forestry-fisheries, and manufacturing are exogenous. These industries are said to "drive" the rest of the economy. Output of the construction industry is a combination of both components. One is dependent on the level of personal income (e.g., residential-type construction associated with an expansion of the Alaskan economy), and another which is directly tied to the building of resource extraction and transportation facilities. After output in each of the major industrial sectors has been determined, the model then calculates the level of industry employment. Employment is a function of output in each industry. It is assumed that the derived demand for labor will determine the level of employment and that the local supply of labor is fixed (i.e., no change in the labor force participation rate). The supply of labor is brought into equilibrium with the demand for labor through migration. This, then, is the principal link between the economic model and the population model discussed below.

Employment in the agriculture-forestry-fisheries industry is determined outside the model. There does not appear to be any clear cut statistical relationship between output and employment in this industry because employment in this sector seems to be determined by non-economic factors. The lack of complete employment data, including proprietors and non-covered employees in the industry, however, may have also led to the decision to specify agricultural-forestry-fisheries employment exogenously.[2]

Employment in state and local government is determined arithmetically as the ratio of total wages and salaries in government and the wage rate. Here the economic model is linked to the MAP fiscal model. Total wages and salaries are part of the State's operating budget which, in turn, is determined by a variety of rules chosen by the model user.

Industry wage rates are then estimated by the economic model as a function of average U.S. wage rates in each industry and the cost of living in Alaska. When the demand for labor rises more rapidly than supply, the model allows for an increase in the wage rate. Labor supply shortages are then assumed to dissipate and U.S. and Alaska wage rates come into equilibrium. A distinction is made between "enclave" and "non-enclave" construction wage rates and wage rates which are associated with employment in large project manufacturing.

Wage and salary earnings are computed next. Personal income is the sum of wage rates times employment in each industry, plus income earned from other sources including rents, dividends, and interest which are regarded as some estimated proportion of wage earnings. Transfer payments made under ANCSA are treated explicitly by the model and are exogenous additions to income based on the provisions of the Act. Disposable income is estimated by subtracting personal tax and nontax payments with a distinction made between Native and non-Native incomes. This is then adjusted to account for the effects of inflation using a relative price index which is a function of the U.S. Consumer Price Index.

The Map Population Model

The MAP demographic model projects population growth using standard cohort-survival techniques. Population growth results from factors which affect net migration patterns and natural increase, the excess of birth over deaths. These factors are treated separately in the model and then are combined in the long run through age-sex distribution of the State's population. The effect of a major migration into the State would alter the sex-age distribution. Since different age-sex groups are characterized by different birth and death rates, changes in their distribution will affect the rate of natural increase. The rela-

[2]*This sector is so dominated by fisheries in Alaska that estimates of output in agriculture and forestry do not add much to the predictive power of the model.*

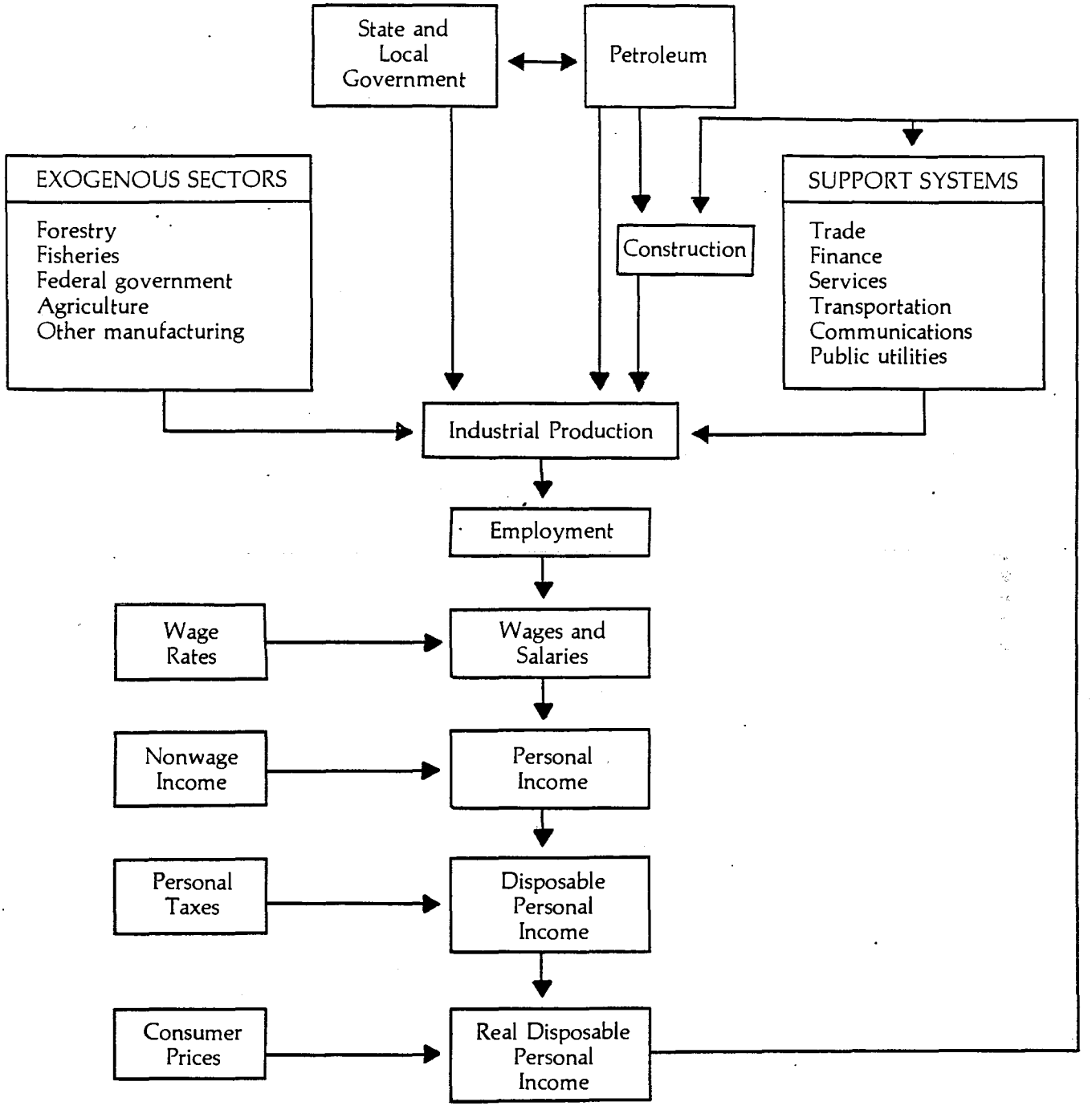

Figure 1. Structure of the MAP Economic Model

Source: Kresge, David T., Thomas A. Morehouse, and George W. Rogers, *Issues in Alaska Development*, Institute of Social and Economic Research (Seattle: University of Washington Press, 1977).

tionship between net migration and natural increase can be seen in Figure 2.

Native and military populations are incorporated in the model separately with the military population determined exogenously and native population assumed to grow independently of factors which control non-native civilian population growth.

Net migration, as mentioned above in the description of the economic model, is a function of a change in the level of Alaskan civilian-non-native employment and the lagged value of the Alaskan-U.S. ratio of real disposable personal income per capita. In a period of rapid expansion in the Alaskan economy, one would expect unemployment to drop and as the market for labor tightens, income per capita will rise. This would induce in-migration until unemployment rises again and the ratio of per capita real disposable personal income between the U.S. and Alaska attains some equilibrium. Because of this feedback mechanism, the model will, in the long-run, keep population and economic growth in some reasonable balance. The MAP demographic model operates as a dynamic simulation model which can replicate fairly complex response patterns of this sort.

The MAP Fiscal Model

The MAP fiscal model predicts state government revenues in four categories. Petroleum revenues are exogenously provided from information furnished by the user about production wellhead prices and facilities. Endogenous revenues are a function of economic activity. Federal transfers are related to the population and fund earnings are determined by the balances in the general and permanent funds. The user, then, decides how the State will disperse these revenues and how they may change in the future. Expenditures may be tied to historical relationships or trends, simple growth rates, or they may be related to specific growth variables like population or the size of the general revenue.

Local government revenues consist of state and federal local transfers, and endogenously generated revenues. Expenditures are determined by income and population.

The MAP Regional Model

There is also a MAP economic, demographic, and fiscal model which analyzes impacts at the regional level. The state was divided into seven OCS development regions which roughly correspond to the

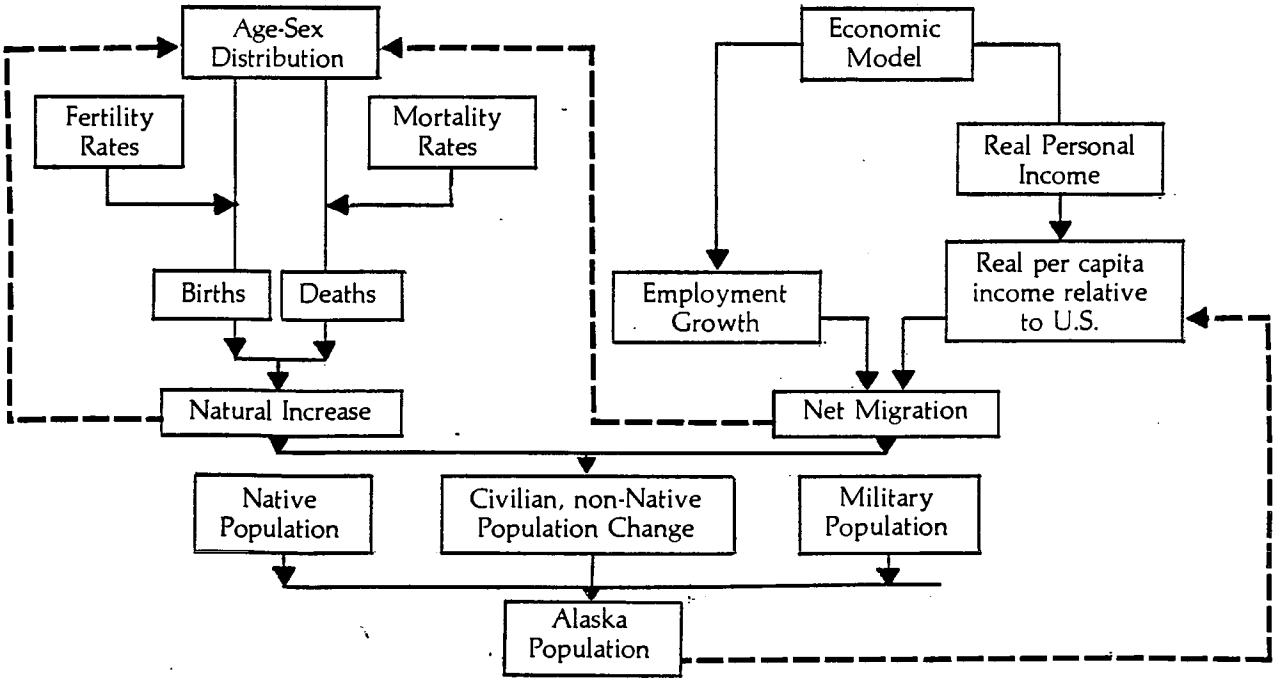

Figure 2. Structure of the MAP Population Model.

Source: Kresge, David T., Op. Cit.

boundaries of the native regional corporations. These were later modified to correspond to existing census division boundaries. This provided better specificity of impact analysis which would conform to historical data series for employment and population.

The regional demographic model is controlled by population totals projected for the state. Total population is allocated to each region using separate regression techniques based on historical employment-population relationships by region. The economic component estimates employment and income in the same way as the statewide model illustrating potential shifts in migration patterns. This serves as input into the regional demographic model in a way analogous to the statewide models.

Improvements to the MAP Model

The MAP model has evolved over time to meet the needs of its users and to accommodate changes in the economy which could not have been anticipated by the projection of historical trends. The availability of new data required that stochastic equations be re-estimated and that the model be "re-initialized" to begin simulation runs in 1980.

More detail has been incorporated into the model to better account for tourism, fisheries, manufacturing, and construction. The model has been even more disaggregated to display the effects of changes in each of these sectors. The service sector, for example, now consists of four components: support sector, tourism, business services, and native claims. The support and business services sectors are determined endogenously. Output in tourism is a function of the number of tourists; native claims is a given. Basic construction now is divided into "enclave" and "non-enclave" construction, the former characterized by premium wages.

Changes in the fiscal model now permits the user to systematically incorporate political decisions in the determination of how the state government capital and operating expenditures will grow in the future. Called the fiscal rule by ISER, budget growth and expenditures are allowed to fluctuate as a function of changes in population, prices and person incomes or, alternatively, by changes in specific events which are outside of the private economy. The user can decide what the effects would be if government policy were set to mitigate the effects of major industrial development. The model even provides an option that requires state expenditure to be a function of revenues.

The structure of the fiscal model has been changed to reflect differences in the level and composition of state expenditures and revenues. New government programs and special capital expenditure programs are incorporated in the model. The model will also track the effect on personal incomes produced by the Permanent Fund distribution program. The net effect of these changes is to account for the greater participation of the state government in the economy.

The overall effect of these improvements on the reliability or the consistency of the model's projections cannot be determined, except by the passage of time. The Model has been run by ISER for at least nine technical reports and technical memoranda in the last five years, and rarely have the projections been the same. Figure 3 illustrates the results of these MAP runs. The "base case" for statewide population growth for each run is included here to demonstrate how the model may be manipulated and how it may be affected by assumptions provided by the user. As should be expected, assumptions made about exogenous employment seem to provide the most important source of variation among the MAP statewide population projects. All of the projections include an expansion of Prudhoe Bay operations into the Lisburne and Kuparak Formations and a shutdown of the Upper Cook Inlet operations in 1990. The construction of the Alcan Gas Pipeline and the Pacific LNG plant are also included in each base case with variations in only the timing of the projects.

The trends project by the Northern Gulf of Alaska and Kodiak sales assume a growth in OCS developments in the Beaufort Sea and Lower Cook Inlet, which was to have peaked in 1981. This dramatic shift in employment (and the resulting in-migration) early in the projection period leads to a larger population estimate to the year 2000 than with any of the other forecasts. More recent runs of the model project produced more moderate increases in population. Other construction projects, notably the Susitna Hydroelectric Dam, Beluga Coal Mine, and a petrochemical facility to process State royalty oil, among others, have been included in these later runs. Completion of all these projects are scheduled to occur in the 1980's. The Bering/Norton and Lower Cook Inlet developments are similar in that they show a drop in population growth in 1984-1986 as the economy shifts from rapid construction industry growth in the late 1970's, and resumes a growth rate which is more normal in the 1980's.

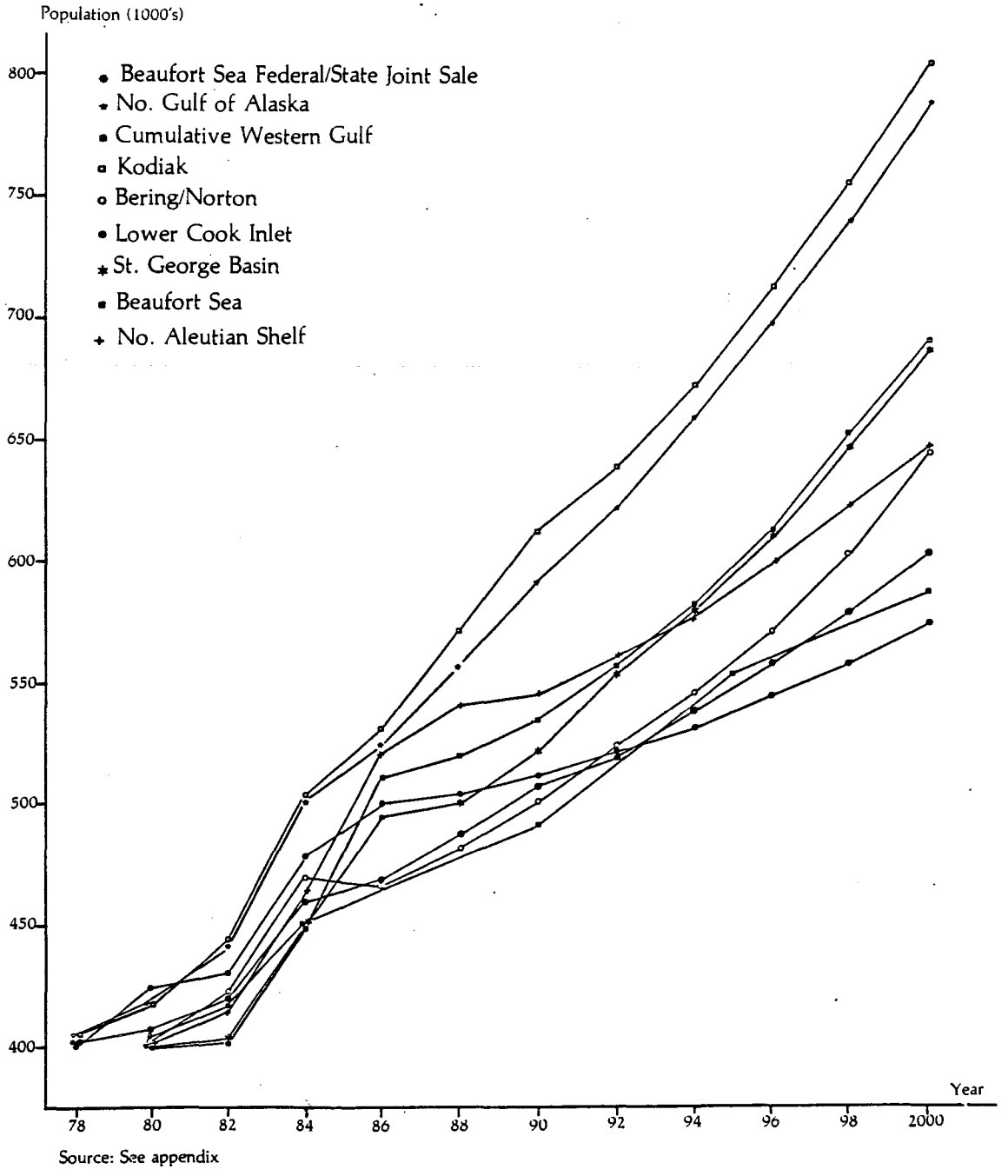

Figure 3. MAP "Base Case" Population Projections.

The Small Community Population Impact Model

The small community population impact model (SCIMP) was developed in order to model OCS impacts on the census division level.[3] At the time, the MAP regional model had not yet been disaggregated beyond the seven regions and the SESP felt that more localized impacts needed to be addressed. Over time, the SCIMP model has been further adopted to model the impacts on individual communities as well.

The principal advantage of SCIMP is that it may be run on communities or census divisions for which little or no historical data exists. The SCIMP is a straight-forward accounting program which calculates economic and population growth given the interrelationships provided by the user. Unlike the MAP model, the user must supply a number of assumptions and initializing values; these parameters are not implicitly determined by econometric techniques. Since the model is inexpensive to run, in terms of computer time, the user may conduct repeated sensitivity analysis, testing the effect of slightly altering his or her assumptions until some "reasonable" projection is formulated.

The SCIMP model, like the MAP model, depends on an economic base model. The basic industry sectors (manufacturing, fishing, state and federal government, mining and special projects construction, and military) drive the community economy. By creating employment opportunities, the industries generate new jobs in two supporting sectors, the trade and financial industries. New jobs attract migrants and in-migration is assumed to occur to clear the local labor market. A cohort-survival approach is used to project population growth, taking into account the age and sex ratio of the resident population and that of the in-migrants and their dependents.

The model is highly sensitive to two important parameters: the local labor force participation rate (LFPR) and the rate that local employment (in the support industries) grows to serve the exogenous industries. The empirical estimate of these two parameters has been the subject of recent SESP studies.[4] It has been shown that actual LFPR in rural Alaska is sensitive to the "discouraged worker" effect and the seasonality of employment preferences. Growth in employment opportunities will result in higher rates of unemployment as discouraged workers return to the labor market. As unemployment rises, it is usually anticipated that out-migration will occur to bring actual LFPR into some equilibrium. The extent out-migration in rural Alaska is, however, constrained by the social costs imposed on the migrant when he or she must leave the familiar surroundings of home and culture to work elsewhere is a predominant factor. But migration does occur on a temporary or seasonal basis which also tends to obscure an estimate of LFPR for SCIMP modeling. Seasonal employment preferences are related to the importance given to subsistence activities, and leisure, and the associated opportunity costs of cash employment for the rural Alaskan.

Evidently the equilibrium LFPR in rural Alaska is subject to change given some exogenous growth in unemployment opportunities. This growth will surely lead to increased wages, an increase in the cost and a decline in the productivity of subsistence (over the long run), change in tastes, and an increase in the marginal utility of income as more goods and services become available (this may be interpreted as another way of saying that the real wage will increase).[5] As these factors influence a growth in labor force participation as employment grows, a future trend in wage economy participation can be estimated. The LFPR may grow across census divisions in much the same way as the diffusion of new technologies - in each case some maximum is reached - and a logistic curve can be used to describe the diffusion of labor force participation. Analysis of this relationship indicates that the census division labor force will approach its potential, about 75 percent of the population, at a level of 7,400, roughly the level found in the Kenai census division.

The multiplier which describes the rate that local employment grows to serve the exogenous sector is made up of two components. There is, first, the employment generated as a response to the growing demand of the basic sector on the support sector and, second, the employment generated as a result of rising personal incomes within the region and subsequent demand for goods and services from both sec-

[3]*Huskey, Lee, William Serow, and Ted Vivlin, Op. Cit. and Huskey, Lee, and Jim Kerr, "Small Community Population Impact Model", Technical Report No. 4, Alaska OCS Socioeconomic Studies Program, June 1980.*

[4]*Huskey, Lee; et al., Economic and Demographic Structural Change in Alaska, Technical Report No. 73, Alaska OCS Socioeconomic Studies Program, June, 1982.*

[5]*Fish, E. P. "The Response of Nonmonetary Production Units to Contact with the Exchange Economy" in Reynolds, L., Agriculture in Development Theory, (Yale, New Haven: 1975).*

tors. This multiplier has been static in past applications of the SCIMP model but in rural Alaska this assumption does not adequately illustrate the structural change which occurs as the local economy expands.

More recently, SCIMP has been run for the Aleutian Islands census division as part of an economic and demographic analysis of the Navarin Basin sale. In this case, the employment multiplier is assumed to change over time as the population grows. Again, the Kenai census division is the source of an estimate of the potential employment multiplier. This assumption is based on the recognition that, as the economy grows, there occurs changes in the number and kind of industries and the economy becomes more complex, more interactive. It is also hoped that the local economy becomes less dependent on outside economies and achieves self-sustaining growth. ISER has just completed work which will provide better estimates of the effects of structural change on employment and population.[6] Their work is the subject of another paper presented at this Symposium.

An important issue which has also arisen through the Alaska OCS Environmental Impact Analysis process is the question of precisely who will fill the jobs generated by all of this economic growth. Of concern here is the "Share of OCS Employment to Alaska Residents" (SEAR), and the "Shares of Employment to Local Residents" (SELR), which are fundamental to the problems of identifying leakages in the local and State economy and how important offshore employment will be. The SEAR and SELR factors are first an assumption made about direct employment characteristics before the MAP or SCIMP models are run. Interviews with industry officials and the observed patterns of the Upper Cook Inlet provide a source of SEAR and SELR estimates for each phase in OCS operations.[7] The second aspect of these factors considered is how many Alaskan residents are currently employed who are from the local region or community. These estimates are also based on the Kenai experience tempered by the observations of other industrial projects in the Northern Great Plains[8] and the North Sea.[9]

Unfortunately, the SEAR and SELR factors are subject to a whole host of estimation problems. There is no historical situation which will be similar to the OCS activity in frontier areas of Alaska. No oil has been found there. ISER has attempted to refine their estimates but the SEAR and SELR factors will remain a source of debate. More than any other coefficient in our economic and demographic modeling, these define the local socioeconomic impacts which must be mitigated by the local and State government.

[6] *Huskey, Lee, et al. Op. Cit.*
[7] *IBID.*
[8] *Leistritz, F. Larry; Steven H. Murdock; and James S. Weland, Characteristics and Settlement Patterns of Energy-Related Operating Workers in the Northern Great Plains, Fargo, North Dakota: Department of Agricultural Economics, North Dakota State University, October, 1977.*
[9] *Lewis, T. M. and I. H. McNicoll, North Sea Oil and Scotland's Economic Prospects, London: Groom Heron, 1978.*

Appendix: Map Statewide Population Projections-Various Base Cases

	Beaufort Federal/State Joint Sale	No. Gulf of Alaska (Sale 55)	Cumulative Western Gulf	Kodiak (Sale)	Bering/ Norton (Sale 57)	Lower Cook Inlet (Sale 60)	St. George Basin (Sale 70)	Beaufort Sea (Sale 71)	No. Aleutian Shelf (Sale 75)
1977	399,968	410,660	—	410,660	—	—	—	—	—
1978	402,357	406,667	404,436	406,667	-	404,436	—	—	—
1979	419,124	418,656	402,469	418,656	402,374	403,256	—	—	—
1980	449,203	434,173	405,156	434,173	401,928	407,511	400,500	397,976	402,057
1981	466,927	455,563	415,106	456,078	414,601	419,562	399,946	395,049	415,577
1982	463,198	486,359	434,151	487,441	445,052	440,274	407,591	402,451	433,439
1983	470,099	502,802	450,886	504,694	468,325	457,932	421,857	417,090	448,932
1984	479,525	501,479	453,976	503,802	470,451	462,438	453,741	448,713	464,082
1985	491,934	509,057	456,806	518,372	467,301	465,280	480,755	488,759	489,054
1986	500,022	523,083	—	530,903	467,498	469,501	494,946	510,300	521,101
1987	503,990	539,029	—	551,736	473,881	477,136	499,657	516,114	537,185
1988	504,373	556,942	—	573,044	483,409	487,546	502,956	519,502	540,370
1989	508,403	575,352	—	593,590	494,023	498,194	509,160	525,482	543,411
1990	512,526	591,580	492,853	612,523	503,309	507,570	522,219	534,100	545,098
1991	518,104	606,771	—	626,140	513,399	514,843	583,342	544,443	552,977
1992	522,414	622,335	—	639,242	523,978	521,645	553,102	556,238	560,559
1993	528,300	640,355	—	655,575	534,978	529,300	567,305	570,210	569,582
1994	533,322	658,298	—	672,761	546,142	537,041	579,898	583,372	579,119
1995	539,760	677,649	503,883	692,017	557,924	546,630	593,178	596,828	589,578
1996	545,167	698,406	—	713,324	571,402	557,134	610,490	613,972	600,638
1997	552,447	719,126	—	734,418	587,159	567,907	629,740	633,258	611,903
1998	558,855	740,455	—	756,157	604,098	579,924	648,981	652,729	623,553
1999	567,344	764,593	—	780,692	623,151	591,073	666,240	670,029	635,533
2000	575,574	789,287	588,820	805,725	644,595	604,521	686,394	690,057	648,598

Source: Alaska OCS Socioeconomic Studies Program, Technical Report Numbers, TR-18, TR-34, TR-38, TR-42, TR-50, TR-57, TR-62, TR-68, TR-73, and Technical Memorandum Number 39 (unpublished).

Commercial Fishing Analysis Studies: Alaska OCS Social and Economic Studies Program

Karen J. Gibson

Introduction

Alaska's commercial fishermen harvested 857.2 million pounds of fish and shellfish during 1979. This harvest had a value to the fishermen of $622.3 million.[1] Some of the richest fishing grounds in the world are located in the Bering Sea while Kodiak and Dutch Harbor are among the nation's top commercial fishing ports. These statements provide evidence of the importance of commercial fisheries in the seas around Alaska. Obviously, the oil and gas lease sales on the outer continental shelf will lead to interactions between the seafood production industry and the petroleum industry. The objective of the Socioeconomic Studies Program (SESP) commercial fishing studies is to predict and analyze potential impacts and changes in the commercial fishing industries due to OCS oil and gas activities. Some areas we are examining are the fisheries data base, preemption of fishing grounds, loss of or damage to fishing gear, competition for available labor, and collisions among vessels.

Completed studies in the Gulf of Alaska include lower Cook Inlet (Technical Report 44) and the Northern and Western Gulf of Alaska (Technical Report 30). Completed Bering Sea studies include Bering-Norton (Technical Report 51), and the St. George Basin and North Aleutian Shelf (Technical Report 60). Currently under contract is an analysis of the Navarin Basin and a cumulative Bering Sea case.

Fisheries Data Base

We are concentrating on data from two sources: The Commercial Fisheries Entry Commission (CFEC) and the Alaska Department of Fish and Game (ADF&G). The CFEC data show the number of vessels and number of landings made from each fishing statistical area according to vessel length, species, and gear type. However, because of confidentiality considerations, total catch by vessel length is not always directly available from this data source. A considerable number of the data gaps were filled by using the ADF&G data which listed all the catches made in each statistical area. The remaining gaps were filled by use of catch per unit effort (CPUE) statistics which vary by vessel size, season, and area fished.

Competition for Labor

It was assumed that OCS oil activities would tend to compete with commercial fisheries for labor. To assess the impact to fisheries, a labor transfer probability model was used to compute the number of fishery-related employees that would likely transfer to OCS oil employment.

The labor transfer model assumes that the major reason for transfers is the size of wage and salary differential existing between current and prospective occupations. This means that the employment, earnings, and skills in both fisheries and OCS oil employment must be known or estimated. Skilled/unskilled labor mix assumptions were based on a petroleum technology assessment undertaken by another contractor for the Alaska OCS Office. These assumptions, in the form of percentages, were

[1] *Frank Orth and Associates, Inc. Alaska Commercial Fisheries Directory. Prepared for the Office of Commercial Fisheries Development, Department of Commerce and Economic Development, State of Alaska, 1982.*

applied to the OCS employment figures to obtain the number of job opportunities into which fishery labor might transfer.

The initial formulation for the job transfer is as follows: The probability of transfer to a higher paying job was related to the implied salary differential as a percentage of current earnings. It was recognized that some people are more likely to change jobs than others even when the salary differential offered is the same. After an examination of factors such as seniority and expected job length, a relationship between age and the tendency to change jobs was established. The transfer probabilities were modified to reflect the reduced willingness to transfer as one gets older. A distribution was established for current fishery employment based on Alaska Department of Labor statistics. Findings showed that 50 percent of the harvesting employment was composed of people less than 30 years old, while for processing employment it was nearly 69 percent. These percentages were applied to the employment estimates to obtain employment by age groups. Applying the transfer probabilities to age- and wage-specific employment estimates resulted in the expected number of people willing to transfer. The actual transfers, however, would have an upper ceiling dictated by the number of available OCS jobs.

Ocean Space Use

Preemption of Fishing Grounds

Loss of fishing ground has been considered an impact if it results in a reduction of total catch. The proportional area method is based on the simplistic assumption that the loss in catch is proportional to the area rendered inaccessible to fishing due to oil and gas installations (OGI). The estimation procedure, therefore, centers on equating the proportion of fishing area lost to the proportion of catch. The area lost is estimated and expressed as a proportion of total fishing area. This ratio is multiplied by total potential catch (or historical catch before the OGI are in place) to estimate potentially lost catch. This method does not take into consideration increased fishing effort outside the OGI. Therefore, the effect of preemption may be negligible.

Collision

Two models were used to calculate collision impacts; specifically these models were applied according to the travel patterns projected for both OCS and commercial fishing needs. The parallel path model was used in situations where expedient transit through a given area was deemed to be the major intent of vessels, while the "free gas" analogy (or random movement model) was applied to situations in which vessels could be moving in all directions. Combining the results of the two models leads to an overall estimate of number of collisions.

The parallel path model (originated by the Sperry Piedmont Corporation) assessed the expected number of collisions in each fishing statistical area by multiplying the conditional probability of a collision by the estimated number of collision situations (potential collisions). These probabilities are a function of the following factors:

—Number of vessel trips associated with the waterway
—Length of a specific body of water to be traversed by vessels
—Average velocity of vessels
—Average width of clearance of vessels
—Width of the body of water
—Number of encounters per year
—Average number of collisions per year

Historical statistics from the "Proceeding of the Merchant Marine Safety Council" and from the "Waterborne Commerce of the United States" were used in addition to statistics on vessel traffic derived from the Strait of Dover in the English Channel and an estimate of the conditions in the Pacific region of the United States waters. The parallel path model computes only part of the collision impacts, those associated with expedient travel. The following approach addresses the more random travel associated with fishing.

The free gas analogy or random movement model was used to apply to encounters between OCS vessels in transit to and from platforms and rigs, and fishing vessels engaged in fishing activities. The

number of collision situations were multiplied by the conditional probability to estimate the expected number of collisions per year for a specific fishing area. These estimates were based on: 1) the total number of miles logged in a fishing statistical area, using the number of vessels necessary to conduct fishing in the area and also those transiting the area for OCS purposes, 2) vessel density in the statistical area using the estimated number of vessels required for harvesting, and the number of OCS vessels estimated to cross the same area weighted by the time spent annually. Although increased traffic will result from OCS activities, collision problems are minimized by the large ocean areas involved.

Gear Loss

Fishing gear can be damaged or lost by coming into contact with OCS-related debris or submerged structures. Submerged structures may include suspended wellheads and pipelines which have not been buried. When areas around such structures are well known to the fishermen, damage to gear may be avoided. To estimate the number of claims projected for fishing gear loss, three factors were considered. These include:

—Claims per thousand hours per oil and gas installation in the North Sea
—Estimated fishing effort in future OGI affected areas
—Future number of OGI expected in the lease sale area

The experience in the North Sea where oil and gas developments have had some impacts on the fishing industry was used because both the resources and harvest methods in the North Sea are similar to those in the St. George Basin in the Bering Sea. A variety of demersal fish species occur in both regions and the harvest methods to both fisheries are mostly those involving trawl operations. Although there are some exceptions, enough similarity exists to allow analysis of potential gear loss and damage. The number of claims per 1,000 hours of fishing effort per OGI in the North Sea was estimated. Total effort in thousands of hours was estimated for the fishing statistical areas in the lease sale area which are assumed to be future locations of platforms. This was done using estimates of fleet size, trips per year, days fishing per trip, and hours fishing each day. Potential catch in the same statistical areas was also estimated. The total number of claims per year can then be estimated by multiplying the claims per thousand hours in the North Sea by the estimated fishing effort in future OGI-affected areas by the future number of OGI in the lease sale area.

Findings

Some results from SESP commercial fishing studies indicate that the propensity of labor to transfer from the fishing industry to higher paying OCS jobs will be quite high for certain unskilled labor categories. However, because the number of jobs available to skills transferable from fisheries is limited, the impact due to labor competition is minimized.

Similarily, the OCS supply and support vessels will bring in additional traffic leading to increased chances of vessel collisions. For example, only one collision in 20 years is projected in the St. George Basin. Based on the experience of fisheries and OCS interactions in the North Sea, a projected 12 claims per year will be made by fishermen claiming loss of or damage to their fishing gear. Thus far, SESP studies have shown the impacts to the commercial fishing industry due to the presence of the petroleum industry will not be significant in terms of competition for available labor, preemption of fishing grounds, collisions among vessels, and loss of fishing gear.

Certainly not all the questions about the social and economic impacts of the interaction between the two industries have been answered, or even asked. Earlier studies qualitatively addressed the potential competition for onshore infrastructure, and port and harbor facilities. This issue is being addressed in our current research efforts. In addition, more emphasis should be placed on fixed gear (e.g. crab pots, cod long lines) loss.

The future development and direction of the groundfish potential in the Bering Sea is the focal point of fisheries development in Alaska. How this resource will be exploited and what direction that development will take is subject to a wide variety of projections. Further, the role of joint ventures, onshore or offshore processing, and marketing potential will be key factors in determining the groundfish fishery development and warrant study. Future commercial fishing studies undertaken by SESP will focus on groundfish development and the nearshore interactions between the commercial fishing and petroleum industries.

Modeling the Economic Impact of OCS Petroleum Development in Rural Alaska

Lee Huskey and Gunnar Knapp

Introduction

The location of Alaska Outer Continental Shelf (OCS) petroleum resources assures that the onshore activity associated with their development will occur near small, remote, rural communities. The problem of modeling the impact of OCS development on these communities is complicated by the non-marginal nature of the change which will occur. The pattern of change that occurs is likely to be dominated by the size of the exogenous change relative to the size of the community. When the OCS development is relatively large, as in most potential cases of OCS development in rural Alaska, the pattern of local economic response to exogenous forces may change as the structure of rural economic and demographic relationships change. This paper addresses the need to take account of the potential for structural change in modeling economic impact.

Economic impact as used in this paper, is the change from some projected future pattern of growth as a result of a specific project. The modeling problems addressed in this paper are concerned with the accuracy of a projection of the economic impact in the sense that we wish to limit the uncertainty involved in our projections. The accuracy of an impact projection depends on three separate sets of assumptions: 1) assumptions about base case growth or growth without the project; 2) assumptions about the pattern and scale of the specific project (the scenario); and 3) assumptions about the response of the local economy and labor force to the project. Modeling addresses this last set of assumptions, but the results of the modeling effort are significantly influenced by both base case and scenario assumptions.

The extent of our concern with accuracy in impact modeling, or more importantly, the resources we devote to improving the accuracy of a model depends on the uses and timing of the projections. Impact projections have two basic uses: decision making and planning. The first step in which projections are used in the process of OCS development is the decision to lease tracts. Projections of impacts are used at this stage in the process to weigh the benefits of development against the costs. What is needed at this stage is a feeling of the order of magnitude of the impacts, not an exact projection. Once the decision to lease is made, projections are needed to plan ways to mitigate the impacts. The need to invest in public or private infrastructure and services to meet the increased population requires a fairly certain estimate of the level of future population. Our concern with accuracy is greater in the planning stage.

The point in time the projection is made also influences our concern with accuracy. The farther out in time the OCS development is planned to occur, the less we should be concerned with the accuracy of our model. The farther out in time an event will occur, the more likely it is that important parameters will change, so spending a great deal of resources on modeling will not guarantee the accuracy of projections. The timing of the projection also influences the information we have about the magnitude and path of resource development.

Bender and Juers (1975) call uncertainty about the character of resource development one of the major planning problems faced by communities. The less we know about the dimensions of the development (i.e., how much oil, what the industry plans to do), the less concerned we should be with the accuracy of our models. If we don't know the parameters of petroleum development, even a perfect model will not guarantee the accuracy of a projection. In devoting resources to improving the accuracy

of our models, we should be most concerned with short-run planning applications. The remainder of this paper examines the particular problem of structural change, and the necessity of incorporating structural change in the projection of impacts.

Impact Projection in Rural Alaska

Traditional approaches to describing regional economic growth are not appropriate for forecasting the impact of OCS development in rural Alaska. The traditional approach of economic base theory makes two essential assumptions about regional growth which differ in subtle but important ways from the economic growth process in rural Alaska. These assumptions are that the growth of the economy results from growth in the basic sector and that population growth is determined by economic growth. The linkages between basic and support sector employment and population are not so direct in rural Alaska as usually assumed. Nonwork sources of income and the potential for exporting labor also influence the growth of the economy. These factors, along with the importance of subsistence, limit the need and the desire to migrate in response to a lack of employment.

The development of resources in enclaves, such as Prudhoe Bay, with few links to the local communities means that basic sector activity can occur with no economic impact on local communities. These differences must be incorporated in any modeling effort which describes rural Alaska.

A more important problem faced in modeling rural Alaska impact is how to incorporate structural change into the analysis (i.e., the change in the basic relationships in the economy). For example, in traditional types of explanations of economic growth, the multiplier describes the relationship between the basic and support sectors; a change in this multiplier is structural change.

Rural Alaska economies are in the transition stage between pure economies and market economies (Fisk, 1975). Table 1 shows that the subsistence economy is still relatively important in rural Alaska. This transitional nature and the small size of the cash economy insures that structural change would occur in response to OCS development.

There are three structural relationships which are especially important in determining the impact of energy development. These are the local economic response (multiplier), the rate of labor force participation, and the residency of energy workers. The primary determinant of changes in each of these is the size of the local economy. As the size of the local economy increases, we expect these relationships to change. We describe the process of structural change and evidence of the potential for change in each of these relationships below.

Table 1. Share of Food from Subsistence Economy

Region	Most	About Half	Some	None
Alaska[1]	30.5	27.7	28.9	11.6
Yukon-Porcupine[2]	27.0	28.0	24.0	21.0
North Slope[3]	30.0	15.0	42.0	13.0
Nunam Kitlutsisti[4]	29.1	29.6	33.2	8.2

[1]Nathan and Associates, 1974, T2A-6.
[2]ISER, 1978, T5-3.
[3]ISER, 1981, T5-13.
[4]PAL, 1981, TE-1.

Local Economic Response

The response of the local support sector to exogenous increases in economic activity is a major component of community economic response. The local support sector consists of that portion of the local economy which provides goods and services to the community. The relationship between exogenous changes and the change in the local support sector is usually described by a multiplier. The multiplier shows the increase in local support or endogenous economic activity which occurs in response to changes in basic or exogenous activity. For marginal changes, this multiplier could be assumed to remain constant, and past relations could be assumed to describe the response. However, we would not expect the multiplier to be static in rural Alaska as changes in the multiplier will reflect structural change.

Multipliers have shown considerable variation in rural Alaska. In typical impact studies, historical ratios are used to represent the local economic response to exogenous change. Table 2 illustrates the problems with this simple approach to estimating multipliers. The simple ratio approach will not provide an accurate description of the local economic response for two reasons. First, there is a great deal of variability among years, so that a simple ratio will not accurately describe the response over the projection period. Second, there is some evidence that these ratios change with growth, and a simple ratio will not describe growth over time. To accurately project the response of rural Alaska economies to OCS activity, we need a model which accounts for potential changes in the multiplier.

A more appropriate description of the causes of support sector growth in rural Alaska assumes local growth is a function of growth in the local market. The market is determined by the income and number of local residents and purchases made by the local resource enclaves. The relationship between basic sector growth and the growth of the local support sector is not as direct as traditionally assumed because of the possibility of enclaves, which means that basic sector employment growth does not necessarily increase the size of the market.

Table 2. Support Sector Ratios (1970-1978)

	SS1[1]/Basic[3]			SS2[2]/Basic[3]			SS1[1]/Population			SS2[1]/Population		
Census Division	High		Low	High		Low	High		Low	High		Low
Aleutians	.237	(—)	.062	.255	(—)	.106	.078	(—)	.032	.042	(—)	.075
Bethel	.278	(+)	.181	1.085	(+)	.278	.035	(+)	.017	.153	(+)	.026
Bristol Bay	.283	(+)	.107	.368	(+)	.077	.053	(+)	.024	.072	(+)	.019
Kobuk	.348	(—)	.165	.508	(+)	.251	.056	(+)	.027	.072	(+)	.031
Kuskokwim	.518	(+)	.182	.281	(+)	.171	.078	(+)	.020	.043	(+)	.020
Nome	.461	(—)	.165	.996	(+)	.344	.060	(+)	.026	.148	(+)	.039
Wade Hampton	.113	(+)	.037	.696	(—)	.206	.015	(+)	.003	.051	(—)	.027
Kenai	.567	(+)	.287	.686	(+)	.457	.125	(+)	.040	.111	(+)	.060
Kodiak	.205	(—)	.156	.446	(+)	.292	.058	(+)	.041	.146	(+)	.075
Seward	.196	(+)	.067	.633	(—)	.420	.057	(+)	.016	.142	(+)	.110

[1]SS1 includes employment in construction, transportation, communications, and utilities.
[2]SS2 includes employment in retail trade, wholesale trade, services, and finance.
[3]Basic includes employment in mining, manufacturing, government, agriculture, forestry and fisheries.

(—) Decline in ratio over the period.
(+) Increase in ratio over the period.

The size of the local support sector is limited by the size of the market with regional income and population determining the size of the market. As the region grows, we expect more goods to be produced and more services to be provided in the region. As the markets expand, local producers will be able to achieve certain economies of scale which will allow them to compete with goods and services from outside the region which will, in turn, absorb high transport costs. The scale of the economy influences the goods and services available in the region, and consequently, the extent of local sector

growth for each additional dollar of income.

Table 3 provides evidence of the potential for change in the structure of the local economic response as the market expands. To investigate the potential for this type of structural change in response to OCS activity, we examined the change in support sector employment as the size of local markets changed both over time and across regional economies (see Huskey, et al., 1982). The regressions shown in Table 3 were run for coastal economies in Alaska and for small rural counties in the rest of the United States. In both cases, employment grew faster than population, indicating a change in the relationship.

Table 3. Comparison of U.S. and Alaska Support Sector Growth Regression Coefficients

	U.S.		Alaska[1]	
	Sector 1	Sector 2	Sector 1	Sector 2
Constant	-22.470	-16.213	-12.902	-10.298
Population[2]	1.444	1.413	1.216	1.394
	(13.46)	(16.18)	(9.45)	(12.18)
Per Capita Income	1.656	1.155	.919	.500
	(5.48)	(.4698)	(7.29)	(4.46)
R^2	.779	.825	.623	.666

[1]Excludes Kenai from the data set.
[2]All variables are in natural logs.

Labor Force Participation

The labor force participation observed at any point in time is a function of existing labor market conditions. Because of this, the existing labor force participation rate provides only limited help in predicting how residents will react to changes which affect existing labor market conditions. The existing labor force participation rate will be less likely to describe future response, the greater the discouraged worker effect. Discouraged workers are those workers who drop out of the labor force because they know there are no jobs available. One response to increases in economic activity in rural areas of Alaska will be the entrance of discouraged workers into the labor force.

Labor force participation plays a key role in determining the full response to OCS-generated opportunities. The response of the local support sector depends on the increase in incomes of local residents which, consequently, depends on which residents take OCS jobs. The population growth effect of OCS development will depend on how many of the jobs are not filled by local residents. The lack of correspondence between actual and desired labor force participation makes the projection of future economic and population growth less than straightforward. To describe future OCS-induced changes, we need to understand both how the actual labor force participation rate relates to the desired and how the desired rate increases.

The actual labor force participation rate is defined to be that share of the population either working or actively seeking work. This rate is related to but not always the same as the desired rate. The most important reason for this is the discouraged worker effect. When there are only limited employment opportunities, people may drop out of the labor force because they know there is no chance of finding a job. In rural Alaska, the small size of the labor markets makes this information easy to get. This ease of acquiring labor market information and the poor market conditions make the discouraged worker effect important in rural Alaska.

The small size of rural labor markets and the limited economic activity in rural Alaska suggests that the discouraged worker effect would be significant and Tables 4 and 5 indicate this. Table 4 shows the results of a state survey conducted in the Wade Hampton Census Division. This survey compared those saying they were unemployment by the conventional definition (looking for work) with those unemployed by a broader definition which includes those who want work but are not looking. The difference in these two definitions measures the discouraged worker effect. Table 5 shows the extent of this effect; the unemployment rate almost doubles under the broad definition, rising from 25 to 49 percent. This means in Wade Hampton, there are almost three times as many potential workers available than measured by the conventional definition. Ignoring the discouraged worker would, in this case,

seriously overstate the need for migrant workers to respond to OCS activity.

The desired rates of participation can also be expected to change over time; as the economy grows, we would expect the structure of labor force participation to change. Kleinfield's descriptioin of the rapid increase in female labor force participation in response to the increase in employment opportunities is one example of this type of structural change (Kleinfield, 1981).

Growth of the local economy may actually increase the desired labor force participation. In rural Alaska the desired labor force participation rates are higher in the larger, more developed economies of the regional centers. This type of structural change must also be incorporated into the projections.

Table 4. Desired Participation and Actual Participation

Statewide	Percent
Had Job in Previous Year[1]	61.9
Wanted Job, Did Not Have One[1]	15.9
Had Full-Time Job[2]	29.4
Wanted to Work Full Time[3] (in home village)	53.9
Nunam Kitlutsisti[4]	
Want More Paying Jobs	87.2
Yukon-Porcupine[5]	
Had Year-Round Job, 1976	38.0
Wanted Year-Round Job	54.0

[1]Nathan and Associates, 1974, T2H-4.
[2]Nathan and Associates, 1974, T2H-5.
[3]Nathan and Associates, 1974, T2H-6.
[4]PAL, 1981, TB-4.
[5]ISER, 1978, T5-2.

Table 5. Discouraged Worker - Wade Hampton

	Unemployed	Unemployment Rate
Conventional Definition (actively looking for work)	282	24.7%
Broad Definition (not looking for work)	820	48.8%

Source: Alaska Department of Labor, 1981, T8.

The change in desired labor force participation results from three general effects associated with the growth of the rural economies. These changes can all be explained in a model of labor supply which describes the trade off between market work, leisure, and nonmarket work (Huskey, et al., 1982). The three effects are an increase in real wages, changes in subsistence, and changes in the marginal utility of income.

Increases in the real wage for market work results from an increase in average wage of those employed, a decline in the cost of living, or an increase in the probability of employment. Each of these will probably result in an increase in the real wage as the market increases. Increases in the real wage will most likely lead to a substitution of market work for nonmarket work and leisure. Changes in the cost, productivity of time, and the utility of subsistence will also change the desired participation in market work. As the population in a region grows, the costs of subsistence are likely to increase and the productivity decrease, which should increase the labor force participation. Finally, as an economy

grows, more goods and services will be made available, and costs will be reduced, which will increase the utility of a dollar of income. As the value of a dollar (in terms of what it can buy) increases, individuals will participate more in the market economy. In addition, the increased employment opportunities will allow that proportion of the population which would have migrated to find jobs to stay. The higher labor force participation rate of this group will increase the average rate.

Residency of Workers

The final relationship of importance to impact analysis is the proportion of the immigrant population which lives outside of an enclave in the community. Migrants in the community bring families and will increase the population effect of OCS development. This in turn will increase the secondary economic response to OCS development.

The residency share of migrants depends primarily on the policies of the oil companies. If they decide to base operations away from any community, the residency effect will be low. If oil companies pay trips to some base, such as Anchorage, the residency effect will also be low. Given an oil company policy, the residency will be higher the larger the economy. Although Alaska has only extreme examples, such as Prudhoe Bay, the attraction of larger communities has been shown in other research, and we would expect a similar pattern. The larger communities offer more amenities and housing for the migrants, so we would expect more people to migrate in response to OCS development.

Effects of Structural Change on Base Case and Impact Projections for Rural Alaska

In this section, we examine the effects of structural change on base case and OCS impact population projections for the Aleutian Islands. These provide an indication of the relative importance of structural change in different modeling circumstances.

The projections were done using a model developed by the Institute of Social and Economic Research as part of the Alaska OCS Socioeconomic Studies Program, in order to project the impacts of OCS development on small Alaskan communities or regions. The model is referred to as the Small Community Impact Model, or "SCIMP." A detailed description of the model is presented in Knapp (1982).

The SCIMP model is divided into four separate sectors—the baseline sector, the short-term impact sector, the long-term impact sector, and the secondary impact sector. In each of these sectors, the model projects separate the major demographic events—births, deaths, and migration—which determine population change. The sectors are linked through labor supply and demand considerations.

In the baseline sector, the model projects population and employment which would occur in the absence of industrial development. In the short-term impact sector, the model projects population and employment changes which would occur in response to short-term impacts. The impacts occur primarily as a result of employment of local labor by the impact industry, and importation of labor to fill jobs not filled by local labor. Short-term imported labor is implicitly assumed to leave after each year. In the long-run impact sector, a portion of the import labor is assumed to reside permanently in the community, resulting in a changing age structure of the impact population. The secondary impact sector projects seconday employment generated by employment in the short-term and long-run impact sectors, as well as migration to fill these jobs and jobs left vacant by local residents taking impact industry jobs. Finally, a summation sector calculates summary outputs of the model.

The primary determinant of population change in the SCIMP model is usually migration, which occurs in response to changes in employment opportunities. Employment is calculated as the sum of basic or exogneous employment and endogenous support sector and government sector employment. Government employment is a function of population. Support sector employment is calculated by multiplying basic sector employment by a simple multiplier.

To examine the effects of structural change on population projections of the model, we ran three different sets of projections for the Aleutian Islands, incorporating different assumptions about growth in the base case (without OCS) and the size of the employment impacts of OCS. For each of the three combinations of assumptions, we ran the model twice—once with "structural change" and once without "structural change." In the case without structural change, the support sector multiplier was assumed to remain constant at the current ratio of endogenous to exogenous employment, or .26. In the case with structural change, the multiplier was assumed to follow a logarithmic growth path as population grows, as defined by the current multipliers for the Aleutians and for Kenai. This growth path is given by the equation

Multiplier = -2.225 + .291 log (population).

Thus, a very simple model of structural change was used, based on very limited cross-sectional evidence. However, the results serve to illustrate the possible relative importance of structural change under different modeling circumstances.

Different base case growth paths were projected based on differing assumptions about the growth of an onshore bottomfish processing industry in the Aleutians. OCS impacts were for a typical Bering Sea OCS sale, with the greatest impacts occurring during the construction period from 1986-1990. Under the "low impact population" assumption, only a small share of OCS workers become local residents, while under the "high impact population," over half of OCS workers become local residents.

The three sets of model projections are presented in Tables 6-8. In Table 6, a low growth base case and low impact population are assumed. In this case, there is relatively little effect upon the models' projections when structural change is allowed for. Base case population projections differ by only one in the maximum impact year of 1989, while the total projected impact increases by only 32, or five percent.*

In Table 7, a low growth base case and a high impact population are assumed. Here the effects of allowing for structural change are much more significant. Although there is little change in the base case projections, when structural change is allowed for, the 1989 impact population increases by 494, or 20 percent.

In Table 8, a high growth base case and a high impact population are assumed. Here, allowing for structural change results in much higher projections of the base case population, especially in the final years of the projection. In addition, projected peak year (1989) impact population increases by 789, or 31 percent.

These three examples illustrate a simple but important point concerning the significance of population-related structural change when modeling small communities. If little change is expected in the base case and if the impacts are expected to be small, then structural change is unlikely to occur to any great degree, and models which do not account for structural change are likely to provide reasonable projections.

However, the more that growth can be expected to occur, either in the base case or due to an impact industry such as OCS, the greater the potential importance of structural change. In effect, the greater the impact projected by a model, the greater the chance that the impact will be underestimated unless the model also takes account of structural change which the impact might bring about.

The SCIMP model slightly understates the total impact in the structural change case, because the multiplier is calculated using total (resident and impact) population, leading to an overestimate of structural change in the base case.

Table 6. Effects of Structural Change on Base Case and Impact Population Projections: Low Growth Base Case and Low Impact Population

Year	Base Case Population Projections	
	Without Structural Change	With Structural Change
1980	5125.	5125.
1981	5213.	5213.
1982	5304.	5304.
1983	5481.	5481.
1984	5620.	5620.
1985	5735.	5735.
1986	5804.	5805.
1987	5845.	5846.
1988	5857.	5858.
1989	5949.	5950.
1990	6040.	6041.
1991	6131.	6133.
1992	6222.	6224.
1993	6312.	6314.
1994	6402.	6404.
1995	6491.	6494.
1996	6579.	6587.
1997	6667.	6767.
1998	6814.	7005.
1999	7024.	7286.
2000	7271.	7602.

Year	Impact Population Projections	
	Without Structural Change	With Structural Change
1980	0.	0.
1981	0.	0.
1982	2.	2.
1983	4.	4.
1984	8.	8.
1985	21.	21.
1986	173.	179.
1987	395.	409.
1988	491.	514.
1989	592.	624.
1990	420.	452.
1991	33.	50.
1992	22.	24.
1993	23.	24.
1994	23.	25.
1995	24.	26.
1996	24.	26.
1997	25.	27.
1998	26.	27.
1999	26.	28.
2000	26.	28.

Table 7. Effects of Structural Change on Base Case and Impact Population Projections: Low Growth Base Case and High Impact Population

	Base Case Population Projections	
Year	Without Structural Change	With Structural Change
1980	5125.	5125.
1981	5213.	5213.
1982	5304.	5304.
1983	5481.	5481.
1984	5620.	5620.
1985	5735.	5735.
1986	5804.	5805.
1987	5845.	5846.
1988	5857.	5846.
1989	5949.	5859.
1990	6040.	5951.
1991	6131.	6135.
1992	6222.	6226.
1993	6312.	6316.
1994	6402.	6407.
1995	6491.	6496.
1996	6579.	6637.
1997	6667.	6846.
1998	6814.	7102.
1999	7024.	7395.
2000	7271.	7720.

	Impact Population Projections	
Year	Without Structural Change	With Structural Change
1980	0.	0.
1981	0.	0.
1982	5.	5.
1983	14.	14.
1984	122.	122.
1985	469.	468.
1986	1039.	1103.
1987	1720.	1915.
1988	2062.	2406.
1989	2524.	3018.
1990	1906.	2393.
1991	683.	928.
1992	651.	794.
1993	645.	769.
1994	645.	769.
1995	645.	774.
1996	646.	776.
1997	647.	776.
1998	645.	777.
1999	638.	777.
2000	629.	777.

Table 8. Effects of Structural Change on Base Case and Impact Population Projections: High Growth Base Case and High Impact Population

Year	Base Case Population Projections	
	Without Structural Change	With Structural Change
1980	5125.	5125.
1981	5215.	5215.
1982	5371.	5371.
1983	5649.	5649.
1984	5920.	5920.
1985	6277.	6345.
1986	6844.	7014.
1987	7584.	7932.
1988	8476.	9099.
1989	9656.	10642.
1990	11041.	12524.
1991	12634.	14670.
1992	14445.	17058.
1993	16484.	19901.
1994	18762.	23246.
1995	21292.	27134.
1996	24085.	31611.
1997	27154.	36735.
1998	30512.	42575.
1999	34172.	49183.
2000	38146.	56620.

Year	Impact Population Projections	
	Without Structural Change	With Structural Change
1980	0.	0.
1981	0.	0.
1982	6.	6.
1983	15.	16.
1984	118.	119.
1985	459.	457.
1986	1024.	1126.
1987	1708.	1991.
1988	2067.	2570.
1989	2529.	3313.
1990	1896.	2698.
1991	615.	1046.
1992	503.	804.
1993	412.	672.
1994	298.	536.
1995	167.	371.
1996	165.	249.
1997	165.	251.
1998	165.	258.
1999	165.	265.
2000	166.	271.

Conclusions

The change in the structure of important economic relationships in response to OCS development must be incorporated into impact models used in rural Alaska. In this paper we have shown that the potential for structural change exists in rural Alaska among three important relations: the local economic response, the labor force participation, and the residency of immigrants. Each of these relations both affects and is affected by the growth of the economy. When OCS activity represents a non-marginal change to the economy, structural change will occur.

We have also shown, using the SCIMP model, the difference in the projected impact which results from incorporating structural change. The incorporation of structural change in an economic impact model makes the impact more sensitive to the base case assumptions. If a particular economic relation depends on the size of the local economy, the size of impact will depend on the level of base case activity. This means that improving a model's ability to incorporate structural change also entails increased effort at improving the base case.

Incorporating structural change into an impact model is not a simple task. To date, the growth in rural Alaska has not been of the type which would indicate a likely pattern of structural change. Research must focus on cross-sectional analysis of small economies both inside and outside of Alaska.

The incorporation of structural change in an impact model requires a great research effort. Fortunately, the task can be simplified in some cases. First, when the community is not projected to grow much or OCS activity is relatively small, the potential for structural change is limited. The relative size of OCS activity reflects the decision of the oil industry on the isolation of the industrial activity. If OCS activity occurs in an isolated enclave, the relative effect of development will be small, independent of actual size of the activity. This makes the industry's approach to development an important research question.

Secondly, the approach to incorporating structural change should reflect both the use and timing of the projection. When accuracy is not the prime consideration, sensitivity analysis using different sets of reasonable parameters may be enough to provide the necessary information. In this case, the important question for research is: what are the limits of potential change? When our information about the pattern of resource development is specific and accuracy is more important, more research effort is required. The research questions in this case are: what pattern the structural change will follow, and what are the determinants of the change? Structural change is not linear and the turning points are important.

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Section III: Facility Siting and Public Participation

Introduction

Ron Inouye

This chapter contains six papers, three each related to facilities siting and public (citizen) participation. The locating of facilities to extract or process natural resources is a major concern for all involved in resource development. The economic and social costs and benefits are determined variously as the authors discuss. The papers review national siting experiences, discuss problems the social scientist faces in siting studies, and raises issues of siting facilities near isolated communities.

Public (citizen) participation is a method of obtaining and providing information for decision-making. The authors review the historical development of public participation in national programs and recommend techniques appropriate for Alaska.

Halstead reviews previous national energy facility siting experiences and proposes guidelines for future attempts. Cook and Cortese present a model for systematically identifying the direct and indirect impacts of facilities siting decisions on isolated communities. Flynn reviews siting efforts to protect local communities, raises problems unresolved by social scientists in that effort, and discusses siting implications for Alaska.

Black examines citizen participation in National resource management programs and presents a model for both Outer Continental Shelf leasing and development decisions. Blunck recounts the public participation program of the Alaska Power Authority. She cites specific examples and makes recommendations based on her experiences with the Susitna Hydro Project. Jeffery summarizes the laws, regulations, and legal doctrines requiring government agencies to conduct public hearings and enumerates specific recommendations for effective village citizen participation based on his experiences in North Slope villages.

Siting Energy Facilities: Past Experiences and A Look to the Future

John M. Halstead

Not long ago, developers wishing to site energy facilities had only to go through a process of site selection, permit application, and land purchasing; there was usually no question as to the final outcome of the undertaking. In 1969, however, the National Environmental Policy Act (NEPA) changed this situation by requiring that developers fully evaluate the environmental consequences of their projects. NEPA's interpretation was later broadened to require that socioeconomic impacts also be considered in the siting procedure. Waste management disasters like Love Canal (New York) and the growing anti-nuclear movement aroused public concern and opposition to these types of facilities. Western "boom towns" like Rock Springs and Gilette, Wyoming, caused many energy-rich communities to wonder whether the economic stimuli and tax revenue increases resulting from development were worth experiencing the negative social and economic impacts that accompanied them. In short, the past 15 years have seen a change in both legal requirements and public opinion with regards to facility siting.

The traditional siting process has been called the "decide-announce-defend" model (Ducsik, 1982). The developer makes a series of technical choices regarding site selection, usually with little or no input from the public. Once appropriate land has been optioned, a particular site is chosen as "best." The developer then announces his decision to the public, who may perceive their only recourse at this point as obstruction and delay; hence the third facet of the procedure, defending the siting decision against the public and winning project approval (O'Hare et al., 1982). It has become increasingly difficult in the past decade to site facilities over public opposition (even those regarded as beneficial); Morell and Magorian (1982) have gone so far as to maintain that it is impossible to site a facility in the face of widespread opposition, in spite of the procession of legal right. Thus, the traditional process no longer appears to be an effective mode of facility siting.

This paper examines past experiences in energy facility siting and proposes some rules to follow for future attempts. The first section examines some case studies of siting attempts, both successful and unsuccessful. The second section deals with some of the theoretical aspects a siting process should consider. The third section discusses various permitting processes and siting laws employed by different states. Finally, the last section proposes some guidelines to facilitate the siting process, including an examination of several functional developer-community agreements.

Past Experience

Some facilities, such as hazardous waste disposal sites, often pose extremely difficult siting problems since few people want one in their "backyard." Yet, few would dispute the need for them; and in spite of a lack of favor from the public, facilities have been successfully sited. Ironically, facilities which would have increased both local employment and tax revenues in economically depressed areas have been defeated by local opposition. Siting problems may not end with granting of final construction permits or even completion and operation; projects have been delayed by legal action, civil disobedience, and even post-completion sabotage.

What, then, are the secrets of a successful siting approach? What went wrong in siting attempts that "should have" succeeded? This section examines a situation where public opposition led to project

cancellation; cases where quasi-legal actions and even "guerrilla warfare" wreaked havoc upon the operators of unpopular developments; and two cases where facilities generally perceived as noxious and undesirable were sited with minimal public opposition.

How Not to Site a Facility: The Case of Searsport, Maine

In 1974 Central Maine Power Company (CMP) announced Sears Island in Penobscot Bay as the preferred site for its 1,200 MWe nuclear power plant. This decision came as a result of efforts by Searsport town officials to attract industry to the area in hopes of duplicating the successes of the neighboring town of Wiscasset. Wiscasset, home of the Maine Yankee nuclear plant, had achieved substantial increases in its tax base resulting from the power plant's location there.

Although the town officials strongly supported the project, problems arose in CMP's dealings with the public. Inconsistency in information dissemination confused the public as to whether Sears Island was the preferred site or merely one of several sites. CMP denied that Sears Island was the preferred site until "publicly embarrassed" into doing so (O'Hare et al., 1982). When this fact was made known, the local public felt deceived by CMP.

In addition, CMP did not make serious efforts to inform state officials of their intentions, and did not discuss its plans with town officials until after the Sears Island site had been chosen. According to O'Hare et al. (1982):

> Although CMP played by the rules and violated no regulations, its information policy created confusion, suspicion, and mistrust—conditions that strongly contributed to subsequent opposition and wariness on the part of state officials. . . . CMP believed it continually maintained an open policy, but opponents perceived them as deceptive and trusted neither CMP nor town officials.

Although CMP attempted to rectify these problems, the damage was already done. After several years delay and an $8 million investment, CMP scrapped its plans for a nuclear power plant on Sears Island.

Aftermath of "Successful" Siting Actions: Pitfalls of the Legal Approach

The case study of Searsport, Maine documents how failure to identify and address public concerns—in spite of having fulfilled all legal project requirements—ultimately led to the company's failure to site a proposed power plant. This case is an illustration of what O'Hare et al. (1982) called the "Lawyer's Fallacy": viewing the siting process as a series of legal and jurisdictional tests resulting in granting of permits and eventual project completion. As the authors point out, however, having a legal right to proceed is not necessarily equivalent to having the power to build. This fallacy is amply illustrated in cases such as the Seabrook, New Hampshire and Montague, Massachusetts proposed nuclear plants, where threats of arrest and imprisonment (often carried out) did not deter opponents from going to enormous lengths to stop these legal projects (for further discussion, see Rose et al. (1979) and Wondolleck (1979).

Failure to win at least a large measure of local public support for a project can result in delays, increased construction costs, and often cancellation. In some instances, it can lead to demonstrations, closures, and even sabotage after the facility has been constructed, as illustrated in the following three cases.

Wilsonville, Illinois

In 1976 Earthline, Inc. built and began operating a hazardous waste landfill site near Wilsonville, Illinois. Local officials and residents were notified in advance of the company's intent, although in retrospect, it seems that local residents may not have understood the nature of the hazardous waste involved, and may have expected more local economic benefits than later materialized. For the first four months of operation, in spite of some minor problems with odor and traffic, the community was relatively undisturbed by the project.

Then, in April 1977, Wilsonville residents learned that the facility would be receiving PCB contaminated soil from Missouri. Opposition to this undertaking grew until the first trucks carrying the contaminated soil were greeted by an angry armed mob. This touched off a legal battle which lasted sixteen months and eventually led to a decision that the facility was not in the public interest, that it would be closed, and all wastes stored there removed. Although SCA (which succeeded Earthline as manager of the facility) appealed the decision and requested permission to keep the disposal site open until the appeal was resolved, the village of Wilsonville dug a trench across the access road to the facility, effectively closing it. The roadwork was officially part of culvert repair to control flooding (O'Hare et al., 1982).

Vermont Yankee

The town of Vernon, Vermont, is the home of the Vermont Yankee Nuclear Plant, a 540 MWe boiling water reactor which began operation in 1972. Although the plant has been operating for ten years, recent years have shown a marked increase in anti-nuclear demonstrations at the site. One such civil disobedience action was staged to protest the refueling of the plant on October 8, 1977. The protesters blocked the entrance to the plant and were subsequently charged with criminal trespass (Hadden et al., 1981). As stated by the defense, the purpose of the action was to: ". . .prevent workers from gaining access to the plant, and thus reasonably attempt to stop the flow of radioactive substances into the environment by preventing its further operation" (Atlantic Reporter, 1979). Similar (though much larger) actions have taken place at the site of the proposed Seabrook, New Hampshire, nuclear plant where, in 1977, 1,414 demonstrators were arrested, costing the state $50,000 a day to care for them (Christenson, 1979; Newsweek, 1977). The rationale expressed for the demonstration was similar to that at the Vernon Plant. These protests fall under the general beliefs of civil disobedience, which can be defined as: ". . .a deliberate act of lawbreaking which is both a public and conscious act of protest . . .civil disobedience accepts the general legitimacy of authority but attacks some particular aspect of authority in order to affect a change" (Vermont Law Review, 1980). These actions illustrated were staged to protest the health effects of nuclear power; however, civil disobedience could also be used as a rationale for protesting more conventional developments, such as coal-fired power plants (due to acid rain, visual disamenities, and noxious odors). This type of opposition might therefore be expected following the construction of any unpopular or noxious facility.

The CU Project: Farmers vs. Utility Companies

In 1973 two midwest utility cooperatives, Cooperative Power Association (CPA) and United Power Association (UPA) of Minnesota, announced plans to build a large electricity generating plant in Underwood, North Dakota. The project would also entail building a 430 mile long powerline (conducting 800,000 volts) to Minneapolis. The powerline was dubbed the "CU project."

The utilities apparently felt that they had addressed the public interest sufficiently in choosing the powerline right-of-way by avoiding woodlands, lakes, urban centers, and highways. The final route chosen primarily traversed agricultural land. Owners of the land were given what was felt to be generous compensation.

The farmers were not convinced of the "wisdom of the enterprise, and hence the necessity for their sacrifice" (Casper and Wellstone, 1981). Although numerous public hearings and information meetings were held, the farmers felt they were fighting a battle against the state and utility companies, who they perceived as insensitive to their needs. Litigation gave way to crowds of angry farmers chasing surveying and construction crews from their land in 1978, and the eventual use of state troopers to maintain order.

What is especially interesting in this case, is that opposition did not cease once the powerline was in place. A kind of guerrilla warfare was staged, where mysterious attacks of "bolt weevils" toppled towers, "insulator disease" shattered glass wire insulators, and "wire worms" splayed open conducting wire. Even with the use of state troopers and high-speed helicopters, the utility was frustrated (Casper and Wellstone, 1981). Thus it can be seen that even legal right and project completion are not always sufficient to achieve siting result.

How to Site a Facility: The Experience of Wes-Con

One of the most difficult siting problems, especially in the wake of such management diasters as

Love Canal (New York) and the "Valley of the Drums" (Kentucky), is finding a location for a hazardous waste disposal facility. Numerous towns throughout the country have reacted to the problem by passing ordinances prohibiting hazardous waste facilities within their borders (Morell and Magorian, 1982; O'Hare et al., 1982). The prospects of possible environmental and health damages, noxious odors, and unsightly areas seem to far outweigh any anticipated economic benefits. How, then, in 1972 and 1979, did Wes-Con, Inc. site two hazardous waste disposal facilities with very little public opposition?

Wes-Con's disposal process involved the use of abandoned missile silos in rural Idaho to store wastes. The first site, 10 miles from Grand View (population 260), Idaho, is two miles from the nearest rancher and surrounded by Bureau of Land Management grazing lands.

During the time Wes-Con was completing its environmental assessment and applying for a state conditional use permit, the company took the initiative to solicit support from the county commissioners (although they had no legal leverage over the site) and the local Cattlemen's Association. Once construction began, Wes-Con hired local residents for a management staff, donated salvage materials to community groups and citizens, and invited visits to the facility. In addition, the company provided free disposal of local hazardous wastes (mostly pesticides), provided area ranchers free use of their heavy equipment, and agreed not to accept any controversial wastes (i.e., nuclear wastes and nerve gas). Wes-Con's major site management decisions were deferred to state agencies to maintain political support and public credibility. Finally, the company purchased the first fire truck ever available to local ranchers and farmers.

Wes-Con's second experience, near the town of Bruneau (20 miles away, population 100), was located within the same county (Owyhee) as the Grand View site. Again, Wes-Con approached local officials and organizations for support and offered services and benefits to the community. Local politicians and civic leaders saw the Bruneau facility as an extension of the Grand View site and gave their approval. After a public hearing for a conditional use permit and subsequent incorporation of improved operating features into the site, the facility began operating in 1979 with no local opposition (O'Hare et al., 1982).

Theoretical Considerations in the Siting Process

In recent years, through legislation such as NEPA and a general change in public philosphy regarding the desirability of many facilities, local opinion has gained substantial leverage in the siting process. Susskind and O'Hare (1977) have identified four reasons why certain groups are likely to exert pressure out of proportion to their numbers:

1) The prospective neighbors of a new facility are easy for an organizer to identify. This is in contrast to the potential beneficiaries of a facility, who may be dispersed throughout a large area;
2) The members of these opposition groups are known to each other by sight. This discourages "cheating" (not contributing to the group effort);
3) The neighbors of a facility stand to suffer losses which may place them below their initial welfare position. Beneficiaries of the facility suffer only the failure to advance beyond their initial welfare position; and
4) Any feelings of suspicion of government or industry are readily utilized by local opponents to band together in opposition to the project.

Citizens directly affected by a facility often stand to lose much more than any single beneficiary has to gain; therefore, the loser is much more likely to actively oppose the facility than the gainer is to actively support its construction. It is assumed here that the initial decision to site the facility passes the Hicks-Kaldor test of public policy alternatives; that is, a facility should be sited at a given location if those who gain from the siting could fully compensate those who lose, and it is the best available site. The Hicks-Kaldor test is generally regarded as the efficiency criterion of the "new welfare" economics, whereby the objective of social policy is to maximize the value of the output of goods and services (Freeman, 1979).

If a facility passes the Hicks-Kaldor test, but is cancelled due to public opposition, the outcome may be socially inefficient. This is because: a) it may prove to be impossible to locate a socially desirable pro-

major cause of inertia in the policy making process. The second benefit is avoidance of future "demoralization costs;" that is, even if a project is sited and constructed, lack of public acceptance can make siting of future facilities more difficult. Fair compensation and open negotiation provide a "good example" for future facility hosts (see Wes-Con case study described earlier in this paper).

The following is an example of the successful use of compensation-incentive plans to resolve disputes in an unusual situation.

Case Study: The Grayrocks Dam

The Grayrocks Dam was originally conceived to be constructed on the North Platte River to provide cooling water for the Missouri Basin Power Project's (MBPP) Laramie River Plant near Wheatland, Wyoming. Opponents to the project were mainly divided into three groups: farmers, who worried about the impact of the dam on streamflow; state of Nebraska officials, who felt that construction of the dam would force the state to restrict its water usage; and environmentalists, concerned over damage to the river habitat of the whooping crane. Informal negotiations between MBPP and the affected groups yielded no solutions; consequently, the opponents filed a consolidated lawsuit, charging that the project's EIS (Environmental Impact Statement) was insufficient.

In this situation, MBPP was losing money through construction delay. Similarly, conservationists were uncertain that the court would rule in their favor. Thus, the stage for negotiations and settlement were set.

MBPP opened negotiations by offering the opposition groups $15 million to purchase water rights to maintain appropriate streamflow and maintain the whooping crane's habitat. The offer, to MBPP's surprise, was flatly rejected. Nebraska officials were leery of accepting direct payments so as not to be perceived as "selling out" water rights for cash, and the environmentalists were not convinced that streamflow levels could be legally maintained through water rights purchase.

MBPP then revised their offer to $7.5 million and guarantees of minimum streamflow for various seasons. The cash was to be used to purchase additional water rights to artificially maintain the crane habitat, and was eventually placed in a trust fund for that purpose. Thirty days later, a binding agreement was made.

What makes this case interesting is that strictly cash settlements were unacceptable to the dam's opponents. Indeed, offers of cash payments may be seen as "bribery" by environmental groups. By using a program of both in-kind and monetary compensation instead, the dispute was resolved (O'Hare et al., 1982).

The State and Local Government Roles in Facility Siting

Recognizing the need for orderly growth as well as the need for certain useful (though noxious) facilities, various permitting processes and siting laws have developed. In the energy-rich regions of the West and Southwest, these range from the state-wide approach employed by Wyoming (The Industrial Development Information and Siting Act) to the Colorado process, which leaves permitting requirements to county-level government (examined here in the Rio Blanco County experience). In the East, where major problems have been encountered in attempting to site hazardous waste facilities, several states have passed legislation to facilitate siting (example here is the Massachusetts Hazardous Waste Facility Siting Act).

The Wyoming Industrial Development Information and Siting Act

In 1975 the Wyoming Legislature enacted the Industrial Development Information and Siting Act (amended in 1977, 1979, and 1981), requiring all industrial activities with proposed construction costs in excess of $50 million to file for a permit from the Industrial Siting Council. The act assigns responsibility for a broad range of socioeconomic impacts to the Council, as well as the power to refuse (or grant conditionally) permits for construction.

In addition to fulfilling environmental requirements, the act requires descriptions of impacts on scenic resources, land use patterns, economic base, housing, transportation, and any other social or economic impacts, as well as plans for their mitigation, in the permitting process. The permit applica-

ject anywhere, or b) the project may be sited, but at a less than optimal location. It should be noted, however, that even though these local opponents may cause a socially inefficient outcome, siting the facility may also lead to inefficiency. If construction of the facility creates externalities—that is, external costs for which no compensation is made, such as involuntary risk bearing or decline in quality of life—then the project does not reflect its true social costs.

This provides part of the justification for paying compensation. For our purposes, compensation is defined as the payment necessary to return the impacted individual or community to his initial welfare level (in other words, to make him as well off as he was before the facility was built). In effect, compensation serves to correct a failure of the market place, causing the project to reflect its true social costs, and facilitating the construction of socially desirable projects. It can take the form of:

1) Monetary payments;
2) Conditional compensation (supplied only if particular adverse circumstances occur in the form of surety bonds, insurance, etc.);
3) In-kind compensation (direct replacement of lost amenities); and
4) Offsetting (recognizing that some adverse impacts of development are virtually impossible to prevent, but that creation or enhancement of benefits in other areas may offset the negative effects) (Faas, 1982; O'Hare et al., 1982; DePape, 1982; Leistritz et al., 1982).

However, it is possible that even with compensation payments, local opposition may not be mitigated. In some cases, it may be necessary to make incentive payments to individuals and communities. These payments are different than compensation in that they leave the impacted party better off than he was before the siting. For practical purposes, an acceptable position occurs when net benefits for the project are still positive; that is,

$$TB > TC + C + I$$

where: TB = total benefits, facility construction;
TC = total costs, facility construction (not including compensation and incentive payments);
C = compensation paid;
I = incentives paid;

From the perspective of traditional microeconomic theory, however, it may be inefficient to use incentive payments, in that marginal benefits are exceeded by marginal costs, a violation of efficiency criteria.

To elaborate further, this problem can be viewed in three ways. First, the incentive payment may be viewed merely as compensation for intangibles like risk bearing and decline in quality of life. Second, incentives could be seen as a "premium" payment for suffering an irreversible loss of land use, lifestyle, etc. (as in cases of hazardous or nuclear waste storage facilities). Finally, the incentive payment may serve to correct a market imperfection, just as compensation does. This situation violates standard rules of pure competition in that it:

1) Implies perfect or near perfect market information on the seller's part;
2) It may be a case of individuals colluding to fix prices; and
3) It implies monopsony or oligopsony in the product market.

Only in the third case are incentive payments truly in excess of standard compensation, and this case may merely represent the "seller" parlaying his knowledge or situation for economic gain (certainly not an unusual situation!).

There are two final benefits which favor compensation and incentive use. First, equity considerations which implies a more just distribution of benefits. This is a difficult concept because of conflicting interpretations of what is meant by equity or fairness. However, there appears to be a general reluctance to impose large losses on clear and identifiable segments of society (Morell and Magorian, 1982). In fact, Thurow (1980) has stated that political reluctance to impose clear economic losses on specific groups is a

tion is then reviewed by a variety of state agencies, and public hearings on the application are held. The applicant is responsible for demonstrating that:

> "(i). . .the proposed facility will comply with all applicable laws. . .;
> (ii). . .the facility will not pose a threat of serious injury to the environment nor to the social and economic conditions of inhabitants or expected inhabitants in the expected area; and
> (iii). . .the facility will not substantiallly impair the health, safety, or welfare of the inhabitants." (State of Wyoming, 1981.)

The Council is required, within 60 days, to grant unconditional approval, grant approval conditioned upon specified changes in the application, or reject the application.

One problem with the act is that the $50 million limit does not make provisions for control over multiple small energy development projects, whose cumulative impacts may be severe. The granting of a permit for the Laramie River Station near Wheatland, Wyoming, has also drawn criticism of the Siting Council due to failure to specify transmission line routing and failure to establish a priori the utility's responsibility for financing impact alleviation efforts in the permitting process. On the positive side, the permit for the Laramie River Station required commitments to impact mitigation which the community could not have obtained from the developer by itself. The Council has also shown a willingness to be flexible in execution of the permit requirements, which is useful in cases where impacts are not as severe as was predicted (Susskind and O'Hare, 1977).

Facility Siting in Colorado: One County's Experience

Unlike Wyoming, Colorado's system of siting regulation is centered at the county level. One county in western Colorado, Rio Blanco, has been the site of substantial energy development. The County's ordinances give it a high degree of control over development, ranging from mobile home siting restrictions to County road vehicular restrictions.

One of these ordinances, Impact Regulation, directly affects facility siting. The regulation is:

> "designed, enacted, and adopted for the purpose of regulating the use of land on basis of the impact thereof on the County, its communities or surrounding areas, and other matters in accordance with the County Comprehensive Plan in order to protect and promote the health, safety, morals, convenience, order, prosperity, and general welfare of the present and future inhabitants of Rio Blanco County." (Rio Blanco County, 1979.)

These impacts include both "services and activities" generally considered as public services—such as schools, law enforcement, waste disposal—and "matters" which include air and water quality, housing, traffic, and area property values. No project may be approved until the County Planning Commission has determined that the proposed project will not adversely affect the services, activities, matters, and Comprehensive Plan Policies within the County.

This system of ordinances was extremely successful in obtaining impact mitigation payments from Western Fuels, Utah when the company developed the Deserado Mine in Rio Blanco. In an unusual situation, the plant (with most of the tax revenue) was located in Utah, while much of the worker settlement occurred in Colorado. The agreement reached between the company and the County provided for payments to local hospitals, fire protection districts, and town and county governments, as well as other impacted service areas. Provisions were made for revising payments up or down using monitoring reports of project impacts. Finally, payments for and construction of new housing was provided for in the agreement.

The Deserado Compensation Agreement utilizes both lump sum and annual payments. Flexibility and adaptability is provided by monitoring systems designed to detect differences between projected and actual impacts. Although it has been maintained that Rio Blanco's bargaining position in this case was strong because it did not "need" the project (Metz, 1982), it serves as an example of how county-level ordinances in Colorado function to affect facility siting.

The Massachusetts Hazardous Waste Facility Siting Act

The American Northeast, with its paucity of extractable resources and abundant supplies of labor and infrastructure, would seem an unlikely place for disputes over facility location. Yet, due to the highly industrialized nature of the area, the need exists for hazardous waste disposal facilities. Unfortunately, even though few are philosophically opposed to the idea of toxic waste dumps, fewer still would desire one in their "backyard." Recognizing this, several states have attempted to legislate a solution to the problem. In this section, the Massachusetts Act is examined.

Enacted in 1980, the act provides for the exercise of eminent domain in siting, environmental restriction and review, and public participation. The act establishes a hazardous waste facility site safety council, whose duties include observing conduct and operation of waste sites, awarding technical assistance grants to cities and towns, reviewing proposals for construction and operation of hazardous waste sites (and rejecting those found unacceptable), encouraging developer-community negotiation, and establishing compensation to be paid by the developer to abutting communities.

The final siting agreement specifies terms, conditions, and provisions under which the facility shall be constructed, maintained, and operated. Compensation levels for adverse impacts is to be negotiated between the developer and the impacted communities. Finally, if it is determined that an impasse has been reached between the developer and the site community, the council may settle the matter through binding arbitration. In effect, then, the act tries to legally insure that all aspects of site selection, participation, compensation, and negotiation are addressed before the state is forced to use its power of eminent domain. The act also makes any town or city permit which was not required before the bill was passed unnecessary for the developer to obtain.

Facility Siting: Some Practical Considerations

> "Today, industry cannot indulge in the luxury of siting its facilities or developing natural resources in areas where there is no risk of community rejection. Such areas probably are nonexistent. In every situation, there is some threshold of impacts or perceived impacts at which the siting of a facility will be seriously questioned or opposed" (Luke, 1980).

As Ron Luke has stated, developers no longer have the autonomy they once enjoyed in the siting process. This section deals with some ideas to improve the efficiency and equity of the siting process.

The case studies of unsuccessful siting attempts presented in this chapter display some similar attributes. One prevailing theme is that the lack of effective public involvement can and has led to disastrous results. Public opposition through legal means can lead to project cancellation, either through court rulings or by causing delays so costly that the project loses its economic feasibility.

Through negotiations with local groups, developers can identify concerns regarding the facility's construction, and set up a compensation process. By identifying concerns early and addressing as many impacts as possible before construction begins (such as safety measures or visual improvements), the risk of public opposition can be substantially lessened.

Obviously, not all disputes over compensable impacts can be settled through developer-community interaction. The need exists for a binding arbitration procedure to resolve impasses. This is provided by the state in the Massachusetts' Hazardous Waste Facility Siting Act. In addition, several Canadian companies have initiated arbitration practices. Ontario Hydro uses an arbitration board, comprised of members appointed by both the developer and the community, to resolve disputes over impacts of its Darlington nuclear generating station. The agreements also provide a trust fund to pay for impacts (Baril, 1981). The Northern Flood Agreement in Manitoba provides a sole arbitrator mutually acceptable to all parties involved. In addition, the agreement also establishes compensation of four acres for each acre of Indian land taken for the Northern Flood Dam Project (Northern Flood, 1977). By establishing an arbitration procedure, the community is assured of the developer's intention that the facility bears its full costs, and also that there is a mechanism in place to resolve any grievances arising after the facility is constructed.

Of course, a profit-maximizing developer may attempt to either avoid making compensation payments or to minimize compensation paid. Conversely, overly zealous attempts at compensation—especially monetary—may be greeted with charges of bribery. O'Hare et al. (1982) have iden-

tified eight dispute characteristics which may create ideal conditions for compensation:

1) Few parties to the dispute;
2) The opponents are geographically defined. This is especially important in that the opposition corresponds with some local governmental jurisdiction, yielding an entity with which to negotiate;
3) Opponents well organized;
4) Mutually acceptable outcomes exist;
5) Impacts are clearly traceable to the project;
6) Recreation of the status quo is possible;
7) The parties involved are capable of offering a binding agreement. For example, some environmental groups are unable to assure agreement or compliance of their members; and
8 Absence of initial hostility. The way in which a developer approaches the community will strongly influence local acceptance of the proposed project.

In the case of a particularly disagreeable facility, incentives or rewards may be necessary to lessen opposition. Carnes et al. (1982) have identified some questions/criteria to judge the applicability of these payments (note: incentives are not necessarily monetary). They are:

1) What is absolutely necessary? Preconditions for introduction and use of incentives include: safeguards for health and safety; control-authority arrangements; and negotiations among affected parties. Absence of these conditions may result in siting failure due to withdrawal of key local support or local demand for extreme levels of compensation and assurance;
2) Will it work? Objectives of an incentive include certainty, constancy, adequacy, and ease of administration;
3) Can it be understood? The community must be aware of and understand the incentive; it also must be relevant to their concerns. Failure to meet these criteria can result in failure of the incentive and possibly credibility damage due to bribery charges; and
4) What are the consequences? This concerns distributional effects, effects of the program on local consensus, and hopefully resolution of some of the adverse consequences of the facility.

If compensation or incentive payments seem worthwhile after these considerations, O'Hare et al. (1982) have suggested some "advice to developers" in implementation:

1) Recognize that while the project may be good for the area as a whole, it is likely to make at least a few individuals or groups genuinely worse off. Distributional effects of the project should be closely scrutinized;
2) Find out who losses if your facility is constructed and why. Understanding of how people view the project is essential, along with the realization that perceptions change over time;
3) Be sensitive to people's fears. Perceived dangers often effect the same responses as real ones;
4) Think creatively about ways to make people whole; that is, to leave them as well off after the facility is built as they were before. Prevent anticipated damages from occurring, and develop methods to correct unavoidable damages. Also be prepared to negotiate compensation levels;
5) Be sensitive to the fact that your actions to initiate negotiation of compensation agreements may offend opponents. Try to introduce compensation indirectly, so as not to look as if "buying off" local concerns;
6) Focus on bargaining rather than gift giving. Concentrate on what each party has to offer the other;
7) Presume mistrust. Industry and government are often viewed with suspicion in these situations; avoid actions that may be construed as deceptive or threatening;
8) Be forthcoming with information. As seen in the Searsport case study, misinformation produces mistrust;
9) Recognize that if opponents do not know much about your project, they are likely to assume the worst. "Ignorance often leads to fear and extreme bargaining positions." Funding a locally sponsored study of the project's effects is often a good idea;

10) Suggest ways to resolve future disputes. Arbitration procedures detailed earlier in this paper can be useful here;
11) Be up front with your offer. Keep interactions with community and opponents in the open; and
12) Try not to appear intransigent. There is a high return to soliciting comments from the community.

Conclusions

This paper has attempted to present some of the difficulties involved in siting energy facilities, both in an historical and theoretical context. Although many of the cases examined relate to nuclear or hazardous waste facilities, the siting problems encountered can be viewed as extreme examples of the problems which might be expected in the siting of any energy facility. Through an analysis of past successes and failures, and careful attention to changing public opinions with regards to development, it is felt that a more efficient siting process can be designed.

This paper makes two principal assumptions: first, that the traditional siting process has outlived its usefulness; and second, that a substantial amount of local opposition can stymie a siting attempt, regardless of legal rights or perceived need for the project. With this in mind, it is suggested that through early and effective local involvement in the siting process (as well as ongoing participation in management decision, if possible), and an impact lessening/compensation and incentive program the possibility of successful siting can be greatly enhanced. Although state siting laws and regulations can accomplish much of this, the developer and the community must accept a share of the burden of the siting process.

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Isolated Facility Siting and Impact Model

Peter D. Cook and Charles F. Cortese

This paper summarizes the results of an applied research project carried out for the Minerals Management Service, Alaska Outer Continental Shelf Office (MMS/OCS). The resulting model (IFSIM) was designed to assist MMS/OCS planners in examining the industry-community decision process for onshore facilities, and the resulting direct and indirect impacts. The model simulates decisions on siting, employment, sharing of community utilities and services, and policies toward housing and access of workers to the community. Twelve categories of direct impacts are classed according to level of interaction between industry and community, and then linked to 135 types of potential indirect impacts of a social, cultural, or economic nature.

Objectives of the Model

The objectives of IFSIM are to:

1) Determine the most likely decisions on siting and community resource sharing by OCS industry.
2) Relate these decisions to their probable direct social and economic impacts.
3) Link direct impacts systematically to all potentially important social, cultural, and economic indirect impacts.
4) Provide a rapid means of testing the impacts of alternative decisions.
5) Provide a means of identifying the most critical areas for mitigation or enhancement measures.

The three key terms used above are defined as follows:

- OCS Industry – the combination of oil companies and supporting contractors which carry out OCS oil and gas exploration, development and production.
- Community – the land area and population within or immediately adjacent to the boundaries of a village, town or city.
- Impact – a significant change in the economic, social or cultural organization of a community.

The model was designed for use with the offshore oil and gas industry in Alaska, and its interaction with smaller bi-cultural communities which are physically remote from the major economic centers of the State. In principal it is applicable to any export-oriented industry and any community that is in an isolated area near the potential sites.

Structure of the Model

In its simpliest form IFSIM is divided into three basic elements as shown in Figure 1. The first element simulates the decision process concerning the scale and location of the facility, the sharing of community resources (labor force, utilities and services) and the related level of in-migration as a result of the industry's existence. Each potential site is analyzed in the light of industry requirements and preferences as well as community resources and attitudes. The resulting decisions are identified as the probable outcome of a negotiation process between industry and community representatives.

The second element determines the direct impacts of these decisions in two categories (described in Table 1) and for three levels of interaction between the industry and the local community. Finally, the third element specifies the potentially important indirect impacts that are expected to be associated with the type and scale of each direct impact identified before.

IFSIM has been designed to systematically identify the full range of potential impacts and distinguish the general level of impact, where this was judged possible, from a synthesis of past research in Alaska, the western U.S., Canada and Scotland. It is oriented to a community-level analysis that can be adapted to site specific differences and differences in community characteristics. This level of detail requires certain specific community data, but not extensive primary research (although additional primary research is needed to verify the working hypotheses in the model).

The model has been generalized to cover (1) all three OCS phases (exploration, development and production), (2) the possible level of oil and gas discoveries and related industry requirements, and (3) the wide range of characteristics exhibited by Alaskan communities. This level of generality is highly useful for policy analysis but leads to some uncertainty about specific decisions and micro-level impacts which can be addressed at later stages if detailed impact analysis is required.

This uncertainty, as well as other uncertainties in the outcomes of the negotiations, can be handled by using the model in a sensitivity analysis form. To do this, alternative assumptions can be made for specific decision points or impact determination points in the model, and the effects of these assumptions traced through to their direct and indirect impacts. If no important differences are identified, the assumptions can be left in their original form with no loss of accuracy, even if the actual outcome is not the same. If there are important differences, the critical assumption can be prepared for more careful examination or additional data collection performance.

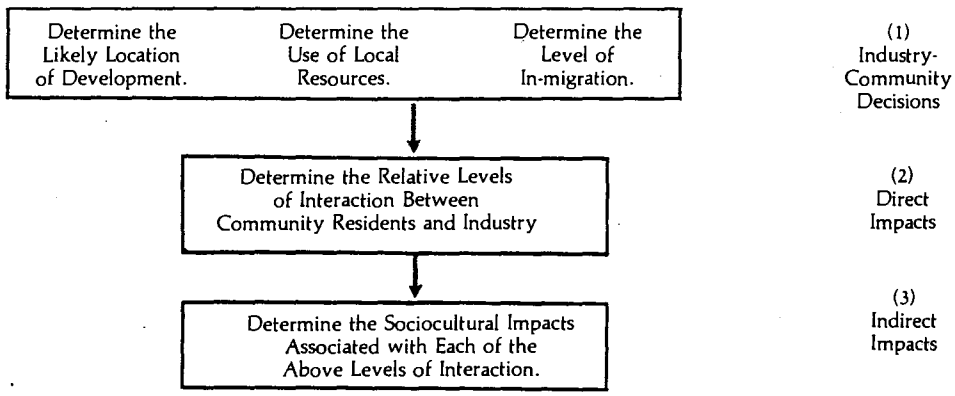

Figure 1. The basic elements of the impact forecasting model.

Analytic Procedures

Some of the critical assumptions and decision points in the model are brought out in the more detailed flow diagram in Figure 2. Essential site features in this case are runway length and port depth. Other important aspects are land availability, community attitudes toward development, and whether the potential site is road-connected to town or not.

Use of local resources, labor and in-migration are determined in the analysis with the aid of a computerized econometric model called SCIMP.[1] This model simulates the local labor market, secondary economic effects and the attractiveness of local jobs to outside workers, on a yearly basis. The IFSIM analysis then identifies the maximum impact for each phase of oil and gas activity in order to specify the direct impacts in these categories in Table 1.

The levels of impact are determined by a set of decision rules that relate to size of the facility relative to the community, the phase of activity, and the attitudes of the community and industry toward land, labor, shared use of community utilities and services, and access to the community by camp workers. These decision rules are actually working hypotheses based on a synthesis of past research findings adapted to Alaskan communities. Examples of these are given in Table 2.

[1]*Small community impact model developed by the Institute of Economic Research of the University of Alaska.*

Table 1. Direct Impacts of OCS Development

Level of Interaction	Local Economy	Local Labor Force	Land Use Patterns	Transportation Facilities
(A) Minimal Interaction	1) Industry uses few local suppliers and contractors	2) Little use of local labor relative to the local work force	3) Few land use conflicts	4) Increased use of some or all transportation facilities but no serious congestion
(B) Moderate Interaction	1) Industry uses some local suppliers and contractors	2) Moderate use of local labor relative to the local work force	3) Some land use conflicts	4) One to three transportation facilities are congested due to shared use
(C) Maximum Interaction	1) Industry uses many local suppliers and contractors	2) Significant use of local labor relative to the local work force	3) Many land use conflicts	4) All transportation facilities congested due to shared use

Table 1. Direct Impacts of OCS Development

Level of Interaction	Public Utilities (Water, Telephone, Power, Sewer)	Community Services (Police, Fire, and Medical)	Local/Regional Tax Base	Presence of Newcomers
(A) Minimal Interaction	5) Increased use of some or all community utilities but none or over capacity	6) Increased use of some or all services but none are over capacity	7) No increase in community tax base 8) Little increase in potential tax base outside community	9) Low inmigration of new residents 10) Little use of community services by employees living in camps 11) Little use of bars and stores by employees living in camps 12) Little use of local hunting and fishing areas by newcomers
(B) Moderate Interaction	5) Two or three community utilities are at or over capacity due to sharing	6) One or two services are at ore over capacity due to sharing	7) Some increase in community tax base 8) Some increase in potential tax base outside community in camps	9) Moderate inmigration of new residents 10) Moderate use of community services by employees living 12) Moderate use of local hunting and fishing areas by newcomers
(C) Maximum Interaction	5) Four or five community utilities are at or over capacity due to sharing	6) Three services are at or over capacity due to sharing	7) Significant increase in community tax base 8) Significant increase in potential tax base outside community	9) Significant inmigration of new residents 10) Significant use of community services by employees living in camps 11) Significant use of bars and stores by employees living in camps 12) Significant use of local hunting and fishing areas by newcomers

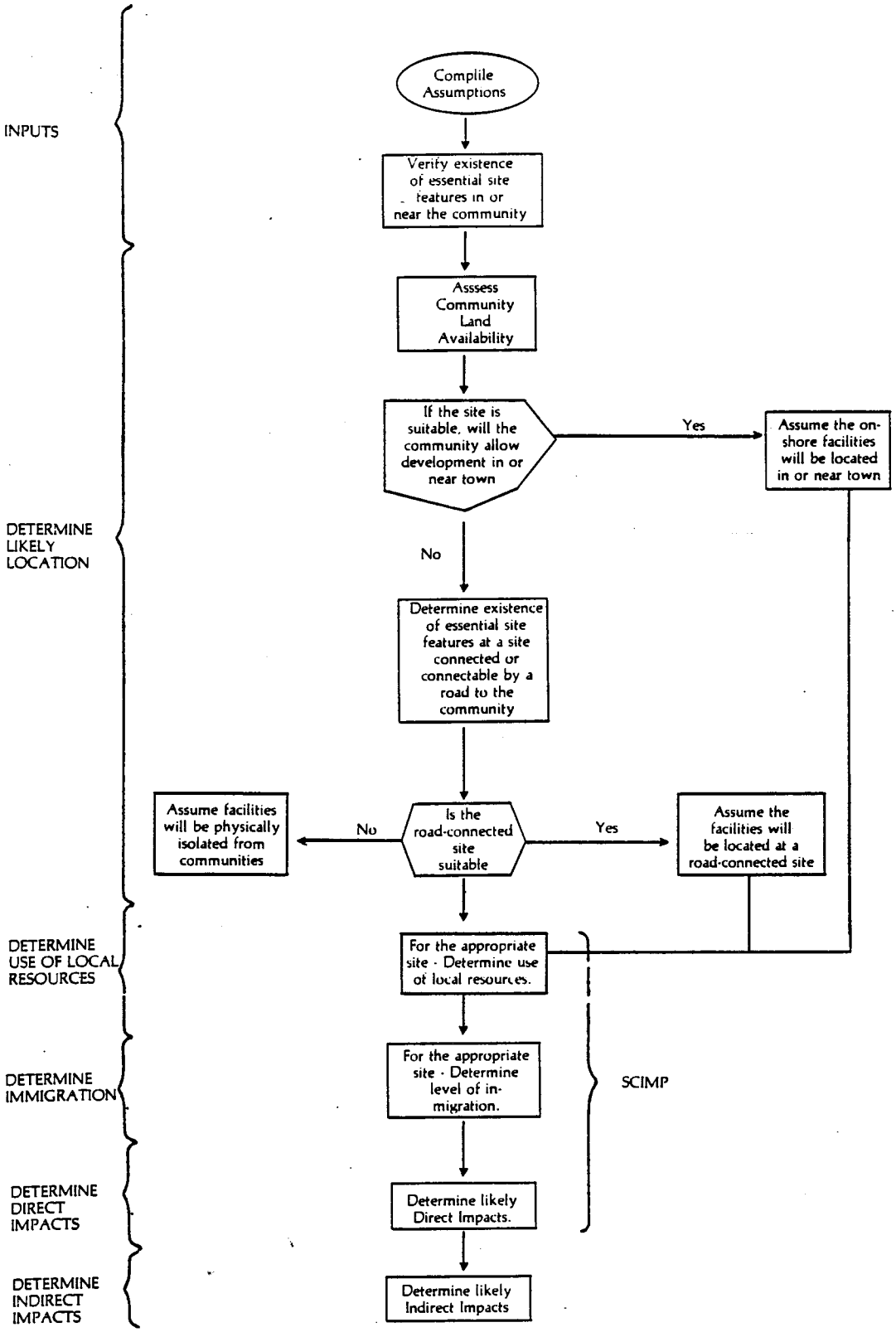

Figure 2. Basic Procedures of Impact Analysis for a Particular Phase and Level of Find

Table 2. Examples of Decision Rules for Direct Impacts

1. In-migration Impact

low	=	less than 15% increase in local non-camp population
moderate	=	15-50% increase in local non-camp population
significant	=	over 50% increase in local non-camp population

2. Community Services Impacts

few	=	less than 15% increase in local non-camp population
some	=	15-25% increase in local non-camp population
many	=	over 25% increase in local non-camp population

3. Use of Local Hunting and Fishing Areas by Newcomers

low	=	less than 3% increase in population
moderate	=	3-5% increase in population
high	=	over 5% increase in population

4. Employment Impact

low	=	less than 3% additional employed of previous number of local employees
moderate	=	3-10% additional employed of previous number of local employees
high	=	greater than 10% additional employed of previous number of local employees

5. Tax Base Impact

little or no	=	exploration phase facilities
some	=	development phase facilities
significant	=	production phase facilities

6. Land Use Impacts

few	=	land in uncongested area with little competition
some	=	land with some competition, congestion, or important for subsistence hunting or fishing in production phase
many	=	land with competing users and congested, or important for hunting and fishing in development phase

These hypotheses are, of course, subject to refinement as more research on impacts is carried out in Alaska. Many of these decision rules appear in a simple form, but represent a complicated sequence of analysis.

Once the set of direct impacts are determined for a given site, by level of interaction, in each of the 12 impact categories, then the potential indirect impacts can be specified. A set of 135 indirect impacts were selected as potentially important for OCS industry activity in Alaska. These cover three broad categories:

1) Social Impacts including:
   - changes in size, composition and distribution of population.
   - changes in the organization and functions of health care, schools, churches, public safety, housing and local business.
   - changes in the administration of local government.

2) Cultural Impacts, including:
   - changes in subsistence activities.
   - changes in social organization.
   - changes in perceptions of quality of life.
   - changes in communication between individuals or groups.

3) Economic Impacts, including:
   - changes in employment and income.
   - changes in the structure of the local economy.
   - changes in the real estate market.
   - changes in government tax base.

These indirect impacts are listed in Table 3 in more detail.

Based on a second set of working hypotheses, each direct impact type and level was linked to a set of indirect impacts. In some cases a level of indirect impact was specified, where a link was noted in the research literature. In many cases only a more general association was specified and the level was left indeterminate. Examples of these linkages are listed in Table 4.

These explicit linkages between direct and indirect impacts appear to be unique in the field of applied social impact research.

Nome Case Study

As part of the research project, the model was applied to Nome. Three types of sites were considered: (1) an in-town site, (2) a site on Cape Nome connected by road to the town and (3) a site on a gravel island or barge based offshore of Nome.

Only a partial service base can be expected at Nome for the exploration phase, as the present harbor depth is not sufficient for rig tender boats. The airport runway, on the other hand, is more than adequate, so that an air support base is likely for the exploration phase.

Cape Nome was deeper water than the City of Nome, but a dock and a road to the airport would have to be built. This is more probable if oil is discovered and the development phase oil terminal is located on Cape Nome.

The gravel island or barge base would have most supplies shipped by barge directly to the site, not passing through Nome. Still there would be some impact on Nome, due to limited support activities in town and use of the airport as a staging area.

Nome, as a community, was found to have a pro-development attitude which favored maximum use of town services and utilities and in-town housing where available. The present labor force is somewhat limited in skills appropriate for OCS industries (except construction), but many individuals in other skilled jobs now, could be attracted to higher salaries in the OCS industry. Community utilities are close to capacity now, but other services can easily expand.

Table 5 shows the expected impacts of the three sites on Nome during the exploration phase. The Cape Nome site effects are very similar to those of an in-town site, since an open access policy is expected to encourage use of the town by camp workers and some in-town housing.

It should be noted that the number of indirect impacts expected from even a low level of in-migration and camp worker access would be the preponderant set of impacts. This has major implications for community and industry policy makers, as these effects can be seen as positive or negative (probably a combination) by local residents. In Nome the positive effects appear to be seen as greater than the negative effects, but this perception can be different for other communities.

Table 6 shows the impact by phase of OCS activity (exploration, development, production) for one of the sites: Cape Nome. Exploration activity can be seen as a relatively low level of activity with mostly outside workers, and little use of local services. The development phase involves major construction activities, as long as it lasts (5-7 years), and provides the most opportunities for local employment and businesses. The production phase is more long term (15-20 years or more) but at a lower level of activity. Some of these differences do not show up in Table 6, since they are differences in level of impact rather than the number of impact expected.

Table 3. Potentially Significant Indirect Impacts of Isolated Facility Development

I. SOCIAL IMPACTS

A. Population

1) Change in population composition (age, sex, rac)
2) People relocate due to dissatisfaction with community
3) Reduce outmigration of local people to urban areas
4) Population decreases following construction and production phases

B. Local Government

1) Administration

a) Annexation or creation of new types (e.g., boroughs)
b) Increase in turnover of officials and public employees
c) Increase in newcomers involved in government
d) Change in expectation of government performance
e) More planning and impact studies needed
f) Time and personnel required to govern increases
g) Public participation increases
h) New services demanded
i) New facilities required
j) Legal work increases
k) Increase in perception of political powerlessness by some community members
l) Increase political power of land-owning Village and Native Corporations
m) Disputes between pro- and anti-development factions increase
n) Decrease in kinship-based authority
o) Overcapacity of services following peak activity

2) Fiscal Resources

a) More opportunity for shared investment
b) Increase in tax revenues
c) Increase in expenditures prior to revenue increaase
d) Increase in debt financing and bonding of public infrastructure
e) Fiscal resources reduced after production phase when tax base decreases
f) High facility maintenance expenditures following peak activity

C. Health Care

1) More medical personnel needed
2) Medical personnel turnover increases
3) Change in orientation from self-care to professional care
4) Limited facilities are burdened
5) New facilities and technology available
6) Change in structure of health care delivery system
7) Increase in medical emergency transportation demand
8) Increase in potential for industry support of community
9) Mental health needs increase

(Table 3 Continued)

Table 3 Continued

D. Schools

1) School enrollment exceeds capacity
2) More teachers and rooms needed
3) Teacher turnover higher and more stress
4) Change in curriculum requested by newcomers
5) Administrative and planning demands increase
6) Conflicts increase between students
7) More dropouts due to jobs
8) More adult education provided

E. Churches

1) Congregations increase and build more churches
2) New denominations appear
3) New social service functions appear
4) More prosletyzing occurs
5) Increase in conflicts within congregations

F. Public Safety

1) Change in crimes against property and person
2) Change in rate of alcohol and drug abuse
3) Change in rate of family disturbance and child behavior problems
4) Increase in concern about safety
5) Increase in racial and cultural tensions
6) Strain on courts and police
7) Rise in traffic accidents
8) Rise in violence and alcoholism during recession periods

G. Housing

1) Increase in competition for housing
2) Increase in prevalence of substandard dwellings
3) Increase in number of high quality dwellings
4) Increase in households living in over-crowded conditions as workforce increases
5) Rapid increase in housing costs as local workforce increases

H. Local Business

1) Change in way of doing business
2) Change in role of business leaders
3) Change in shopping patterns

(Table 3 continued)

Table 3 Continued

II. CULTURAL IMPACTS

A. Subsistence (Non-Market) Economy

1) Decrease in dependence on subsistence resources for new full-time employees
2) Increased concern about protection of subsistence resources and lifestyles
3) Increase in importance of women in wage earner activities
4) Increased access to subsistence technology due to wage income
5) Decrease in amount of resources shared among village members
6) Increased competition with sport hunters and fishermen for subsistence resources
7) Less flexibility in timing of subsistence activities due to wage employment restrictions
8) Change in ways of managing cash income
9) Change in working groups for hunting, fishing, trapping
10) Decrease in subsistence skills passed between generations

B. Social Organizations

1) Decreased dependence on kinship alliances and associations
2) Non-kin common interest associations increase
3) Decrease in perception of community as cohesive society
4) Change in observance of festivals, rituals and customs
5) Increase pride in cultural heritage
6) Decrease in role of kinship groups in settling disputes
7) Decrease in informal social interaction
8) Increase in formal community functions (e.g., school board meetings)
9) Increased conflicts of individual values vs. group values
10) Decrease in importance of elderly in family leadership
11) Decrease in traditional male roles and authority
12) Increase in authority of women in decisions
13) Change in wealth redistribution patterns
14) Decrease in number of extended-family households
15) Increase in number of single-family households
16) Increase in number of female heads of households
17) Increase in income and mobility of women
18) Increase in rate of outmarriages

C. Perception of Quality of Life

1) Decrease in satisfaction with community due to over-burdened facilities and services
2) Increase in satisfaction with community due to new or expanded facilities, services and stores
3) Increase in perception of economic disparity
4) Increase in personal mobility
5) Decrease in community cohesion
6) Newcomer dissatisfaction with local stores and services
7) Increased perception of community as impersonal
8) Expectation of new wealth by local people
9) Change in satisfaction with visual appearance of community
10) Increase in perceived pace of live in community

(Table 3 Continued)

Table 3 Continued

D. Communication

1) Decreased usage of indigenous languages
2) Increased contact with outside world
3) Television, books and magazines become more common

III. ECONOMIC IMPACTS

A. Employment

1) Change in local labor force participation
2) Increase in job competition with newcomers
3) Skill levels of local labor increase
4) Increase in employment in services, construction, and transportation
5) Increase in local government employment
6) Local firms and government face competition for limited labor supply
7) Local firms and government experience increased employee turnover
8) Skills in traditional industries, such as fishing and subsistence, decline
9) Number of temporarily unemployed workers increases due to arrival of job seekers

B. Income

1) Increased dependence on cash income
2) Increase in income differentials
3) Increase in community income
4) Increase in local inflation rate
5) Decrease in real value of fixed incomes
6) Increased income leakage to regional centers

C. Structure and Function of Local Economy

1) Businesses expand in anticipation of increased demand
2) New businesses are established
3) Increase in goods and services available
4) Increased business operating costs (rent and labor)
5) Cost-Price squeeze in existing primary industries such as fishing
6) New and expanded industries become dependent on oil revenue
7) Local economic recessions occur following peak periods
8) Increased demand for services, construction and transportation
9) Increased demand for Native crafts due to more outsiders
10) Relative decrease in importance of existing primary industries (such as fishing)
11) Increase in new businesses purchased by outsiders

D. Real Estate

1) Property values increase
2) Land speculation increases
3) Increase in land purchased by outside investors
4) Increase in property tax rate as public facilities expand
5) Decrease in property tax rate as base increases

Table 4. Selected Linkages Between Direct and Indirect Impacts

(1) Potential Indirect Impacts Due to "Moderate Use of Local Labor Force" (B-2)

	Category
Reduced out-migration of local people to urban areas	I-A-3
Mental health needs increase	I-C-9
Teacher turnover higher and more stress	I-D-3
More dropouts due to jobs	I-D-7
Increase in rate of alcohol and drug abuse	I-F-2
Increase in rate of family disturbances and child behavior problems	I-F-3
Rise in violence and alcoholism during recession periods	I-F-8
Increase in number of high quality dwellings	I-G-3
Increase in households living in over-crowded conditions as workforce increases	I-G-4
Change in shopping patterns	I-H-3
Decrease in dependence on subsistence resources for some new full-time employees	II-A-1
Large increase in importance of women in wage earner activities	II-A-3
Increased access to subsistence technology due to wage income	II-A-4
Changes (increases and decreases) in amount of resources shared among some village members	II-A-5
Less flexibility in timing of subsistence activities due to wage employment restrictions	II-A-7
Change in ways of managing cash income	II-A-8
Change in working groups for hunting, fishing, and trapping	II-A-9
Decrease in subsistence skills passed between generations	II-A-10
Changes (increases and decreases) in dependence of kinship alliances and association for some individuals	II-B-1
Change in observance of festivals, rituals, and customs	II-B-4
Decrease in informal social interaction	II-B-7
Increased conflict of individual values vs. group values	II-B-9
Decrease in importance of elderly in family leadership	II-B-10
Decrease in traditional male roles and authority	II-B-11
Increase in authority of women in decisions	II-B-12
Change in wealth redistribution patterns	II-B-13
Decrease in number of extended-family households	II-B-14
Increase in number of single-family households	II-B-15
Increase in number of female heads of households	II-B-16
Increase in income and mobility of women	II-B-17
Increase in rate of outmarriages	II-B-18
Increase in perception of economic disparity	II-C-3
Increase in personal mobility	II-C-4
Decrease in community cohesion	II-C-5
Increased perception of community as impersonal	II-C-7
Increase in perceived pace of life in community	II-C-10
Decreased usage of indigenous languages	II-D-1
Increased contact with outside world	II-D-2
Increase in local labor force participation	III-A-1
Increase in job competition with newcomers	III-A-2
Skill levels of local labor force increase	III-A-3
Increase in employment in services, construction and transportation	III-A-4
Local firms and government face competition for limited labor supply	III-A-6
Local firms and government experience increased employee turnover	III-A-7

(Table 4 Continued)

Table 4 Continued

	Category
Skills in traditional industries, such as fishing and subsistence, decline	III-A-8
Increased dependence on cash income	III-B-1
Increase in income differentials	III-B-2
Increase in community income	III-B-3
Increase in local inflation rate	III-B-4
Decrease in real value of fixed incomes	III-B-5
Increased income leakage to regional centers	III-B-6
Increased business costs (rent and labor)	III-C-4
Cost-price squeeze in existing primary industries (such as fishing)	III-C-5
New and expanded industries become dependent on oil revenue	III-C-6
Local economic recessions occur following peak periods	III-C-7
Relative decrease in importance of existing primary industries (such as fishing)	III-C-10
Increase in new businesses purchased by outsiders	III-C-11

(2) Potential Indirect Impacts Due to "Moderate Increase in Use of Bars and Stores by Employees Living in Camps" (B-11)

	Category
Mental health needs increase	I-C-9
Change in crimes against property and person	I-F-1
Change in rate of alcohol and drug abuse	I-F-2
Change in rate of family disturbance and child behavior problems	I-F-3
Increase in concern about safety	I-F-4
Increase in racial and cultural tensions	I-F-5
Strain on courts and police	I-F-6
Rise in traffic accidents	I-F-7
Newcomer dissatisfactions with local stores and services	II-C-6
Increased perception of community as impersonal	II-C-7
Expectation of new wealth of local people	II-C-8
Increase in perceived pace of life in community	II-C-10
Television, books and magazines become more common	II-D-3
Increase in employment in services, construction and transportation	III-A-4
Increase in community income	III-B-3
Increase in local inflation rate	III-B-4
Decrease in real value of fixed incomes	III-B-5
Businesses expand in anticipation of increased demand	III-C-1
New businesses are established	III-C-2
Increase in goods and services available	III-C-3
New and expanded industries become dependent on oil revenue	III-C-6
Local economic recessions occur following peak periods	III-C-7
Relative decrease in importance of existing primary industries (such as fishing)	III-C-10
Increase in new businesses purchased by outsiders	III-C-11
Property values increase	III-D-1
Land speculation increases	III-D-2
Increase in land purchased by outside investors	III-D-3

(Table 4 Continued)

Table 4 Continued

(3) Potential Indirect Impacts Due to "Low In-migration of New Residents" (A-9)

	Category
Possible annexation or creation of new types of government (e.g., boroughs)	I-B1-a
Small increase in turnover of officials and public employees	I-B1-b
Small increase in newcomers involved in government	I-B1-c
Change in expectation of government performance	I-B1-d
More planning and impact studies needed	I-B1-e
Slight public participation increases	I-B1-g
Some new services requested	I-B1-h
Mental health needs increase slightly	I-C-9
Administrative and planning demands increase slightly	I-D-5
Minimal conflict increases between students	I-D-6
A few social service functions appears	I-E-3
Small increase in crimes against property and person	I-F-1
Small increase in rate of alcohol and drug abuse	I-F-2
Small increase in rate of family disturbance and child behavior problems	I-F-3
Small increase in concern about safety	I-F-4
Small rise in traffic accidents	I-F-7
Small increase in competition for housing	I-G-1
Small increase in prevalence of substandard dwellings	I-G-2
Small increase in number of high quality dwellings	I-G-3
Small increase in households and size of family units living in over-crowded conditions as workforce increases	I-G-4
Rapid increase in housing costs as local workforce increases	I-G-5
Some decreased dependence on kinship alliances and associations	II-B-1
Non-kin common interest associations increase	II-B-2
Decrease in perception of community as a cohesive society	II-B-3
Increased pride in cultural heritage	II-B-5
Decrease in role of kinship groups in settling disputes	II-B-6
Increase in formal community functions (e.g., school board meetings)	II-B-8
Increased conflict of individual values vs. group values	II-B-9
Some decrease in importance of elderly in family leadership	II-B-10
Increase in perception of economic disparity	II-C-3
Decrease in community cohesion	II-C-5
Newcomer dissatisfaction with local stores	II-C-6
Increased perception of community as impersonal	II-C-7
Change in satisfaction with visual appearance of community	II-C-10
Increase in perceived pace of life in community	II-D-2
Television, books and magazines become more common	II-D-3
Local firms and government experience some increased employee turnover	III-A-7
Number of temporarily unemployed workers increases slightly due to arrival of job seekers	III-B-2
Some businesses expand in anticipation of increased demand	III-C-1
A few new businesses are established	III-C-2
Small increase in goods and services available	III-C-3
Small increase in business operating costs (rent and labor)	III-C-4
Slight cost-price squeeze in existing primary industries (such as fishing)	III-C-5
Property values increase	III-D-1
Land speculation increases	III-D-2
Small increase in land purchased by outside investors	III-D-3

Table 5. Nome Case Study Exploration Phase Impacts

Direct Impact Type	In-Town Base		Cape Nome Base*		Barge Base	
Use of local suppliers	Few	(9)	Few	(9)	None	(0)
Use of local labor force	Little	(14)	Little	(14)	Little	(14)
Land use conflicts	Many	(11)	Some	(11)	Some	(11)
Congestion of transportation facilities	Little	(5)	Little	(5)	Little	(5)
Use of community utilities at capacity	High	(12)	High	(12)	None	(0)
Use of community services at capacity	None	(6)	None	(6)	None	(6)
Community tax base increase	Small	(1)	--	(--)	- -	(- -)
Regional (non-community) tax base increase	--	(--)	Small	(2)	Small	(2)
In-migration of new residents	Low	(48)	Low	(48)	Low	(48)
Camp workers use of services	Moderate	(27)	Moderate	(27)	Low	(9)
Camp workers use of bars and stores	Moderate	(27)	Moderate	(27)	Low	(12)
Newcomer use of hunting and fishing areas	Little	(6)	Little	(6)	Little	(6)

*Intown mix of housing ( ) Nuer of indirect impacts

Table 6. Cape Nome Site Impacts by Phase of Oil and Gas Activity

Direct Impact Type	Exploration*		Development		Production	
Use of local suppliers	Few	(9)	Many	(15)	Some	(14)
Use of local labor force	Little	(14)	Significant	(57)	Moderate	(57)
Land use conflicts	Some	(11)	Many	(11)	Many	(11)
Congestion of transportation facilities	Little	(5)	Little	(5)	Little	(5)
Use of community utilities at capacity	High	(12)	High	(12)	High	(12)
Use of community services at capacity	None	(6)	None	(6)	None	(6)
Community tax base increase	--	(--)	--	(--)	--	(--)
Regional (non-community) tax base increase	Small	(2)	Some	(4)	Significant	(5)
In-migration of new residents	Low	(48)	Low	(48)	Low	(48)
Camp workers use of services	Moderate	(27)	Significant	(31)	Significant	(31)
Camp workers use of bars and stores	Moderate	(27)	Significant	(28)	Significant	(28)
Newcomer use of hunting and fishing areas	Little	(6)	Significant	(6)	Significant	(6)

*In-town mix of housing ( ) Number of indirect impacts

Conclusions

The Isolated Facility Siting and Impact Model (IFSIM) appears to be an extremely useful method of systematically identifying the direct and indirect impacts of facility siting decisions on relatively isolated communities. These impacts can be treated as potential impacts which vary somewhat with site-specific and industry specific factors and can be controlled to some extent by local policies or agreements between industry and community.

The most important impact categories relate to local employment, to access of workers to the community and to in-migration as a result of the project. Only in some very traditional, non-business-oriented communities, can the impacts, both positive and negative, be kept to a minimum. In other types of communities there will necessarily be spillover effects that will have some impact on the community, through local businesses trying to attract customers and outsiders looking for jobs or housing.

In Alaska and other places the oil industry has shown a willingness to adapt to local community requirements (e.g., ARCO in Yakutat and Dome in Tuktoyuktuk), especially where there is local leverage in the form of contractual agreements with the industry. These impacts have been successfully controlled from the community standpoint during the exploration phase. The much larger development phase, if oil is discovered, is another order of magnitude in activity, and therefore much harder to control.

All projects seem to have desirable and undesirable aspects, but indirect effects of OCS facilities will probably dominate in the long run with the presence of newcomers and new activities being a source of change in the community. The nature of this change can be shifted through negotiation between community and industry leaders, to channel it in ways that are beneficial to both, and to control the negative side effects, once these effects are known in advance from a systematic model such as IFSIM.

The development of this model represents a challenge to three parties at this conference. First, the set of working hypothese which form the links between siting decisions and direct impacts and between direct and indirect impacts, are a challenge to the impact research community. Research to refine and validate these hypotheses is needed and a theoretical base developed to explain these linkages in a social ecology framework.

Second, the use of the model by MMS is a challenge to systematically analyze a wide variety of potential impacts and identify those involved that are the most important for the attention and concern of the industry and communities involved.

Finally, the challenge is for local communities to identify those areas where they have potential control over their future, and the most effective means of cooperation by community and industry to achieve the desirable aspects of future development.

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Socioeconomic Issues in Siting Major Developments

Cynthia B. Flynn

Siting a major development has become much more complex during the last ten years, and increasingly so during the last five years. Projects whose construction costs are over $50,000,000 are encountering increased scrutiny and, in some cases, resistance from local citizens and government officials. This paper covers the history of siting efforts in the U.S., modern approaches to siting which protect the local communities, examples of cases where these techniques have been used and ignored, problems that remain unresolved by modern social science techniques, and the implications of this discussion for Alaska. The issues raised in this paper may apply to smaller developments in varying degrees, but are most easily described using the larger projects as examples.

The Influence of Project Characteristics on Siting

It must be recognized at the outset that the siting issues will vary according to the nature of the proposed project. In some cases, the developer has no choice of site; the ore body or hydroelectric site or soil field has a specific location, and the developer has little choice as to where his project will be located if he chooses to proceed. Control of site development may be limited to managing the order in which development takes place; one example is when large timber resources are developed.

In other cases, several sites may qualify from a technical standpoint. Power plants, recreational developments, and manufacturing projects are examples. With linear projects, such as transmission lines, pipelines and highways, multiple routes from point A to point B are usually possible. Where there is a choice of sites or routes, somewhat different social and economic considerations come into play in the siting process.

Historical Considerations

As social scientists, we are aware of the importance of socialization, attitudes and values, traditional patterns of interaction and subcultural norms on observed behavior. Therefore, it is useful to consider the training and experience of the corporate managers who have responsibility for important siting decisions. Usually, these are men who are at least 45 years of age, have 20 years' industrial experience, and hold a middle management position. An engineering background is common. Their counterparts in government agencies may be somewhat younger.

In the early 1960's, when those now responsible for siting were gaining their first experiences within the industry, the siting process was quite different than today. It was typical for local communities to uncritically favor major development. The employment and tax benefits were recognized and, as often as not, eagerly sought by local communities. Disadvantages were generally unrecognized, ignored or downplayed. In very few cases was any attempt made to measure project-related effects in a systematic way.

In the political climate of those earlier days, technical and economic feasibility issues were critical determinants of where a project would be sited. Among the technical considerations were soil quality, geological substrate conditions, water supply, quality of the ore body in the case of mining, and labor availability. Examples of economic considerations included the most economical way to construct and operate the facility and still meet engineering standards; net present value analysis of the opportunity costs of the investment; and analysis of the projected return on investments.

It was not uncommon for several potential sites to be purchased covertly until these analyses could be completed, as a means of keeping the land purchase portion of the investment costs low. These are still very important considerations for project development. The developer must invest in a technically and economically feasible project from his own point of view, and this fact must not be undervalued by social scientists.

However, during the late 1960's and early 1970's, other considerations were added to the siting process. The U.S. Army Corps of Engineers was one of the leaders in Benefit/Cost analysis. This technique added the consideration of indirect costs and benefits, to the evaluation of economic feasibility. The evaluation norm was that economic benefits had to exceed economic costs in order for the project to be viable.

The passage of the National Environmental Policy Act (NEPA) at the end of 1969 created the requirement of an Environmental Impact Statement (EIS) for major developments which used federal funds or required federal permits. Prior to 1975, the emphasis of EIS's was clearly on the natural environment. Wildlife protection, air quality, noise, and water quality standards were developed and used as guidelines for EIS preparation. The restrictions implied by these standards made, in effect, some potential sites unusable. All of the early NEPA court cases centered around natural science, engineering and other technical issues, or around the procedural adequacy of preparing or processing the EIS.

By the mid-1970's, there was increasing recognition of the importance of social and economic considerations in the siting process and the EIS process. This was due in part to the improved technical ability of socioeconomic researchers and to the increasing involvement of local citizens in the project decision-making processes. This citizen involvement increased the level of political sophistication of local groups as well as their levels of technical understanding. The expertise of both social scientists and citizens continues to improve and has become a critical factor in the success of siting efforts.

In the 1980's, we are seeing the beginnings of the integration of these changes into the management philosophies of leading corporations. Those who wish to be, and to be seen as, good corporate citizens are starting to recognize that the attitudes towards development that worked in the early 1960's are not appropriate for the 1980's. Project proponents may reminisce about how things were in the old days but such recollections cannot stand in the way of dealing with the current realities of community involvement in development planning.

Our firm is seeing more demand for real mitigation planning, integration of social and economic considerations into the siting process, and a desire for scientifically defensible socioeconomic monitoring programs. Similar demands are apparent from the regulatory agencies. Although there appears to be pressure to relax other environmental constraints on development, our experience is that the demand by all parties for socioeconomic information continues to grow.

Choosing Among Alternative Sites

The optimal site for any proposed development rarely exists as any site has one or more undesirable characteristics. When considering multiple sites on multiple criteria, it is, of course, impossible to simultaneously maximize on all variables. Therefore, the siting of a major development has always been a compromise among competing considerations.

Historically, certain sites were eliminated because the required "compromises" on certain variables were impossible or economically infeasible. Other sites were judged as less desirable because the engineering and construction efforts required to overcome the site limitations added significantly to the total cost.

What is new for the 1980's is that socioeconomic variables are finally starting to be considered along with the more traditional variables when a site is being considered. In some cases, socioeconomic "compromises" are necessary in order to overcome site characteristics. In others, such "compromises" are prohibitively expensive or impossible. Exactly what can be done early in the planning process to identify sites which are conducive to development from a socioeconomic point of view is a key question.

Since social systems are reactive in a way that geological systems are not, the developer or government agency has special problems in doing the socioeconomic analysis of sites prior to the announcement of a project. Yet, a "publicly announced" feasibility analysis is sometimes necessary, particularly in the private sector. We are still a free enterprise economic system, and have so far resisted central government control of development plans. Whenever there is competition among developers and the potential for keeping costs down, there will be pressure not to publicize development ideas in their

early stages of development.

Therefore, non-reactive techniques have been developed which give a crude ranking of the various sites being considered. These techniques have less realiability when used alone than when combined with reactive techniques, but they can still be quite useful.

The first step in evaluating the socioeconomic feasibility of a potential site is to conduct a social profile of the local area. The profile answers the basic questions, "Who lives around here?" and "What is the social structure like and how is it changing?" Of course, in Alaska, many potential development sites are virtually uninhabited, so in some cases these questions may be moot.

But when the development will be in close proximity to a community or when a community's residents will be significantly impacted by employment on the project, these questions need to be answered. More specifically, if the community can be divided into more than one social group, then for each group, we should be able to answer the questions:

(1) How large is the group?
(2) What are its demographic characteristics?
(3) How does its members earn their living?
(4) Do its members live primarily in one part of the community?
(5) Are its members primarily renters or owners? Are they transient?
(6) How cohesive is the group?
(7) What are their attitudes and values, regarding both the environment and development-related issues?
(8) How do its members relate to each other socially, politically and economically? How are immigrants integrated into the group, if at all?

Once each group is profiled, the last question can be answered again for **inter**-group interaction, that is, "How have the groups historically related to each other socially, politically and economically?" Non-reactive ways to estimate the answers are usually only available in communities larger than 1,000, since the very presence of a researcher will be noticed. Still, much can be gained by perusal of old newspapers, census records and other statistical data, planning reports, a history of the community, or other documents that can be found in a local library. Sometimes it is possible to discreetly interview persons who are used to keeping confidential information, such as clergymen, doctors, and attorneys.

The second step in evaluating the socioeconomic feasibility of a proposed site is to conduct a *pro forma* socioeconomic assessment for each site. The identical project will have different effects in different locations because the project conditions differ.

The assessment should work through what each of the sites will be like over a time span equal to the useful life of the project. Although this exercise should be carried out for all the variables included in an EIS, we are focussing here on the socioeconomic variables, which would include, at a minimum: the economic base including rates of employment and unemployment and income data; demographic characteristics, including in- or out-migration rates; housing availability including quality and type; other facilities and services; fiscal base; and social structure. When these projections are repeated, in turn, assuming that the project will be sited at each of the locations, it is possible to derive an estimate of the project-related impacts for each of the sites.

The third step is to estimate the mitigation possibilities and their costs. If the project has been announced, then it is possible to use public participation techniques to enlist the aid of the public in designing mitigation plans. In some cases, the citizens will have useful suggestions as to how the project might be re-designed to lessen the adverse socioeconomic impacts or enhance the positive impacts. This may take the form of changes in engineering, timing, or even location. Even if the project has not been announced, often the exercise described in step two elicits problem areas and suggests mitigation possibilities.

It is usually true that many social impacts cannot be mitigated unless there is a monitoring program to trace effects. For instance, given the uncertainty of the timing of construction on large projects, there may be large negative impacts which were unanticipated at the EIS stage. The cost of maintaining a monitoring program over the life of the project needs to be included in the mitigation cost estimates. The cost estimates will vary by site depending on both the local infrastructure and social structures.

Fourth, historical and value differences among the sites must be evaluated in the context of their implications for the ease of siting the project in that area. These historical and value factors are sometimes reflected in state laws and policies, but even within one state, there are significant differences. For instance, permits are generally much easier to obtain in the Southern states than in the

Western states. Recently, a permitting process for two industrial sitings on shorelines required three months in Louisiana (including all Federal permits) and an estimated minimum of two years in Washington. Such differences are not atypical. Within Washington state, it may be possible to site a nuclear power plant in the Tri-Cities area (Hanford Reservation), but it is unlikely that one could be sited anywhere else in the state at this time.

Furthermore, developers and regulatory agencies should recognize early that some projects simply cannot be sited in a particular location at all. Given the values of the local people, the legal tools they have available, and their experience in stopping other large developments, the siting is, for all practical purposes, impossible, no matter what the technical merits of the site. A trained social scientist can identify these sites, and if this information is available early enough in the planning process, all parties can save considerable time and money.

Once steps 1-4 are completed, the sites can be ranked according to socioeconomic criteria (step 5). Some sites will be eliminated out of hand because the siting is impossible. Others will be ranked low because the mitigation costs are high and/or there are significant unmitigatible socioeconomic impacts. Although it is not common to find a site which appears optimal from a social scientist's point of view, some sites will appear more attractive.

The sixth step is to combine the socioeconomic evaluation with the evaluations using other criteria so that an optimal site can be chosen. Taking into account all the mitigation required for all types of impacts, and all the indirect costs and benefits, a benefit/cost analysis for this site can be made.

Some projects do not make it beyond this stage. When the preliminary data have been gathered and the preliminary analyses are completed, there is a decision made not to proceed. Hopefully, this decision is made before all parties invest in the preparation of EIS documents. However, if socioeconomic considerations are not included in the preliminary analyses, there is a serious risk that the project will run into insurmountable obstacles during the EIS process.

Siting Issues at a Single Location

If the project must be sited in a specific place, as is the case with mining, for example, many of the same considerations apply. The analysis includes preparation of a social profile, a *pro forma* socioeconomic impact assessment, an analysis of mitigation possibilities and their costs, and an evaluation of the historical and value issues that will influence the permitting process (steps 1-4). Finally, a benefit/cost analysis of the site, taking both the socioeconomic and all other impacts into account, is made. These factors lead directly to the "go, no-go" decision for the project.

We have had experience both with corporations and regulatory agencies who did their socioeconomic "homework" and those who did not. In every case where the project was eventually stopped, the warning signs were quite clear long before the parties stopped spending time and money on the attempt. This is expensive from the point of view of the developer and a waste of the taxpayers' money.

Additional Problems

Many of the problems that have actually occurred with siting in the past can be identified and mitigated using current social science knowledge. However, it is important to point out the gaps in our knowledge as well.

First is the "not in my backyard" syndrome. This comes up in two somewhat different circumstances, one of which is more amenable to mitigation than the other. In the first, the "backyard" resident can concede that he benefits directly from the project. One example is a power plant in the service area of his utility. If citizens can agree that the power is needed, then they can sometimes agree on a site they can tolerate.

In another version of this syndrome, the benefits to the local citizens are remote at best. The primary beneficiaries are not those who bear the primary costs. This problem is particularly troublesome to citizens who live near resources of national importance. An example we have dealt with is one of the few remaining sites on the west coast which is suitable for a deep water port. All recent proposals for its use would benefit the U.S. balance of trade, and local officials recognize that the site is a national resource, but the primary benefits would not accrue to those who will bear the costs. One proposal for a major development at the site has already been killed, and a second is in trouble. It is not clear how this type of problem can be resolved.

Second is the "irrational fears" syndrome. It is not uncommon in the early stages of discussion about a proposed project for the local citizens to be concerned about issues which are not problems from a technical standpoint. Sometimes these fears can be alleviated by education, a trip to a community with a similar facility, or other public participation techniques. In other cases, the citizens are firm in their beliefs and will fight to stop the project.

There are at least three reasons for this problem that we have identified. The first comes from a lack of understanding about the real nature of the project. The second is an aversion to assuming any risk at all, regardless of the benefits. The third is the human inclination to displace concerns from one area to another; concern and opposition to a proposed project becomes a way to express feelings or emotions about other conditions in their lives that they can't articulate directly.

Implications for Alaska

The discussion so far has centered on siting issues that have been raised in the lower 48, and the solutions that have been used there. At the present time, Alaska is faced with a set of circumstances which make these types of issues particularly cogent. For most of the state, the population density is very low; about half of the state's population resides in greater Anchorage, and the population in the rest of the state is very sparse. In addition, Alaska has a tremendous supply of natural resources, many of which have national importance that affect our position in world affairs. Lastly, Alaska has few state controls that provide socioeconomic protection for its citizens. Many states now have their own State Environmental Policy Acts and/or a specific agency whose sole responsibility is to control major development (e.g. Maryland Power Siting Authority, Washington Energy Facilities Site Evaluation Council, Wyoming Industrial Siting Administration). The controls that Alaska has are fragmented and not based on the best available scientific methodologies.

The resources located in Alaska are large, but not infinite. Thus, they must be developed wisely, and with a careful consideration of the benefits that Alaskans might realize. State policy, and the legal mechanisms to enforce this policy, should recognize the concerns of Alaskans, and protect their interests along with those of other interested parties.

There are several steps that we would recommend to effect these results. First, regulatory agencies in Alaska can begin immediately to do their own siting analyses, as described above. The credibility of a state agency is enhanced considerably if it speaks knowledgeably and scientifically about the socioeconomic impacts of various alternatives.

Second, work **with** developers to define plans that will benefit Alaskans—be clear about your "terms". If the agency is able to suggest an acceptable alternative to a proposal, it is more likely to be able to influence the project design so that it benefits Alaskans. Also, this approach is cost efficient from the point of view of the developer, in that his permits and licenses will be expedited.

Third, the state should enact legislation that is flexible, but which retains authority over development in Alaska for Alaska. The cessation of all resource development in Alaska would obviously have tremendous negative effects on Alaska's economy. Still, Alaskans must keep control of their own vital interests; in the future, responsible development of Alaska's resources will promote the well-being of all Alaskans.

Public Participation in National Resource Management

Robert E. Black

Citizen participation (CP) in government programs is not new. We can pinpoint the modern era of CP in the early 1950's, with the advent of urban renewal programs sponsored by the Department of Housing and Urban Development (HUD). Since that time, citizen participation in public sector programs has been scrutinized by scholars interested in understanding and perfecting the decision making process in government programs. The demand for citizen participation in this process is now viewed as a part of a much larger and comprehensive "grass roots" movement generally labeled consumerism. The logic behind this social revolution rests on the assumption that consumers of goods and services, provided by both public and private producers, should have something to say about the who, what, where, and how much of production. Considering the fact that our social system is based on a Constitution which specifies government by, for, and of the people, it is not surprising that such an attitude should prevail.

The position taken in this paper is entirely supportive of taxpayer citizens playing a direct role in expenditure decisions made in their behalf by elected and appointed officials at all levels of government. A corollary point of view defends direct citizen involvement in analyzing and planning for the secondary and tertiary effects of those primary decisions. That is, in actions necessary to mitigate the adverse consequences of decision making. Suggesting that citizen participation is ideologically desirable and even theoretically possible is a long way from the reality of planning for outer continental shelf (OCS) lease sales and eventual oil and gas development. Two objectives will be pursued here:

1) to examine the costs and benefits of citizen participation in federal programs which preceded the Amendments to the OCS Lands Act of 1978; and
2) to suggest a CP model for both leasing and development decisions on the outer continental shelf and adjacent coastal regions.

The Record

Although citizen participation was formalized in the Housing Act of 1949, it did not come into its own until the Community Action Program (CAP) and the Model Cities Program (MAP) of the 1960's. Both programs were part of the war on poverty directed primarily at inner city populations. The objectives of these programs sought to improve both the social and physical quality of life of these populations, and each included substantial citizen participation strategies for total program involvement. In retrospect there appeared to be three strategies pursued: 1) membership of the target population on planning, decision-policy making boards and committees; 2) employment of the population in projects generated by the program; and 3) as an end in itself affirming the democratic ideal and eliminating alienation, destructiveness, and withdrawal (2). The development of public participation processes and structures in association with urban poverty programs does not lessen their usefulness to our needs in OCS planning and programming. The nature of citizen participation in public programs appears to remain constant regardless of the programmatic substance. The costs, benefits, risks and values of CP seems to be essentially the same from one program to the next (2, 3, 4, 6).

If we accept for a moment that citizen participation in public programs has value and is worthy of pursuit, it is important to define more fully the term "public or citizen participation", to examine the barriers to citizen participation (which to some degree will expose the costs), and finally to review the areas in which citizen involvement in the decision process is valuable.

Citizen participation eludes precise definition. Founded in bias and opinion, a scientific approach is extraordinarily difficult. If one concludes, as this writer does, that CP is, by nature, good and desirable, then most outcomes will demonstrate a modicum of value; conversely, if one is predisposed to be critical of the process, it is not at all difficult to substantiate such doubts. For those who advocate CP, it becomes participatory democracy in which the dignity and worth of the individual is reaffirmed. Those critics who emphasize the more negative and problematic features of citizen participation are much more comfortable with a definition which includes notions of apathy, lack of access to traditional sources of power, and immobilization of government authority (2, 8). Whatever the perspective, one ingredient seems to be shared by all. The notion of redistribution of power as a goal of CP is generally accepted. Proponents agree that a countervailing force is necessary to protect public programs from institutional self-interest, protect the rights of the citizen and restore their self-confidence. The other side views such power in the hands of the inexperienced community as counterproductive and even dangerous if such participation leads to extremism (9). What citizen participation should be was best expressed by Gerda Lewis as long ago as 1959. In a review of CP in urban renewal projects she expressed the view that citizen participation consists of stimulating dissatisfaction with what is, demonstrating what can be, and providing opportunities to do something about both (6). Until something more objective comes along, this definition will serve us well. No discussion of CP definitions would be complete without reference to the legal framework for citizen participation. The urban renewal and poverty programs of earlier days established a legal framework for CP in program implementation in the 1970-1990 time frame. Not all or even most federal programs have CP elements. In addition to HUD and HEW, regulatory agencies which have developed significant public participation programs are the Environmental Protection Agency, Corps of Engineers, and National Oceanic and Atmospheric Administration. Not all legislation implemented by even these agencies contain titles necessitating public participation. In fact some, which claim a participation element are by most standards token efforts at the real thing. Scoping, as specified in the National Environmental Policy Act, is a case in point. Confusion about what is and what is not legitimate citizen participation may be diminished by reference to Sherry Arnstein's typology in Figure 1. The key to understanding this typology is Arnstein's acknowledgement that citizen participation is a categorical term for citizen power, not total nor absolute but sufficient to share in decisions which allocate tax resources, determine policies, goals and objectives, participate in program planning, and monitor/evaluate project implementation. Given your knowledge of the scoping process, where would you place it on the ladder?

In the 20 years that CP has been more or less institutionalized in one or more federal agencies, it has not been a smashing success from the national perspective. Certainly, one can point to local successes which have provided communities with results far better than would have been expected from the usual way of doing business.

A review of the literature and work done by a number of evaluation groups indicates the following problem areas with CP:

1) low priority given to CP in federal legislation,
2) in laws which have CP elements:
   a) clear responsibility for implementing or monitoring CP is absent,
   b) insufficient funds have not allowed full public participation,
3) disinterest or hostile attitudes exist among officials toward CP,
4) programs so complicated that participation in them requires technical competence, time commitment, and expense,
5) because of rapid deadlines and bureaucratic inefficiency, citizens are not given sufficient time to review,
6) agency program personnel, untrained in management of CP process, do not know what to do with citizen groups,
7) apathy of unaffiliated public in specific programs is misread as lack of citizen interest in participation,
8) lack of media interest.

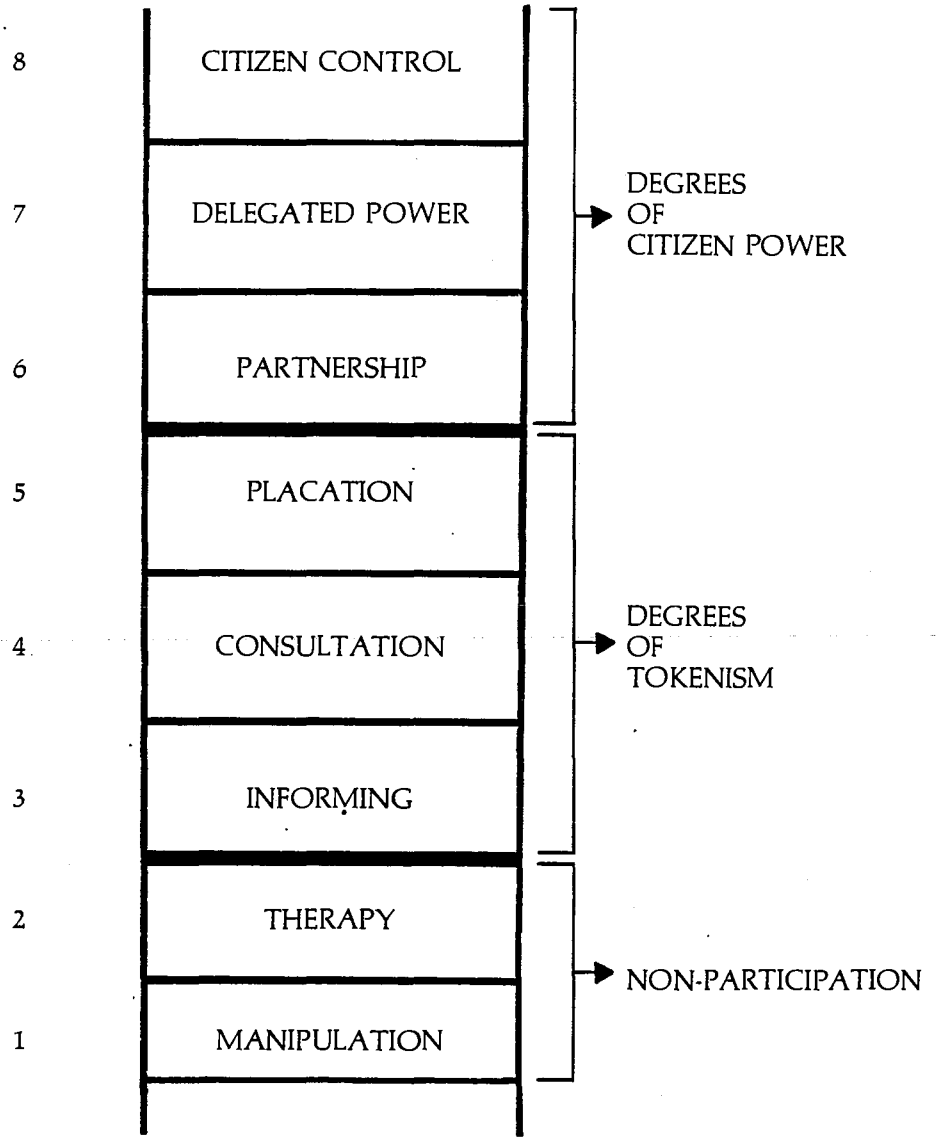

Figure 1. Eight Rungs on the Ladder of Citizen Participation
By Sherry R. Arnstein

"Citizen participation does not mean the illusion of participation, the semblance of involvement, the opportunity to speak without being heard, the receipt of token benefits, or the enjoyment of stop-gap palliative measures" (9). It does mean redistribution of decision making power without usurping legally designated authority, the provision of adequate resources in order to make responsible decisions, and most importantly, a recognition that the citizen taxpayer or consumer does have the right to participate. If such an approach is taken, there are four steps in the decision process in which citizen participation is valuable (3):

1) **Problem identification.** Assessment of technology impacts is at best difficult. The intimate knowledge of problems in a particular area is best known by the residents. The structure or form that a community should adopt for the future must be decided locally.
2) **Evaluation of Alternatives.** Cost-benefit Analysis on the aggregate level abuses the rights of individuals at the point of program implementation. Citizens can identify unacceptable options, and in so doing, reduce conflict and lost time in litigation and environmental impact preparation.

3) **Review of Draft Recommendations.** This is the last opportunity to "buy" into the process. The final report becomes a report shared by the public and the public servant and official recognition becomes a function of the public support given the recommendation.
4) **Project Implementation.** Citizens who have worked on the program have a vested interest in seeing their work carried to completion. Project success depends on local acceptance, favorable ordinances, and a vision of what changes will occur.

OCS Development and Public Participation

Citizen participation in the OCS program occurs as a result of requirements mandated not only in the OCS Lands Act (as amended) but in other federal legislation affecting OCS development. The other pieces of legislation involved are the National Environmental Policy Act (NEPA) and indirectly, the Coastal Zone Management Act of 1972. Primary citizen imput focuses on "scoping" the issues to be addressed in the environmental impact statement (EIS) and participating in a public hearing on the completed EIS. Legal action by citizen groups (often in conjunction with state governments) is effective, although not considered by most official decision makers to be a desirable course of action. Finally, as state and local agencies become involved in the process, opportunities for public participation increases. By any measure, citizen involvement cannot be rated very high on Arnstein's ladder - perhaps only to the "Consultation" rung. The recognition has grown, and this symposium is witness to the fact, that a national energy development policy that fails to take state and local sensibilities into account is not viable. I suggest that consideration be given to a form of public participation which views OCS policy development and implementation as a partnership. This means that power is in fact redistributed through negotiation between citizens and powerholders. Such sharing in practical terms means joint planning and decision making through such structures as policy boards, planning committees, and conflict management mechanisms. Such partnership requires citizen accountability, financial resources to pay for staff and information transfer, and an organizational structure which will permit genuine bargaining.

It is not my intent to duplicate an existing structure for citizen input into the OCS decision process, or substitute a mechanism for a workable process already in place. In fact, the Department of Interior (DOI) has, in its wisdom, established an OCS Advisory Board consisting of three elements: 1) Policy Committee, 2) Scientific Committee, and 3) Regional Technical Working Group (RTWG). It is the RTWG that is of interest here as the Policy and Scientific Committees are national in scope. As a participant-observer of the OCS Advisory Board for the past several years, it is my opinion that none of its constituent parts fills the definition of citizen participation as described above. The operation of the RTWG, as portrayed in DOI policy papers, appears to have the potential for building an acceptable CP structure and process at the regional and state levels (10). I am less enthusiastic about its ability to facilitate input from the most important local or community level. Further study, beyond the purpose of this paper, will be required to make such a determination.

The decision process as outlined in Figure 2 indicates two major phases for decision making in OCS development. As you can see, there are nine decision points in the pre-lease sale phase and five in the post-lease sale phase. For public participation to be effective (assuming a partnership is arranged), input at decision points critical to the public is paramount. I have selected two such points in the pre-sale phase and two in the post-sale phase. These four decision points represent direct input from an organized CP structure to influence the three major OCS program activities administered by the DOI. These are: 1) the leasing process, 2) the environmental studies program, and 3) transportation planning. The term "transportation planning" is interpreted in its broadest sense, i.e. not only to plan for an oil and gas transport network but also to arrange land use patterns and site energy related on-shore facilities compatible with local growth policies.

A generalized organizational structure is also suggested in Figure 2. State Technical Working Groups (STWG), made up of members of community impact planning committees and appropriate state agency representatives, would coordinate the grass roots efforts of the local Citizen Planning Committees (CPC). Staffing, technical assistance, and the development of an information system necessary to support the local activities are important elements which need detailed investigation. I would expect the various regional OCS offices would play a large role in this support activity. With proper staff training,

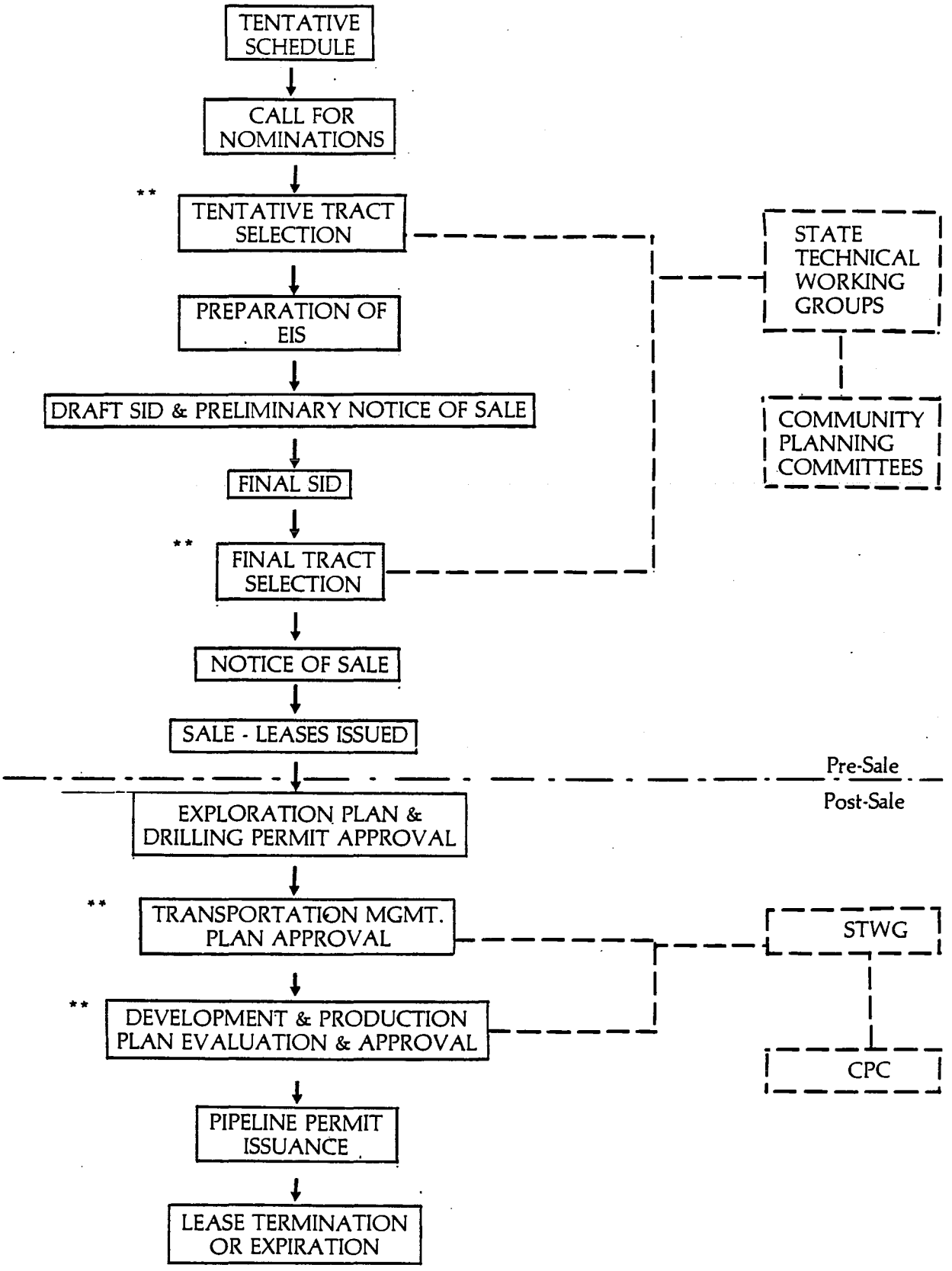

Figure 2. Steps in the decision-making process in OCS development.

one such relationship might look like the organizational chart in Figure 3. The viability of the existing RTWG is at this time uncertain. The usefulness of the RTWG varies greatly among the four OCS offices. My recommendation would be to merge the regional group into new state groups, thereby eliminating a layer in the structure and allowing the state and local participants closers interaction with the OCS office.

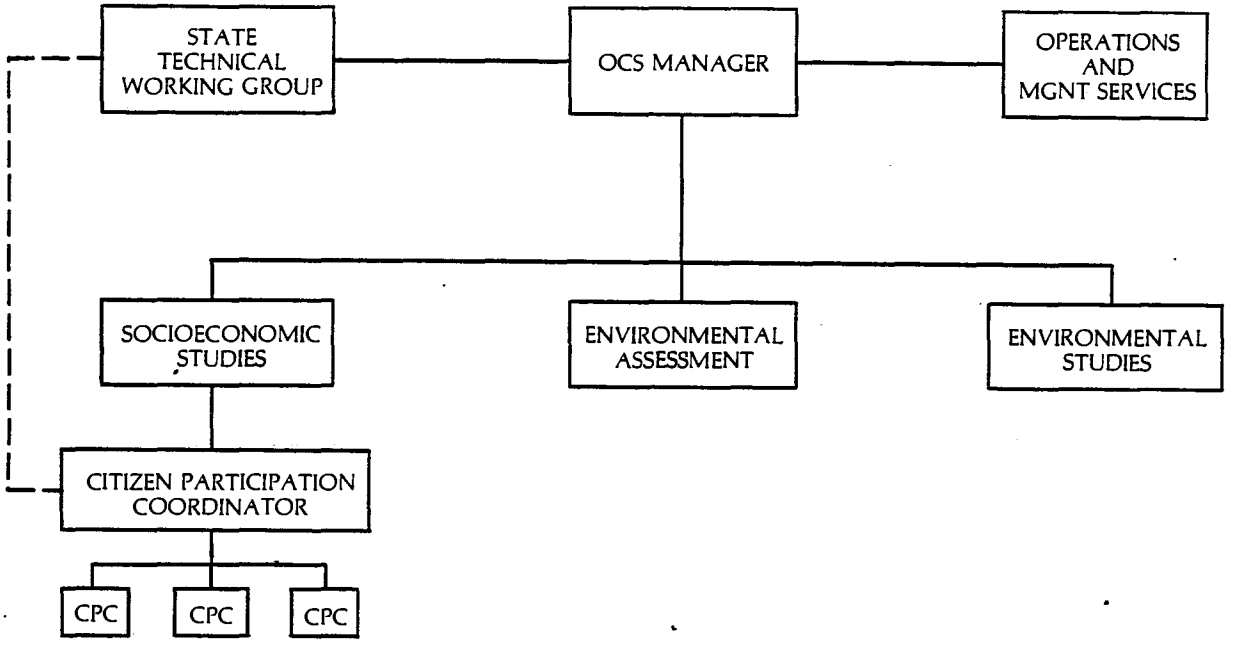

Figure 3. State Citizen Participation Organization.

Conclusion

The citizen court suit is not a desirable form of citizen participation. It is costly, time consuming and probably not in the best interests of a national energy policy. Consumers of federal policy deserve more from their representatives than an adversary relationship. This paper has attempted to make that point and recommend a basic recipe for CP in the OCS oil and gas program. Detailed ingredients such as determining who participates and how, the nature of power sharing, staffing and supporting the participants, conflict management mechanisms, and many more must be thought through, discussed and negotiated. All agree that citizen participation is not easy and involved are many risks and additional costs. It is the contention of this paper that participation by citizens in public programs, like the OCS activity, is in the best interest of policy implementation. It develops a sense of citizen control over their destiny (being one's own master) which leads to a conscious acceptance of government actions taken in their behalf.

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Public Participation on Complex Projects with a High Level of Conflict

Nancy L. Blunck

Introduction

Successful public participation must be a function of top level management. At the Alaska Power Authority we have a clear policy on the Susitna hydroelectric project in that: (1) there will be public participation; (2) Alaska Power Authority will pay for it; and (3) we will use the information we collect in making decisions regarding the project.

I was hired to conduct an aggressive public particpation project on Susitna; although the Executive Director of the Power Authority sometimes became anxious over the process, he was and continues to remain very supportive and very committed to what we're doing with public participation.

Clear Planning Process

Successful public participation is not done in a vacuum, but is tied to a clear, well-defined planning process. In fact, I believe the reason public participation most often fails is the lack of both a clear planning process and clear decision-making points. There are several elements basic to any planning process: identifying the problem; creating alternative solutions; evaluating those solutions; deciding on one solution; and implementing that solution.

In order to insure success in the planning stages, anyone who conducts a public participation process must first determine the steps and timing of the planning process, the points in the process at which public input is most useful and welcomed, and who actually has the final authority to make decisions. After I obtain this information, I use it for my own planning and also give it to the public so they know when to be involved and on which particular issues their input is most necessary.

Initial Assessment of Level of Public Participation Needed on Susitna

Susitna was a highly charged situation and had a history of conflict. In addition, large, centralized projects run somewhat counter to the strong independence of a number of Alaskans. Since we knew in the beginning we would have lots of conflicts, we also knew that people needed lots of opportunities to get together and talk through the problems. Hence, we utilized a number of aids as follows:

#1. With large, complicated, area-wide or regional issues like Susitna, we found we needed seven or eight methods for public participation, not just one or two.
#2. I have a list of 15 questions I have used over the years. At the beginning of the Susitna Project, I went through it and answered each question with a yes or no. It took about 15 minutes to do, and I used it as a barometer to indicate the level of public participation needed.

In analyzing my response to these questions, every yes answer pointed to the need for public participation and every no answer pointed to the need for public information. On Susitna, I had about 15 yeses. Consequently, the budget for Susitna public participation was sizeable with a total budget over a period of 2½ years of $410,000. This is approximately 1% of the total budget for the Susitna feasibility study and included three full-time staff members.

Practical Aids for Getting Started

We started over 2½ years ago by looking at past and present attitudes of the various public(s) on Susitna and identified three steps in the process:

1. Identification of the previous points of agreement. There were several:
   (a) more power was needed and hydro was, in general, a good idea
   (b) decreasing our reliance on nonrenewable resources was good
   (c) Alaska had lots of hydro potential
   (d) coal was less acceptable given other numerous energy resources available in Alaska
   (e) nuclear was out of the question

2. Identification of previous points of disagreement, such as:
   (a) how much power was needed
   (b) when it was needed
   (c) whether Susitna hydro power was "too big" and several smaller hydro plants might be better
   (d) whether Susitna would stimulate energy intensive industry like aluminum smelting

3. Examination of the kinds of conflicts that might be generated because of the project. Generally there are two kinds of conflict that may exist on any project: the first is a fear, mistrust, or feeling of powerlessness on the part of one or more publics and the second is an honest difference of opinion or values.

One must work to resolve the first kind of conflict before one can begin to discuss and face the honest differences of opinion or value. If you don't, gamesmanship develops, and parties begin to second guess each other in order to "get one up" on the other side. On Susitna, we had some level of mistrust by the public in knowing whether an objective study would be done, whether alternatives to a large hydro plant would really not be considered, whether Susitna wasn't already a foregone conclusion, and whether the information I would be producing would be objective because, after all, I worked for the Power Authority. We had to work to resolve this issue of mistrust first before we could get anywhere with discussions about tradeoffs or compromises.

Paths of Communication

One of the first steps we had to take was to determine who constituted the "interested public(s). In the case of the Susitna project, as in most projects, there were a number of publics: local residents living near the project; taxpayers around the state who might end up paying for part of it; those directly benefiting from the project—mostly those residents living in Anchorage and Fairbanks; the utility companies; state and federal agencies involved in review and permitting; elected officials and leaders; Native landowners in and near the project; and over 45 special interest groups.

We developed an internal policy within the Power Authority to divide up the various publics. I dealt with groups and organizations, communities and the general public. The Project Engineer (at least initially) dealt with the utilities and agencies. We found this didn't work very well and have since hired an Environmental Coordinator to work with the agencies. The Native organizations hired their own staff liaison to look out for their interests and to keep them informed and involved.

An important principle of communication when dealing with various publics is that you can't communicate with everyone in the same way. For example, with groups like the Alaska Center for the Environment and the Northern Environmental Center, we needed to provide them with a high level of technical information; on the other hand, the general public doesn't care so much about detail, but tendsto ask broader-based questions. At each step of the way we kept asking ourselves questions regarding who we should communicate with and what we actually wanted out of the communication.

There were also several geographical considerations. The Susitna project area of influence included 66% of the people in Alaska and there were some special problems with physical access. Communities were spread over 400 miles; they were connected by road but distances were so great we often flew, which is more costly. At the same time, weather can be bad and at the last minute you drive anyway—in essence, we double planned in terms of getting to meetings. In addition, some people potentially affected by the Susitna project lived along the Alaska Railroad, 30 miles from any roads.

They had to flag down the train to catch a ride to the nearest town for a meeting. This sometimes meant staying a week in town before they could catch the next train back because the train only runs once a week in winter. Meetings had to be scheduled to accommodate train schedules.

There were also some cultural considerations. There were patterns of work that people had that we needed to be aware of and plan for such as commercial fishing in summer. One small community that could be impacted by Susitna is the support center for mountain climbers around the world wanting to climb Denali; a large part of the livelihood of this community is earned from May through July. They don't even have time to talk to you during that period unless it's about climbing. Our responsibility in both cases was to be sure we weren't trying to get public input during those times.

Practical Aids and Public Participation Methods Used in Working with the Public

There are a number of practical aids I used in working with the public on this project. Some of these include:

—keep asking questions of the public (e.g. what are your concerns, what is important to you) and of yourself.(e.g. what exactly am I hearing the public say and are their comments based on reality and correct information?)
—take project planners and engineers out to see, hear and feel the consequences of their decisions and to let the public hear directly from those making the decisions
—let people know when they've had an impact on the agency's thinking
—let people know the consequences of not being involved
—create options/alternatives with the help of the public

Some of the public participation techniques we used were standard and some were not. Among the techniques were small and large group meetings, workshops, newsletters, word of mouth, surveys and interviews, personal letters and phone calls, radio messages and public hearings. Our primary method of disseminating information to the public was a series of five newsletters. Each newsletter had its own theme and 30,000 copies were printed and mailed. The issues covered topics as varied as seismicity findings on Susitna and environmental impacts on fish and wildlife to the fifth issue on the impacts of the project and people.

Guidelines Useful in Working with Consulting Firms on Contract to the Alaska Power Authority

Most of the work at the Power Authority is done on contract as we are mainly a staff of managers. I use the following guidelines in working with consulting firms:

1. In working with consultants, my main job is to assist them in articulating the answers to the following two questions:
   a. What do we need from the public in order for us to move on this phase of the project?
   b. What do we think the public needs from us in order to tell us what they think?
   At first glance, these questions may seem simple. They are two very difficult questions to answer but we must answer them in order to have a meaningful dialogue.
2. Help the firm interpret what the public is saying. After all, citizen input can be sloppy and is not as precise as the information generated by engineers.
3. Suggest ways the engineers can use the information coming from the public.
4. Remind the consulting firm when a question before them is not an engineering question, but one from another discipline and is better answered by another consultant.

My Role and Responsibilities with My Own Management at the Power Authority

At major decision points, my role with my executive director, and the Board of Directors, is to lay out the following:

—here's what various publics think and feel
—based on what we've heard to date, here are the decisions that would best reflect the public preferences expressed

—here are those who will agree and those who disagree and their reasons
—basically, here is the overall sense of the kind of reaction you will get from the various options

I have the responsibility to record and document the entire public participation process and to show management ways of responding and using public input as well as advising them of the consequences of ignoring the public. Finally, my role is to advise management when a situation arises that seems to say we should stop, back up for a moment, and reexamine other alternatives that have been discarded.

Conclusions

In concluding, here's the direction we're going in the future. . .the goals for Susitna Phase II, Public Participation. There are six of them, as follows:

Goal 1: to inform on the engineering design work in Phase II
Goal 2: to provide public participation during the environmental phase, including impact assessment and mitigation planning of both the human and physical environment
Goal 3: to ensure that additional data is collected and an objective monitoring system is established to further define Susitna-related impacts on local communities as opposed to impacts caused by large growth that is already expected to occur in these communities
Goal 4: to resolve differences between Susitna-related impacts identified by Power Authority contractors and those perceived by agencies or local communities
Goal 5: to participate with other agencies to reduce Susitna-related impacts in local communities; inherent in this goal is the expenditure of state money to mitigate impacts in local communities
Goal 6: to minimize the time between occurrence of a Susitna-related impact in a community and action to mitigate the impact

We look forward to accomplishing these goals, building on what we've accomplished so far. Phase II starts in January, 1983 and will likely run for a period of two to four years.

Public Participation Along Alaska's Coast: Reaching Out to the Villages

Michael I. Jeffery

Introduction

One of the elders of Barrow, a community on Alaska's North Slope where I have worked as an attorney for the last five and a half years, was telling me his father's dream one day. He said his father had dreamed of seeing fires all along the coast of the Beaufort Sea. He did not know when it would happen, but his father had dreamed that same dream many times. This elder, Horace Ahsogeak, tells me that when his father had dreams many times, the dreams would nearly always come true.

I was very moved by this dream of Mr. Ahsogeak's father. The reading that I have done while representing village councils concerned about the pace of offshore oil exploration and development in the Beaufort Sea provided me with the information that burning is one effective way of at least beginning to deal with a major oil spill in the Arctic waters and ice. Also, I have read how many oil blowouts are often accompanied by platform fires, as the gases spewing out with the oil get ignited. Was the dream of Horace Ahsogeak's father a grim warning that we would all see such spills and that we would have to live with the impact they would have?

It is very difficult for an elder like Mr. Ahsogeak to bring his dreams, and his tremendous knowledge of the sea ice, the environment and the wildlife of the Arctic Ocean to the attention of government decision-makers.[1] He cannot speak English well, he cannot read a complicated government impact assessment, and he feels most uncomfortable at a public meeting during which he might be asked to give his opinions to a group of white strangers at the front of the room.

Yet Mr. Ahsogeak is a skilled subsistence hunter and fisherman, a whaling captain, and he is a person whose lifelong diet has included large amounts of fresh food from the lands and the waters of the North Slope. He is one of the first who would be directly affected by a major Arctic Ocean oil spill and he has told me of his deep fears about a big oil spill in the ocean. His health would suffer terribly if the wildlife were killed by the oil. He knows the wildlife, the ice, and the winds. He has deep knowledge to share, and he has the right to be listended to.

The problems of listening effectively to these experts on the environment of the Arctic become especially acute when they live out in the remote villages. The villages may be located several hundred miles from a regional center. Significant travel expenses and other seemingly difficult arrangements are necessary to gather such information from villages along the coast of Alaska, and to inform their residents about the natural resource projects in their area.

As demands for "streamlining" are heard more and more from the federal decision-makers, and demands for "permit reform" are heard more and more from industry representatives in the Alaskan capital, it seems more and more unlikely that the village people will be heard in the future.

The opinions expressed in this article are the author's and should not be taken as the Official position of the Alaska Legal Services Corporation or any person or organization represented by the Alaska Legal Services Corporation.

[1] *For a discussion of the current problems of North Slope residents in dealing with outside government institutions, see* WORL, R. & R., LONNER, T. BEAUFORT SEA SOCIOCULTURAL SYSTEMS UPDATE AND ANALYSIS *(Bureau of Land Management Technical Memorandum BE(71)-7, May 1981) at 43-140. See also, Dahl, Oil: The Eskimo Impact Statement, Anchorage Daily News, June 12, 1982. (We Alaskans Magazine), at HB, a recent news article bringing out these issues.*

Does this have to be the end result? Or can we build on the experience of North Slope villages over the last few years in dealing with the many proposals for oil exploration and development in their area to develop a model for effectively getting information about natural resources projects and their impacts to the village people, and to hear their opinions about the projects?

This paper is based on the assumption that government decision-makers and their staffs are seriously interested in obtaining this vital information from village people. It also assumes that the information will actually be used in the decision-making process with some prospects that it could help to modify decisions being made. Without this possibility of responsiveness, the public participation effort becomes nothing more than a cynical effort by some to "check off" duties imposed by laws that may be changed in the future.

There are solid legal requirements that government agencies considering projects of many different types must give public notice, and must allow public hearings to gather information to make the agency decision. An Appendix is attached to this paper where a summary of such laws, regulations and legal doctrines is given. The laws discussed there are only some of the major legal foundations for the legitimate expectation of rural people that their government agencies will undertake the commitment of time, energy and money that is necessary to reach the village people and hear what they have to say.

Decision-makers and agency representatives faced with the prospect of holding public meetings in such locations are faced with a dilemna. These residents need to be heard. They have unique expertise about the area and the wildlife, and they are the most directly threatened by the environmental and social problems that may flow from the projects; yet the villages exist in a radically different context for the government decision-making process than the urban centers where the government officials live and work.

Some Suggestions for Reaching Out to the Villages

I have been fortunate over the last five and a half years to have had the opportunity to travel a great deal to the remote villages of the North Slope of Alaska. Many of these trips over the past four years have been to assist in preparations for various kinds of public hearings and public meetings organized by federal, state, North Slope Borough, or industry representatives. I have seen the way in which these meetings have impacted the village people, and the ways in which the people have responded to the different kinds of meeting that were held.

I have come away from this experience with a deep admiration for the patience and insight of the village people. I also firmly believe that these public hearings and meetings must be preserved in the face of increasing pressures for "streamlining" and "permit reform" that would go a long way toward eliminating them.

The following are some basic suggestions that may help to ensure that the efforts to determine the opinions of the village residents are productive as well as cost-efficient. The extremes of ignoring the village people, or of constantly making trips out to ask their opinions, must both be avoided. I believe that consideration of the information contained in this section will insure more effective public participation by the village people, without overwhelming them with an excessive number of public hearings that would take away too much of the precious time available for subsistence hunting and fishing.[2] Most of these ideas have been used by one agency or another but they oftentimes stop using them. In any case, there has never been an occasion when all of them have been used on the Arctic Slope of Alaska.

1. Before concrete analysis of a project begins, preliminary meetings modeled on the current federal "scoping meeting" for Environmental Impact Statement preparation should be held. They provide a useful forum for local people to find out about future government plans for their area. Local meetings should be held in all the affected villages, or at least in certain centrally located communities to which a cluster of other villages could send representatives. Translation of the materials and testimony at the meeting is important.

[2]*The tremendous variety of natural resources development activities that the people of the North Slope of Alaska are having to deal with simultaneously is staggering. Two recent publications summarize the situation:* JACKSON, J.B. AND PRETZ, B.C. OUTER CONTINENTAL SHELF AND ONSHORE OIL AND GAS ACTIVITIES IN THE ARCTIC: A SUMMARY REPORT, OCTOBER, 1981 (UPDATE 1, MAY 1982) (U.S. Geological Survey Open File Report 82-19) at 6-32; and, NORTH SLOPE BOROUGH, NORTH SLOPE BOROUGH COASTAL MANAGEMENT PROGRAM, (Interim Report May 1982) at 2-22 to 2-47.

2. These meetings could be followed up by distribution of television, radio, and/or written summaries of the planned activities. Comments and information given at the meeting could be used as the basis for such programs. The NPR-A program staff of the Bureau of Land Management's Alaska State Office produced an effective series of bilingual video-taped discussions of the plans for oil exploration in the National Petroleum Reserve-Alaska. These half-hour programs included both government maps and information, which were translated into Inupiaq, the local language of the native people. They also included native hunters discussing the issues that they felt were important in considering these government plans. The tapes were shown on the statewide satellite television project, and reached all of the villages affected by the proposals.

3. When an informational document such as the Environmental Impact Statement, for federal activities, or the Social Economic and Environmental Analysis, for State of Alaska activities, is ready, strong efforts must be made to ensure that the document reaches affected communities promptly. It is not adequate to simply drop them in the mail from Anchorage or Juneau. A box of heavy books may take one to two weeks to reach some of the villages from the big cities. Instead, air freight or, if possible, a personal trip to the villages should be used. When the Draft EIS for the Joint Federal-State Beaufort Sea Lease sale was distributed in early 1979, staff members from the Alaska OCS Office brought many copies of the document to each of the villages involved, and held informal meetings to answer questions about the EIS and the lease sale decision-making process. The time frame for commenting on such documents is already so compressed that it is disastrous to have an extra week or ten days of that time eliminated by mail delays. A minimum of ten copies of the complete environmental assessment document should be available in each village affected by the project. Village council members, teachers, and other interested persons would all be able to have a copy (many of these individuals do in fact take the time to review the entire document).

4. I believe that the draft stage of the document is also the time to produce a pamphlet that summarizes the major information and issues of the larger document. This pamphlet could be distributed in much greater quantity than the bulky and expensive complete document, and the shorter document could also be fully translated. The U.S. Army Corps of Engineers, Alaska District, distinguished itself by producing such a pamphlet when it issued the final EIS for the massive Prudhoe Bay Waterflood Project.[3] The final EIS was three volumes; it was summarized in a 27 page booklet, including maps and helpful graphics. All materials in the summary were translated into Inupiaq. It was significant and helpful to have this document available along with the final EIS. But effective public comment on the draft EIS would have been immeasurably enhanced if such a document had been available in draft form along with the draft EIS. All the basic information that most village people would need for commenting on the project was contained in this publication, while the full EIS was necessary for the agency, scientific, and legal reviews that the project must undergo.

5. Effective public notice must be given for the public hearings which are scheduled. For rural Alaska, radio advertisements must be used to supplement signs and flyers. Newspaper ads (even if placed in the regional, native-oriented newspapers) have limited effectiveness to bring information to remote village people. The agency setting up the hearing should coordinate these efforts with the village council, and the basic information including date, time, and excact location should be on the posters and flyers supplied by the agencies. It cannot be assumed that busy, and volunteer, mayors and village council members will set up the meeting, advertise it around the village and make signs.

6. Close coordination with village council members should be made about the **timing** of the meeting. An agency's schedule may suggest a certain day—but that day may also be the time of a weekly church service (often held on both Sunday and Wednesday nights), or a weekly movie, bingo or sport activity night. As a practical matter, meetings scheduled on these days simply will not have significant village participation. Some villages have simply required that those agencies wishing to have meetings in the village must schedule them at the same time as the village council meeting. That night is already reserved for these kinds of discussions, and people will be present and ready to listen. In addition, the needs in Alaska for subsistence hunting and fishing must be respected. Public hearings in Barrow for the 1979 Beaufort Sea Lease Sale were postponed until early June so that the whaling season would be over

[3] *U.S. ARMY CORPS OF ENGINEERS, ALASKA DISTRICT, PRUDHOE BAY-MI SAVAAKSRAQ MAQIPKAINIQ TAGIUMIK NUNAMUN, MAQPIGAALIAQ AQULLIQ UQAUSIGIVLUGIT ALLANNUQTAUNIAQTUAT SAVAAM IGLIGNINANI (The Prudhoe Bay Waterflood Project, A Summary of the Final Environmental Impact Statement), 1980.*

before the hearings. In other parts of Alaska, such respect should be shown toward caribou hunting, fishing, and similar activities.

7. The hearing panel should bring with it any summaries or other brief descriptions of the project so that people at the hearing can review them while the hearing is going on. In this way, people who have not had a chance to review the materials in advance can still make meaningful comments.

8. During the hearing itself, it is vitally important to have a translator present. Experience shows that it is not sufficient to simply have a bilingual person sitting in the room and have people "ask questions if you don't understand". In fact, the people that will have the most questions will also feel the most uncomfortable about speaking up about them. Successful hearings in North Slope villages with a substantial number of people who have trouble speaking English are the hearings in which there is full translation right from the start. That way, everyone in the room has a general idea of what is going on. It is frustrating to everyone when some of the comments, whether in English or Inupiaq, are simply made without translation, so that an important number of people in the room simply lose touch with the information being passed in the hearing.

9. Whenever possible, especially in regional centers like Barrow, live radio and/or television broadcast of the hearing should be arranged on the local station. Elders or working people who may not be able to attend the meeting can share in it. People out hunting or fishing for food for their families may also be listening. All the listeners will be benefiting from the translation that is provided during the hearing. Several hearings in Barrow, including the one on the Beaufort Sea Lease Sale in 1979, included important testimony provided by people who had been informed about the hearing and what it was all about from the radio broadcast that was going on. They came in from the hunting area at Point Barrow to offer their testimony.

10. The hearing should continue as long as necessary to gather all the comments of the people. Many village residents are reluctant to speak out at the beginning of the hearing. There may be long silences during the hearing which are actually a time of reflection, or a time for review and quiet discussion of materials that may be available at the hearing. People outside the hearing may be coming in late, as they hear the radio broadcast, and they are concerned enough to interrupt their other activities to share what they have to say. Then, later on, the hearing opens up with many very valuable comments.

11. An informal atmosphere helps make people feel comfortable in stating their points of view. If the hearing panel comes into the village wearing urban clothing, or uniforms of some kind, it makes it more difficult for the communication to flow among the people that are present.

12. Where possible, the decision-makers or at least senior staff representatives should attend the hearings. It is impressive, for example, that some officials of the Alaska Department of Natural Resources charged with major decision-making authority have made the effort to attend the village hearings concerning proposed OCS leasing. Unfortunately, this effort by Alaskan officials is very much the exception. There is a great amount of frustration among people at hearings when they realize that the people at the front of the room are not the decision-makers. The environmental impact statement preparation staff may listen carefully, but the power of the hearing is not felt beyond them. The actual decision-makers see only a summary of the issues raised at the hearing. Hours of testimony may only change a sentence or two in the issue analysis, and the deep feelings expressed are usually lost in the process. Yet these feelings and opinions should be an important part of the government decision in a democratic system.

13. After the hearing is over and the agency people have left the village, people in the village can often be heard to say that the government will not be paying any attention to what they have said. One way to help people understand how the information is used is to have the people leading the hearing carefully explain the next steps in the decision-making process before they close the hearing.

14. A continuing issue on the North Slope has been how the official transcript of the public hearing will reflect the translated portions of the hearing. Assuming an agency has arranged for translation, the tendency has generally been to use the English transcript of the translation of the Inupiaq language testimony at the hearing as the official text for the record.

This system is not fair to the person giving the testimony, nor to the translator doing his or her best to convey the information promptly and accurately between two very different languages and cultures. Translation at the meeting is critically important and a proper translation of the Inupiaq language testimony must be made from the tapes. In Barrow, as well as in other rural centers in Alaska, there are skilled translators available through regional governments or school districts. These translators are fully

trained and capable of producing accurate, readable English texts of the native-language testimony.

The Alaska OCS Office contracted with such individuals to produce the final text of the transcripts of the three North Slope hearings on the 1979 Beaufort Sea lease sale. This effort was well worth the cost as the transcripts had more integrity as a real expression of the feelings and knowledge of the people. From the point of view of the decision-maker, the more complete transcript means that the effort and expense of holding the hearing have been fully utilized to bring out the precious, oral information provided by the elders.[4]

15. The final step in the process is to let the village know what response has been made to their comments. The practice of publishing written comments and responding issue-by-issue to the written and oral comments in the final impact assessment documents is a necessary and useful practice. But rural people will often not know where to look in the documents and how to understand the responses. A short cover letter sent to the village council and to people who sent in written comments from the village, along with several copies of the final impact assessment documents could point out the pages, if any, where the comments from that particular village have been individually addresssed. If the village's comments were not directly mentioned, at least a short cover letter pointing out where the response section of the document is, and how to use it, would be an important way to show to the village people the way government agencies have listened to what they had to say. In many cases, of course, the impact assessment document has been changed to reflect the comments given during the hearing and people would like to know that kind of information.

16. A final comment is appropriate. Some government agencies dealing with North Slope communities have suggested that oil industry representatives should meet with the village people to work out their differences. Sometimes an oil company will simply tell the agency that it has met several times with village people and are thus aware of the concerns of the village. These concerns may even be summarized by the industry spokesperson, together with the company's response. A suggestion will then be made to the effect that public hearing by the agency is unnecessary.

At a time of budget difficulties, it is easy to see how tempting it would be for government agencies to simply accept this information without scheduling its own public meeting. The dangers of this course of action are clear. Village participation at an industry-sponsored meeting may well have been light. In addition, the comments made by the village people will have been based on information and promises made by the very people who are expecting to reap major corporate profits from the proposed exploration and development activities. It is difficult enough for the people involved with the government-sponsored impact assessment process to be objective about projects from which the government expects to reap enormous tax and royalty benefits. To abdicate the conduct of the public meetings to the corporate project's proponents would be even more devastating to the credibility of the public comment process.

Conclusion

Some readers of the above thoughts about the public hearing process in rural Alaska may be concerned at the expense that may be necessary to make the process really effective. But if the gathering of public information and comment is to be more than just going through the motions, increasing attention by government agencies must be directed at ways to make sure the village people are actually being heard.

There is an increasing danger that the people of the villages will have the feeling these hearings are a waste of their time. They cannot see the impact their comments sometimes have when there is no reporting back to them by the government agencies. They do see that most of the projects go ahead as originally scheduled, even if there has been intense opposition expressed to the project by local residents.

But the hearings can be meaningful, if they are properly arranged and scheduled in a sensible way. Several projects proposed along Alaska's coast have been significantly postponed or cancelled after the public comment process was complete. The knowledge of people who have decades of personal experience and the experience of the centuries in surviving in Arctic Alaska is critically important for

[4]*L. SHAPIRO AND METZLER, R., HISTORICAL REFERENCES TO ICE CONDITIONS ALONG THE BEAUFORT SEA COAST OF ALASKA (1979). This scientific report published by the Geophysical Institute of the University of Alaska, Fairbanks, is based on the testimonies of eight Inupiat elders. It acknowledges the value to the scientific community of the knowledge of the elders about the ice.*

ensuring that the decisions will strike the proper balance between the natural resource needs and the survival needs of people of our state and nation. Effective hearings will bring greater mutual understanding between government agencies, local people and industry. This understanding will help avoid wasteful and ill-advised natural resources projects and needless litigation; and, most important, it will avoid needless human suffering from the oil spills that threaten to bring the fires burning along the Beaufort Sea coast.

APPENDIX

Some legal foundations for village public hearings

A variety of laws, regulations, and legal doctrines require that government agencies give public notice and hold public hearings before making significant decisions about natural resources development. Several recent legal articles and publications have discussed such laws in the context of Outer Continental Shelf development.[1A]

Federal statutes. The basic federal statute that requires public participation during the decision-making process concerning natural resources exploration and development activities is the National Environmental Policy Act of 1969, 42 U.S.C. § 4321 et. seq. The regulations implementing this law are published under the authority of the Council on Environmental Quality at 40 C.F.R. §§ 1500-1508 (1980). A "scoping meeting" is held in the affected area prior to preparation of the Environment Impact Statement in order to ascertain the major issues about the activity, 40 C.F.R. §§ 1501.7. Following publication of the Draft Environment Impact Statement, public hearings are required, usually within 45 days.[2A] This information is then used in preparation of the Final Environmental Impact Statement about the project. A comparison between the "streamlined" procedures of the current administration and the procedures used previously is contained in the introduction to the recently issued final Supplement to the final Environmental Impact Statement on the federal government's proposed five-year OCS leasing schedule.[3A] This revised lease sale schedule and the "stream-lining" procedures are currently being challenged in federal court.[4A]

In addition, the Coastal Zone Management Act of 1972, as amended, 16 U.S.C. §§ 1451-1464, contains requirements that there be an opportunity for public participation in the decision as to whether a project is consistent with a state's coastal zone management program. Regulations implementing the law are found at 15 C.F.R. §§ 930 et. seq. (1980).

If oil exploration activities are allowed to go ahead, permits must still be obtained from federal (and state) agencies having jurisdiction over the proposed activities. In particular, the Federal Water Pollution Control and Prevention Act, 33 U.S.C. §§ 1251-1367, includes the requirement that the U.S. Army Corps of Engineers consider any discharge of dredged or fill materials within the navigable waters of the United States (see Section 404 of the Act). Section 10 of the River and Harbor Act of 1899 contains similar requirements. Public notice must be issued, 33 C.F.R. § 209.120(i)(1)(ii) and (j)(1), and it must include reference to the independent water quality certification to be issued by the state water quality agency, 33 C.R.F. § 209.120(j)(1)(v). Public hearings may be requested from either the Corps of Engineers or the state water quality agency (the Alaska Department of Environmental Conservation) pursuant to these public notices. The general obligations of the National Environmental Policy Act of 1969 specifically apply to the Corps of Engineers permitting process, pursuant to regulations contained at 33 C.F.R. § 209.120(1).

State statutes: The Alaska Constitution contains the basic requirement that

> No disposals or leases of state lands, or interests therein, shall be made without prior public notice and other safeguards of the public interest as may be prescribed by law.

(Note: Citations in this paper conform to the form used by the legal community, as set out in the COLUMBIA LAW REVIEW, THE HARVARD LAW REVIEW ASSOCIATION, THE UNIVERSITY OF PENNSYLVANIA LAW REVIEW, AND THE YALE LAW JOURNAL, A UNIFORM SYSTEM OF CITATION (13th ed., 1981).

[1A] Genuller, Offshore Oil Power Plays: Maximizing State Input Into Federal Resource Decision Making, 12 NAT. RESOURCES LAW 347 (1979). Verges & McClendon, Inupiat Eskimos, Bowhead Whales, and Oil: Competing Federal Interests in the Beaufort Sea, 10 UCLA-ALASKA L. REV. 1 (1980). Jones, The Legal Framework for Energy Development on the Outer Continental Shelf, 10 UCLA-ALASKA L. REV. 143 (1981). Goldberg, Offshore Lease Sales—Are Endangered Species Threatened? 10 UCLA-ALASKA L. REV. 175 (1981). P. CASEY, LEGAL MANDATES AND FEDERAL RESPONSIBILITIES, (Bureau of Land Management Alaska OCS Office Technical Paper #4, 1981).

[2A] BUREAU OF LAND MANAGEMENT, U.S. DEPARTMENT OF THE INTERIOR, FINAL SUPPLEMENT TO THE FINAL ENVIRONMENTAL IMPACT STATEMENT, PROPOSED FIVE-YEAR OCS OIL & GAS LEASE SALE SCHEDULE, JANUARY 1982-DECEMBER 1986, at 21 (1981).

[3A] Id. at 17-22.

[4A] California v. Watt, No. 815099 (9th Cir. August 12, 1982).

Alaska Const., Art. VIII, § 10. An important state law implementing this provision is the requirement that communities near proposed projects be given notice of the projects as soon as practicable, but no less than 30 days before the proposed action. A.S. § 38.05.305(a)(2) (Supp. 1981). If the community chooses to hold a hearing about the proposed action, the Commissioner of Natural Resources or his delegate must attend, A.S. § 38.05.305(a)(4) (Supp. 1981). Similar notice and hearing requirements must be met prior to the required finding by the Department of Natural Resources that a disposal of an interest in state land is in the "best interests" of the people of the State of Alaska, **see** A.S. §§ 38.05.345 and 38.05.346 (Supp. 1981). For major state actions, the Agency Advisory Committee on Leasing prepares a Social Economic and Environmental Analysis of the activity, as provided in Alaska Administrative Order 52, signed by Governor Jay Hammond on January 24, 1979.

The Alaska Department of Environmental Conservation must issue public notices regarding water quality certification requests for development projects, and it may hold public hearings on these requests. These regulations are to be found at 15 A.A.C. §§ 15.050 and 15.060 (1978).

Finally, as Coastal Zone Management programs are developed around the coastal areas of Alaska, the local districts are required to have public meetings to consider the local district programs. 6 A.A.C. § 85.100, 6 A.A.C. § 85.130 (1981).

Statutes relating to protection of subsistence hunting activities. As recognition of the critical role of subsistence hunting and fishing activities in the lives of Alaska's coastal residents has grown, the laws have been giving increasing protection to them. The federal Alaska National Interest Lands Conservation Act, 16 U.S.C. §§ 1301 et. seq. (1980), at Title VIII, contains specific provisions dealing with protection of subsistence activities: "[N]onwasteful subsistence uses of fish and wildlife and other renewable resources shall be the priority consumptive uses of such resources on the public lands of Alaska. . . .", 16 U.S.C. § 3112 (1980). Such provisions provide a clear directive that these subsistence activities must be protected.

This Act requires special notices and "a hearing in the vicinity of the area involved" by the federal agency, when the head of that agency determines that a proposed activity, "would significantly restrict subsistence uses", 16 U.S.C. § 1320 (1980).

Alaska law also contains special provisions relating to protection of subsistence hunting, at A.S. §§ 16.05.255(b) and 16.05.257(c). Public hearings are required before such protective regulations can be adopted, "with at least one of the hearings being held in close proximity to the area potentially affected", A.S. § 16.05.257(c)(1) (Supp. 1981).

A trust responsibility. In addition to the specific laws cited above, federal agencies concerned with native people are required to exercise a careful trust responsibility of the needs of these people. The dimensions of this trust responsibility in the context of Alaska Natives and in natural resources decision-making has received a great deal of discussion recently.[5A]

Although the exact boundaries of this trust duty are still unclear, and under current litigation,[6A] it is at least clear that federal agencies whose actions may hurt native hunting activities protected by native exemptions to federal laws like the Endangered Species Act, 16 U.S.C. § 1539(e) (1976), and the Marine Mammal Protection Act of 1972, 16 U.S.C. § 1371(b) (1976), must honor this trust responsibility.[7A] This concern gives an additional mandate for holding public meetings in native population areas affected by natural resources decisions.

The state statutes protecting subsistence hunting activities for rural residents of all races also require special consideration of the affects of natural resources projects on such activities. The Alaska Supreme Court recently affirmed the specific requirement by a superior court judge that the Alaska Department of Natural Resources make specific, detailed findings on the "effect of [Beaufort Sea OCS] leasing on

[5A] *D. CASE, THE SPECIAL RELATIONSHIP OF ALASKA NATIVES TO THE FEDERAL GOVERNMENT (1978). Comment, The Effects of Increased Tribal and State Autonomy on the Special Relationship Between Alaska Natives and Federal Government, 10 UCLA-ALASKA L. REV. 183 (1981).*

[6A] *See the differing opinions in the lower and appellate court in North Slope Borough v. Andrus, 486 F. Supp. 326 (D.D.C. 1979) and 486 F. Supp. 332 (D.D.C. 1979), aff'd in part and rev'd in part, 642 F.2d 589 (D.C. Cir. 1980). Important issues regarding the trust responsibility and Inupiaq title to the offshore area of the Arctic Ocean are currently under the judicial consideration following the July 1, 1982, court hearing in Inupiat Community of the Arctic Slope v. United States of America, No. A81-019 (D. Alaska filed January 16, 1981).*

[7A] *North Slope Borough v. Andrus, supra.*

the subsistence culture of the Inupiat Eskimo people".[8A] This concern should also encourage state agencies to hold local public meetings when these issues must be considered.

A review of these legal authorities shows the importance of the knowledge of effectively holding public hearings in the remote villages of Alaska. The time, energy and expense involved for everyone involved in these hearings make it essential that the information from the hearings be obtained and accurately preserved.

[8A] *Hammond v. North Slope Borough*, No. 5550, slip. op. at 21 (Alaska, May 7, 1982).

Section IV: Family, Social and Cultural Concerns

Introduction

Marsha Bennett

This chapter contains a number of innovative approaches to cultural, social and family impact assessment which broaden the perspective of SIA in Alaska. The collection includes papers on family impact assessment and human services planning. Two additional papers discuss SIA as it relates to two subpopulations of Alaska: the elderly and women. BLM, Forest Service and Minerals Management Service program approaches to sociocultural and socioeconomic information are treated. A paper suggesting a multi-method approach to socioeconomic monitoring itself warns against the aggregation of social data when taken out of its community-level context. Finally, a paper reports on the negative effects of resource development on indigenous people in Canada and another paper disputes Alaskan SIA conclusions as they pertain to Alaska's indigenous people.

Roy Bowles' paper draws on his extensive experience and other published works on energy impacted small communities in Canada and the American West. He places family violence and other family disfunctioning within a broader ecological framework. He also calls on policy-makers and SIA professionals to recognize the negative social consequences which often attend resource development and to plan for these effects in conjunction with resource development planning.

Judith Davenports' paper summarizes the experience of several Rocky Mountain states with human services planning in response to energy development impacts and offers some much needed tools for Alaska social services delivery and planning. Katie Hurley calls for more studies of women and womens' issues in Alaska, while Terry Haynes reviews impacts on the elderly in small communities in Alaska's interior region and compares these changes with impacts on the elderly reported in other SIA research.

Muth describes a number of methodologies used by Forest Service Scientists in Alaska which undoubtedly have wider applicability. Chuck Smythe's discussion of the Sociocultural Studies component of Minerals Management Service's Socioeconomic Studies Program provides an overview of the major findings and methods used in this important Alaska Studies program.

Steve McNabb's paper describes some of the findings of the Socioeconomic Studies Program's Social Indicator Project concerning the generation of socially meaningful socioeconomic measures, based on field work in the NANA and APIA regions. Data which are meaningful at the community level may lose their meaning when aggregated, he notes. He argues for a multi-method approach in rural Alaska which combines the strengths of several different methodologies.

The Committee of Alaskans for Indigenous Survival (CAIS) reminds us that indigenous people may not see the world in the same light as that portrayed by the social scientists who study them. This point is stated somewhat differently by Justus and Simonetta who report heavy social and cultural costs from oil sands projects in Northeast Alberta on local Indian peoples and relatively little attempt to prevent these high costs by industry on government. Finally, Bob Laidlow describes a BLM approach to cultural resource planning in California which holds promise for Alaska resource managers.

Family Well-Being, Family Violence and Rapid Community Growth: An Ecological Perspective

Roy T. Bowles

It is significant that, in a three day conference on "Social, Economic and Cultural Impacts," this is the only session explicitly devoted to social behaviors. It is also significant that the subtitle for this session includes a rather conventional shopping basket of social problems or social pathologies: crime, alcohol and drug abuse, domestic violence, and mental illness. This suggests that when we think of social impacts we may think only of a few negative and highly visible outcomes. I want to use my time to develop a perspective which will be helpful in understanding these social problems, which are matters of serious concern, but that will also bring additional issues into view. I will focus most directly on domestic violence but I think that the perspective I present can be applied to other issues.

Many observers suggest that there are high levels of social problems or social pathologies, including high rates of domestic violence, in rapidly growing resource based communities. I will not review statistics but will turn to the task of developing a framework which can be useful in understanding how forces set in motion by large-scale natural resource development can create work experiences and community patterns which impinge on the quality of family life. This framework will focus on patterns within families and the way they are shaped by forces outside of families.

To understand family violence we need to look beyond specific cases of inflicted injury and focus more generally on family processes and family well-being. In popular discussions, family violence seems most often to refer to physical injuries which family members inflict on each other. It includes physical violence against wives by husbands, against husbands by wives, against children by parents, and against the elderly by family care-givers. The word "battering" is often used in a way that connotes major and perhaps life threatening injuries. A broader conception of domestic violence, which focuses on the harm family members experience as a result of any physical expression of aggression or because they are not adequately protected and cared for in the family, is becoming increasingly common in professional discussions. Much research on and clinical treatment of child abuse considers abuse and neglect together as resulting in similar risk and arising from similar causes. A primary concern is focused on children at risk of harm resulting from injuries inflicted by parents or accidentally incurred because parents do not provide reasonable protection from hazards, and on children who experience illness because parents do not provide adequate care.

If our task is to understand the ways in which work and community patterns associated with natural resource development may give rise to family violence, even this perspective may be too narrow. Severe family violence is only the tip of an iceberg. If rates of family violence are high in a particular community it is very probable that there are high rates of additional negative family dynamics and we can expect many other social problems also to be common. Family violence is only one form of social pathology.

It is important to direct specific attention to domestic violence because it has often been considered a private family matter. We must, however, not get stuck on the specific manifestations of "battering". I think that the concepts of family well-being and quality of family life can provide a useful framework with which to expand our perspective.

One often hears protests that the terms 'quality of family life' and 'family well-being' are too vague

and idealistic to guide understanding or policy but I do not agree. We know enough about the difference between positive family functioning and family pathology to formulate better social policy and to more effectively deliver services. For certain research purposes clearer conceptualization is necessary. We should not, however, delay action because 'quality of family life' and 'family well-being' are somewhat vague terms.

I would like to develop an analogy. In considering the issue of TV repair, Freidman and Wildavsky have expanded on a formulation first advanced by the philosopher Charlie Brown. " 'The good life is a TV set that works' or at least one that is repaired promptly and at reasonable cost. The bad life is a television set that keeps breaking down despite substantial payments for repair work" (1979:329).

At some risk of oversimplification we can distinguish between family pathologies or low levels of family well-being and constructive family functioning or high levels of family well-being. If a family maintains social relationships which provide satisfaction and support for members, if it organizes resources available in the community to meet the needs of members, if it provides emotional reinforcement that encourages personal competence and a positive sense of self, and if it maintains a positive ambience as a collectivity we can speak of a high level of family well-being. Like the TV set that works, such a family may draw little attention. If a family is characterized by social relationships which generate frustration and strain, if it is unable to mobilize resources to meet needs of the family and its members, if it generates a negative sense of self and feelings of incompetence, and if the collective ambience is one of hostility, frustration or discouragement we can speak of low levels of family well-being. In such families clear pathologies such as violence or neglect occur with greater frequency than they do in families characterized by high levels of well-being. As with TV sets, most families will occasionally fail to function properly. If adjustments can be made fairly quickly, such disruptions need not be considered serious in the long term.

When a TV set breaks down it is often useful to call a reliable repairman but a solution more supportive of Charlie Brown's good life would be the design of more reliable TV sets. When a particular family experiences a crisis, such as interpersonal violence, intervention which protects members and provides support for changes in family patterns is certainly helpful. A more significant long term contribution to family well-being can be achieved by modifying those social conditions which generate stresses that make it more difficult for families to function well.

Most conventional domestic violence programs attempt to provide family members with skills and orientations which permit them to more adequately deal with the stresses which they experience. Psychotherapy aims to develop insight leading to modification of behavior. Parental counseling and education programs assume that learning new ideas, for example, as well as obtaining a more adequate understanding of child development and more realistic expectations of children, will lead parents to treat their children more appropriately. Homemaker programs and social support programs identify stresses which exist within a household and provide resources to help alleviate such stresses. I do not minimize the potential contribution of such programs because families inevitably experience some stress, and capacity to cope with stress is important in avoiding violence and improving well-being. None of the approaches mentioned, however, pose fundamental questions about the origin of stress in families.

Differing hypotheses are advanced to explain domestic violence and other social pathologies in rapidly growing communities. The 'recruitment' hypothesis asserts that individuals who are somewhat maladjusted and prone to deviance or pathology migrate in disproportionate numbers to rapidly growing communities. The alternative hypothesis, which Freudenberg (1982) has called the "significant social change" hypothesis, asserts that changes in the community context create conditions of daily life which are stressful for individuals and families, and that these stresses produce adjustment problems, deviant behavior, and pathology. The recruitment hypothesis sees the causes of maladjustment as existing inside of individuals either as personality problems or as learned cultural patterns. It directs programs and policy toward individual treatment or more selective recruitment. The significant social change hypothesis, while not ignoring individual differences in adjustment and coping strategy, sees the difficult living conditions and the disruptions produced by rapid community growth as a major cause of pathologies such as family violence. It directs policy and programs in part to helping people adjust to the difficulties of the situation in which they live. In part, it directs attention to identifying stresses generated by the situation and changing the responsible aspects of the situations, although this approach is less frequently emphasized than I think it should be. The perspective I will present is based on this

significant social change hypothesis.

My own basic conclusion is that risk of family violence in a particular family, or the rate of family violence in general, is increased by the stresses of disruptive demands placed on families by the work and community contexts in which people carry out their daily lives and lives as families. This is not to say that community and work somehow automatically produce family violence. Because of personality characteristics and learned styles of interaction, some individuals are more likely than others to express their frustrations in violence against family members. In every community there are some cases of child abuse and spouse abuse. If the propensity to family violence among members of a particular community is relatively high because of cultural or personality factors, disruptions and strains in community patterns and work can make it even higher. If propensity to violence is low, stresses originating in work and community can cause it to increase.

This discussion leads us to the question: how do community patterns and work demands create strains or difficulties for family life and how do these strains or difficulties contribute to domestic violence or other pathologies? This question can best be approached by an ecological perspective which sees the family as a concrete setting or context of daily life which is closely connected to other settings - such as work and school - in which family members participate within the community.

Bronfenbrenner has developed such a perspective in *The Ecology of Human Development* (1979) and Garbarino has further demonstrated its utility in *Children and Families in the Social Environment* (1982). In its most general form ecological analysis focuses on the activities of organisms in an environment and identifies consequences of the environment for the patterns of activities and traces linkages between local environments and larger systems. Bronfenbrenner and Garbarino are specifically concerned with child development. They locate the child in the setting of the family and explore ways in which the family is connected to other concrete settings and to more general forces in the social environment. The work of Bronfenbrenner and Garbarino is, at one level, a very useful way of systematizing observations about the impact of social context on family processes. A summary of the points which I find most helpful for this purpose is presented here.

> A family is a setting or a "microsystem" in which a concrete group of people live together part of their daily lives.
>
> There are other settings which are concrete contexts for the continuing experiences of family members, including the work place of a parent, the school which the children attend, the clinic where medical services are obtained, the church or other associations where family members participate separately or together.
>
> Each setting can be described and analyzed in terms of activities in which people engage, relationships between people, and social roles which organize the activities of different participants and the relationship between participants.
>
> There are connections between different settings and occur when activities or roles in that setting influence or constrain activities, roles or relationships within the family.
>
> There is a "macrosystem" in the society or sub-culture which establishes blueprints for each type of microsystem or concrete setting, including t;he nature of the relationships between settings. Bronfenbrenner and Garbarino emphasize cultural and ideological definitions. I would add emphasis on structural consequences of the economy, technological patterns, and decisions made in centers of power.
>
> The ecological analysis of a particular family consists of a description of the concrete family setting (members, activities, relationships and roles), a description of other concrete settings in which family members participate, a description of the interdependent patterns between the family and other settings, a description of broader forces in the society or community and an interpretation of how they shape patterns within the family, other settings, and links between settings.

The analysis of a family setting involves the examination of links to other settings. That is, it involves identifying other settings in which family members individually or collectively participate and the consequences which activities, relationships and roles have for activities, relationships and roles inside the family. A few examples will clarify the nature of this analysis.

The family setting is linked to one or more work settings by the employment of family members. The schedule of work influences the schedule of family life because the hours that a parent is at work cannot be used for family work and activities. The home is used for the regeneration of labor power, that is for the rest and nourishment required to work another day. As is most obvious in the case of shift workers whose children must be silent during different hours of different weeks, the cycle of work and rest imposes a schedule on the family. The family setting receives a worker in the condition that the workplace turns him out. If the worker ends his day exhausted, alienated, frustrated and unsure of his worth, then the family receives a participant who may be edgy, easily threatened, limited in capacity to be nurturant, and less controlled in responses to events which occur in the family.

Relationships between school and family are usually phrased in terms of the influence of family patterns on school performance, but the relationship is reciprocal. The schedule of the school setting constrains the schedule of the family in that coordination and effort are required to prepare a child for departure to school and to receive a child home. If the school is a threatening or insecure environment children will bring home anxieties which will affect family dynamics.

The family setting depends on services and resources delivered in other settings in the community. The conditions under which these other settings will deliver goods and services shapes activities and experiences in the family. If, for example, a medical team visits a community for only one afternoon a week, parents whose children need medical attention must organize their schedules so that they are available at that time. The set of retail outlets available, their stock of merchandise, and the general mode of relating to customers structures the settings in which families meet their needs for consumer goods.

In addition to being linked to several formally organized settings such as work and school, most families are linked through informal association to the settings of other families. A kinship network, a neighborhood network of social support, or a network of recreational association can each be conceptualized as a set of family settings which are linked to each other through interaction. For many families, the quality of family life or the level of family well-being depends substantially on being linked to other families in a way that provides satisfying associations, mutual aid, and socio-emotional support.

Bronfenbrenner states "the *ecological environment* is conceived topologically as a nested arrangement of concentric structures, each contained within the next," "like a set of Russian dolls" (1979:22, 8). This perspective is very consistent with my own work on communities where I conceptualize a community as a concrete small scale context in which human beings carry out the activities of their daily life but which is shaped in important ways by forces operating in the larger society and the world economy (Bowles, 1981, Bowles, 1982). In my *Little Communities and Big Industries: Studies in the Social Impact of Canadian Resource Extraction* (1982), for example, I argue that patterns of life in many small Canadian communities are shaped fundamentally by general patterns in the resource industries on which they are based. These industry wide patterns are, in turn, shaped by the world wide political, economic and technological patterns which shape demand for the resources in questions.

My previous work on social impact assessment, like the work of many others, emphasize the ways in which communities are impacted by development and presents the community as the context of individual experience. We can further expand our understanding of the social and behavioral impact of natural resource development by analyzing families as ecological settings which are 'nested' or located in communities and as settings within which individuals carry out much of their daily lives.

While the family is only one of several settings in which individuals participate, it should be an important focus of attempts to understand well-being because it is so central in the life experience of people and because it is the context in which so many other forces come together. As Lillian Rubin observes in her study of working class family settings, it is in families that "the stresses and strains of everyday life are played out - that children are born and brought to adulthood; that women and men love and hate; that major interpersonal and intrapersonal conflicts are generated and stilled; and that men, women, and children struggle with demands from the changing world outside their doors" (1976:5). A family exists and lives out its daily life in the context of a particular community. While families do travel and do move between communities, and at any point in time the experiences which a particular family has are bounded by the community in which it lives. The opportunities available in the community are those from which most families will choose most of their experiences. The resources available in the community are those which a family must use to meet most of their requirements. Most of the other individuals and families with which a family and its members maintain face-to-face associa-

tion on a regular basis will be found in the same community. Especially in small and remote communities of Alaska and Canada, the community is clearly the social environment within which families are located.

It is now time to address the characteristics of rapidly growing resource-based communities and to analyze such communities as the ecological contexts in which families live. The material presented may not be descriptively accurate for certain Alaskan communities, but the general framework advanced should be applicable in different types of communities.

Each family typically occupies and operates a household that serves as a "base camp" from which members depart for other activities, to which they return for rest and nourishment and where they organize much of the equipment and supplies they use. Organizing a household involves finding a dwelling and procuring the goods and services necessary for regular operation. In small and rapidly growing communities the housing stock is often limited and retail trade outlets are not well enough established to meet household needs on a predictable basis. While a bungalow and a shopping plaza are necessary for family well-being, the uncertainty which many families experience in establishing and operating households, and the time and energy which they must spend in doing so are important sources of stress in rapidly growing communities.

Work settings in expanding resource industries frequently impose demands on and create experiences which have consequences for family well-being. The urgency of construction and of production start-up may result in long and irregular hours of work. Work may be remote from residence and require extended periods of absence from home. Working conditions may generate tension and fatigue. While pay is high during many periods, frequent moves and cyclical patterns of employment leave many families with limited and fluctuating resources. The boom and bust pattern of resource industries can create a sense of insecurity which affects outlook even during good times. The "long arm of the job" reaches into families everywhere and the conditions of work described here are characteristic of some jobs in all parts of the society. I believe, however, families which live in resource communities are particularly likely to experience stress because of the time constraints which work imposes on family members and because of the psychological experiences generated in the workplace.

Features of service delivery in rapidly growing communities frequently make it difficult for families to meet their needs. There is rarely enough front-end funding to establish services before population growth occurs. As a result, in early stages of development there may be inadequate space and staff for schools, limited and irregular medical care, and few social and psychological services. As the need for services runs ahead of the supply, difficulties are exacerbated by overload on staff. Some families may be unable to get services they need immediately. Others may experience anxiety for fear that they will need services and be unable to obtain them. In short, rapidly growing resource communities may frequently be environments which do not adequately provide for needs which families ordinarily meet through formally provided services.

Each family usually maintains some network of association with other families, whether these associations are based on kinship, neighboring, friendship or common membership in associations such as churches. Many families in resource communities will have recently moved and left developed networks behind. While some associations can develop quickly and new neighbors can be helpful, extensive and enduring supportive affiliations emerge only over a longer period of time. Because of the characteristics of a rapidly growing community there are likely to be a relatively large number of families which are not well supported by local social networks.

In summary, the community is the environment within which family settings are located. The family is impacted in large part through its connection to other settings. Rapidly growing resource communities are often environments within which it is more difficult to meet the needs present in family settings and which introduce more stressors into family settings. Because of this, we can expect levels of family well-being to be, in general, somewhat lower in rapidly growing resource communities than they are in certain other types of communities.

I was asked to address the problem of family violence and I should now return and address that topic at a more immediate and practical level. In any incident of child abuse or spouse abuse there is some victim who suffers harm. It is best to consider any single incident of family violence as part of an ongoing dynamic, and hence, to conclude that unless there are changes the victim and other family members are at risk for further abuse. Hence, there is an urgent and continuing need for personnel who have the

responsibility of intervening in cases of family violence and for programs which improve identification, reporting, and treatment. It is helpful in the short term to identify children who are at risk of abuse and to provide services which protect them. It is helpful in the short run to help families learn how to cope with the stresses placed on them by the environment in which they live. Such programs and activities by themselves, however, are not enough. They are like continuing to repair a TV set which, because of the way it is designed, continues to break down. A fundamental approach to the issue of family violence needs to start with basic conditions which generate stress.

Earlier in this paper I characterized family violence as the tip of the iceberg, that is, as something highly visible which rests on a less visible but equally important structure. The submerged part of the iceberg is made up of low levels of family well-being. If family patterns are such that needs are not met and that family members are frustrated, discouraged and threatened then family well-being is low. Compared to families where needs are met and there is a positive ambience, we can expect higher rates of violence and other pathologies. An effective approach to family violence involves understanding the whole iceberg.

In this paper I have developed an ecological perspective which locates the family as a setting in the context of practical limitations and objective stresses imposed by the community environment. I have probably overstated the impact of external constraints and understated the importance of internal dynamics and cultural values. I have done this for the purpose of clearly communicating two points which should be prominent in every study of the social impact of natural resource development. First, one of the costs of resource development as it is usually executed is low levels of family well-being and the associated social problems. Second, low levels of family well-being can be attributed in part to identified patterns in work settings and community settings which result from the high priority put on economic costs and the low priority put on social costs.

These points form the basis of a policy position. Family violence, other forms of family pathology, and low levels of family well-being should be explicitly recognized as among the true costs of development. Effort should be devoted to formulating development strategies which reduce these costs.

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Health and Human Services Planning in Impacted Communities

Judith A. Davenport

Planning for health and human services in rural energy boom towns has been difficult, as with planning in general, for some of the following reasons:

(1) Conservative attitudes toward human services;
(2) Planning is viewed in a negative sense;
(3) Lack of planning skills relative to human services. Traditionally educated planners are not trained in planning for human services;
(4) Resistance by communities because they may feel that the development, and therefore the planning, has been forced upon them;
(5) A "business as usual" attitude. The regular delivery system and infrastructure can handle any problems which might occur; and
(6) Historically, planning has taken longer in rural communities.

Although health and other human services assessment and planning have to be viewed in detail and in the context of individuality of communities, there are some generalizations concerning human services which seem evident. Assessing human services needs appear to be extremely difficult for some communities. Through the years of government involvement with human services, communities have been assured certain services and the need to assess their efficiency and effectiveness has not really been required for program existence. Since the population of these communities has not fluctuated to any great extent, the "business as usual" stance seems appropriate for most service providers and human services planners.

Another problem expressed by communities centers around the usefulness of the Social Impact Assessment (SIA) itself. Although these SIA documents provide good data on demographics, human services planners have to translate the information into something usable for specific program planning for prevention and mitigation. For example, knowing that the possibility for increased strains on the mental health system may occur does not alert the program director about possible ways to tackle the problems. Not being more precise about calculating the numbers of workers and their dependents who will be coming into the community is another source of concern. Companies and state planning authorities have educated guesses and ways of calculating approximate figures with specific information which has been received by the potential employees, but many times these are either over- or under-estimated.

One of the first things communities who have been successful in dealing with impacts have stated is that they have to define their own minimum standard of quality of life. Certain questions of community citizens have to be asked: What are the values the community cherishes? Will the community tolerate child abuse, but not drunk driving? What are the community priorities? To develop the answers to these questions, communities must involve as many individuals and groups as possible. One of the problems communities face in gathering input in decision-making is that they fail to find adequate ways to get the citizenry involved, or that they may choose to not involve certain people in the decision-making process. The one person or group who has been deliberately left out may be the one who can cause the demise of a particular project or plan.

One of the best ways of obtaining community involvement in assessment and planning is the community forum.[1] Most planners of forums take into consideration the need to plan these meetings at times when people can attend, such as after regular working hours and not in conflict with other community events. However, less publicized maneuvers such as recruiting volunteers to provide transportation to the elderly and others without means, providing accessible surroundings, and baby-sitting services must be considered. One frequently used reason for both spouses not attending meetings is the fact that someone has to stay home with the kids.

Simplified questionnaires are one means of establishing priorities for all types of planning. People in impacted communities feel like they are studied to death anyway, so prudence in the amount of time required to complete a questionnaire is imperative.

Using local service providers and community officials as key informants can provide planners with a perspective which the general citizenry does not have. The lay-person may not really know the incidence of child abuse, alcoholism, or truancy. What is perceived as a problem by the citizenry, because of sensational press or rumor, may in fact be a limited problem. However, the community as a whole may be inclined to put more financing into certain perceived problem areas than in areas documented as being a definite problem. A meeting of the minds during a forum, after a community survey or other forms of assessment, may be helpful in educating the citizens, as well as the providers, as to what the citizens want to focus on in their community.

Another area of assessment centers around the community's usual way of coping with problems. For example, is there a process of problem resolution or are programs just started because money is available and it is felt that by pumping more money into the traditional program areas the problem can be mitigated?

From my experience, a well-developed human services plan should include, but not be limited to, the following suggestions:

(1) Educate the citizens as much as possible and use them as resources for planning. Each community must define its own minimum standard of quality of life and learn how to conduct needs assessments which could help them define this standard.

(2) Planners in rural booming communities should be sensitive to rural institutions and values because they have evolved to fit their time and place. For many community residents, they represent a positive alternative to urban values.

(3) Human services planners should be patient and flexible. A more visible plan will be developed if total involvement from all those concerned is sought. Planners should not be so wedded to any one plan that they cannot give it up when it's appropriateness is no longer apparent. Various scenarios need to be developed before one is found that really works for a community. Planning for more than two years may be fruitless, as factors can change rapidly causing totally new plans to be required.

(4) Close cooperation and coordination between communities, state government and federal government is a definite necessity. Communities need to involve all segments of public and private organizations in information-gathering and in decision-making. Many impacted communities have been hampered by state agency rules and regulations which do not fit their burgeoning needs. Some states, like Wyoming, have adopted a plan whereby money for human services at the state level is filtered to local "Human Services Boards" for allocation of local funds.

(5) Task forces should be set up in each community with defined responsibilities for addressing specific issues. No one person is an expert in all areas and division of labor is important when there are limited resources. People should be held to time frames and assignments.

(6) Communities may need outside help in planning and implementing plans and programs. The use of consultants or experts with similar experiences can be extremely valuable. It is important, however, to use consultants who take into account the community's values and perspectives. It is easy for consulting firms to develop models for management of human services which tend to

[1]*For a more detailed discussion of conducting evaluation and performing needs assessments in boom towns see, for example, Olson, Judith K., "Needs Assessment and Program Evaluation in Impacted Communities," and Hawkins, Michael R., "Dynamic Needs Assessment: An Example," in The Boom Town: Problems and Promises in the Energy Vortex, edited by Joseph Davenport and Judith A. Davenport. Laramie, Wyoming: University of Wyoming Department of Social Work, 1980.*

avoid the personal choices, values and particular needs of rural Western communities. The tools for planning in rural areas need to reflect rurality, rather than urban tools narrowed down to scope for rural needs. Sometimes communities are reluctant to use the technical expertise of state and regional offices. These people do have something to offer as long as communities realize they are the owners of the community plans and are responsible for how the plans are developed. Communities should not close themselves in a shell and feel that other people who have experienced similar problems in other areas of the country cannot provide them with information and planning skills which would be valuable and would save them time in the long run.

(7) Whatever plans are developed need to focus on prevention as much as possible. Planning mitigation strategies is a lot easier because treatment strategies are what most of us in the human services are trained to provide. Questions need to be asked concerning how much the community is willing to finance prevention as well as treatment. It is common for people to laud prevention strategies but taxpayers and industry appear to be more willing to pay for treatment services; this is partly because providers cannot furnish them with significant statistics on the cost-effectiveness of prevention. Communities can seek out this type of information from various resources and may want to contact university faculty for assistance.
When developing prevention or mitigation strategies it is important to try to ensure the continued existence of informal systems in the community (such as the family and church). This can be difficult when more formal systems are developed to meet emerging needs.

(8) A complete inventory of current programs and services and how these can be enhanced and enriched **before** developing a new service is essential. New and more innovative forms of service delivery may have to be implemented. Traditional forms of service may not meet the challenges of an expanding and diverse population. Models for ideal services delivery could be developed such as floating positions from state agencies which permit positions to be filled in certain locales only when needed. Plans need to be flexible and the different scenarios which have been developed as well as the plan chosen will have to be constantly monitored.

(9) Human services providers and their clients have to become more political in drawing attention to their needs. They have to learn how better to sell their programs and services to the general public and potential funding sources. In addition, they need to become more precise in evaluating human services. In becoming more political, non-human services people need to be used in planning and advocacy roles for obtaining facilities and services. The charge of vested interest is less likely to be heard when non-human services leaders in the community are spokespersons for human services.

(10) The nature and extent of problems necessitate an increase in in-service training and continuing education. For example, one area of expressed need appears to be that of stress management on the job. Other possible training areas would include innovative approaches to service delivery and materials responding to new needs and problems identified by the community. In-service training and continuing education could be provided in a variety of stimulating and creative ways.[2]

(11) Coordination and cooperation among local agencies is essential. Formal coordination councils may need to be established where none exist. Multifunctional centers can prove to be effective and efficient in providing human services.

(12) Stresses in the community are bound to occur and the community will not be able to prevent or even mitigate all of them. From my experiences, once communities internalize this fact, the stress level for planners seems to go down.

(13) Money does not solve all of the problems. Without sufficient planning tools and sensitive planners, the money allocated will not be spent wisely.

Research in the area of health and health care planning in boom towns has been scant and the literature does not provide us with a global perspective of the problems as much as we would like. The following comments and views have been generated from the literature, my involvement with health personnel and planners in eleven states in the West, and with government agencies at the local, state

[2]*See, for example, Davenport, Joseph and Davenport, Judith A., "Simulation-Gaming for Boom Town Human Service Workers." Paper presented at the Sixth National Institute on Social Work in Rural Areas, July, 1981 at St. Helena Island, South Carolina, and Davenport, Joseph and Davenport, Judith A, "Continuing Education in An Age of Uncertainty: Meeting Human Services Needs in Impacted Communities." Paper presented at the Seventh National Institute on Social Work in Rural Areas, July, 1982, Dubuque, Iowa.*

and regional levels. More research needs to be conducted, however, to give us a clearer picture of the common threads in the health field in order for us to provide more adequate health planning.

Health issues in the typical booming community appear to be in three main categories (excluding health issues related to hazardous materials): (1) health problems associated with stress; (2) health problems related to utilization of services, which include lack of adequate personnel and facilities; and (3) planning problems as they relate to health.

The first category addresses stress as a key factor in major mental health problems and their related somatic problems. It is important to emphasize that stress is not just a problem effecting newcomers. The Holmes and Rahe "Social Readjustment Rating Scale" was used at the Northern Wyoming Mental Health Center to study the stress and mental health-related consequences of energy-related impact on the newcomers and oldtimers in their catchment area. The results of the study indicate there were moderate to high stress levels in the community generated not only by the amount of change in people's lives, but also from the needs and frustrations produced by deficits in community services, the demands of adjusting to life in a new community, family needs, plus a variety of other stressors stemming from a boom town situation.

"When the people in an impacted community display high levels of stress in their lives, a predictable increase in health problems is likely to develop. Such problems/illnesses will manifest themselves through job-related deficits like absenteeism and high accident rates, and in terms of increased demands for medical and mental health services. Those inflated needs for medical and mental health care can threaten to overwhelm or overburden the already stretched services training to keep up with the demands of rapid population growth."[3]

The problems in this category take our discussion into the next category involving utilization of services and lack of adequate personnel and facilities. These small rural areas, in general, have not acquired the more specialized health professionals and services enjoyed by more urban communities. Long-time resident physicians in many of these communities are approaching the age of retirement and are wanting to slow down their practice. For example, the average age of doctors in Wyoming is ten years above the national average. There is, of course, a lack of specialists in these communities as there are in other rural areas of the country. Attracting new physicians to boom towns can be difficult for the following reasons: (1) the high interest rates to build clinics or offices; (2) housing shortages; (3) lack of support services for patient referrals; (4) unattractiveness of community to spouses; (5) recruitment efforts which come too late; (6) younger doctors want more time for leisure than a boom town might allow; (7) long distances to well-equipped medical centers, specialists, and colleagues; and (8) it may be difficult to recruit physicians to an area which has a "boom/bust" cycle built in. The doctor may have patients during the boom but does the long-range outlook provide for continuation of the needs?

Some communities provide physician services from other communities. This practice can fill a void but can also be inconvenient and even dangerous due to hazardous weather conditions in the Rocky Mountain West. Physician Assistants have been used to provide medical services in some of these communities and physicians services have been sought through the Health Services Corps. However, some of the corpsmen have visited these booming communities and have rejected them as places to live.

Health personnel such as nurses, pharmacists, health educators, and other health specialists are also scarce. These professionals may be as hard to recruit as the doctors. The wage scale for nurses is extremely low for the superinflationary impacted communities. One pharmacist in a boom town in Wyoming closed down his pharmacy and retired early rather than be subjected to calls at all hours of the night to fill prescriptions. Public health specialists who inspect public buildings are inundated due to increased day-care facilities, restaurants, schools, and sewer systems. They also have to be involved with the health hazard investigations relating to the environmental impact statements coming from the energy industry.

Utilization patterns are another issue relevant to this category. As indicated previously, there have been a large number of elderly in these communities prior to impact. With the influx of younger workers and their families, there are changes in patient load toward cases involving family planning, venereal disease, pediatrics and obstetrics. Many physicians express a concern that patients are visiting

[3]*Weisz, Robert, "Stress and Mental Health in a Boom Town," Boom Towns and Human Services, edited by Joseph Davenport, III and Judith Davenport, page 39. Laramie, Wyoming: University of Wyoming Department of Social Work. 1979.*

them with social and mental problems because there is a tremendous waiting list at the mental health centers.

Emergency rooms at hospitals will be used more frequently because people do not want to wait several hours to see a doctor in his office or clinic. They cannot afford to stay away that long from their high paying jobs and can afford the extra cost of the emergency room. Also, many physicians have been forced to limit their new patients and newcomers have to resort to emergency room services. Most companies provide some type of medical services for small industrial accidents on site, but health personnel report increases in numbers of cases related to industrial accidents, as well as accidents especially related to increased alcohol intake.

Hospitals are ill equipped to accommodate the new patient loads. Certain types of services have to be expanded such as the obstetrics wards and newborn nurseries. One North Dakota physician stated that it is routine for his hospital to place women in labor in the hospital corridors. Ambulance services are usually inadequate in number of vehicles and up-dated equipment. Certain difficult cases still have to be transported over long distances to other health centers. A problem related to the administration of hospitals concerns bill collections; due to the transient nature of the population, many health care bills go unpaid. In general, health utilization is crisis-oriented with less time and emphasis being placed on prevention strategies.

Another important dilemna centers around who is responsible for planning and/or financing the new services needed in a given area. Is the financing to be the role of government, industry, or both? If it is maintained that it should be government's role, which government? There has also been a tendency to use urban planning tools for rural planning but many health planning models do not fit rural impacted communities.

The preceding categories of problems appear to be overwhelming to many boom town residents. However, the following are some suggestions as to how communities could better prepare for and mitigate health-related problems. Communities may want to:

(1) Develop task forces on health to assign tasks and monitor progress.
(2) Develop flexible, innovative programs, especially geared toward prevention and health education, including the promotion of self-care. The use of natural helping systems and voluntary organizations should be explored in this effort.
(3) Use more physician assistants and nurse practitioners, taking into account the biases and obstacles in doing this.
(4) Start recruting physicians early in their residencies. The recruitment of Westerners or rurally-oriented people should be encouraged because they are familiar with the lifestyles and environment.
(5) Provide more support services such as social and mental health services for physicians and other health providers.
(6) Encourage hospitals to rent space to physicians to establish their practices.
(7) Adjust salaries of health and human services personnel in the public sector to accommodate superinflationary economy and to help reduce the "burnout syndrome."
(8) Provide adequate respite time and continuing education for those involved in health care.
(9) Work toward national health policy revisions which would benefit rural and impacted communities.
(10) Work with industry to promote a campaign for better health services utilization and encourage companies to take a more active role in providing health services or in providing funding for such services. Governments could give extra tax incentives to companies for providing direct funding for such services.
(11) Use extension services to provide health training.

It is important to remember that there are no pat solutions to these problems. However, with the attitude of developing solutions which fit individual community needs and solutions which are equitable, more of a manageable plan can be obtained.

We are now better able to deal with the negative aspects of growth due to the recognition and sensitivity to proposed problems by energy company officials, governmental entities, planners, and the general citizenry. We have learned from the boom towns of the past and present. Managed and controlled growth is the key to more positive impacts.

Research on the Impact of Resource Development on Women

Katie Hurley

There are two primary categories of research which I would like to discuss today. One is field work, involving researchers who interview people and explore their perceptions, ideas, values and opinions about a particular topic. The other is the area of baseline data, involving the collection and compilation of enough basic information about a particular item to enable researchers and others to analyze the effects of things on the particular item under consideration, for instance, the effect of resource development on women.

In Alaska there has only been one major effort to compile and analyze baseline data specific to women. In 1977, in response to a specific mandate from the Alaska State Legislature, Dorothy Jones et. al authored *A Preliminary Study: The Status of Women in Alaska.* The initial cost estimate of the study was $200,000 but it was funded at a much reduced level of $25,000. As so often happens with projects that are related specifically to women there was a great deal of volunteer effort that went into producing this report and it has been used extensively in the ensuing years for research, planning and advocacy efforts. Despite the fact that it was "preliminary" it has never been updated or expanded beyond the original areas of education, employment, mental and physical health and the justice system. There has never been a thorough needs assessment of native and minority women in the state, nor has there been any comprehensive effort to explore women's economic status in Alaska. There is an urgent need for this information in a time of such rapid change and extensive development. The Commission on the Status of Women has advocated long and hard for the legislature to appropriate sufficient funds to maintain such information, but has until now been unsuccessful in convincing either the administration or the legislature of this need. We have found the area of employment opportunity to be one of the hardest hit by the lack of current data on women. Companies such as Northwest Alaska Pipeline Company are able, in the absence of such data, to secure approval for affirmative action goals which are totally inadequate, "goals" which are so low as to ensure unqualified success in reaching them with no effort at all. Perhaps the only real benefit which the delay in pipeline construction may provide is ample time and opportunity for Northwest Pipeline and any other interested company to either conduct the necessary studies on their own or to profit from the Census data available in 1983 which will, for the first time, include women in the occupational categories from which they have been excluded for so long. (In the 1970 census women were included in only 26 of the 42 jobs groups which were analyzed in published reports.) The only other effort to compile baseline data on women was a joint effort sponsored by the Commission on the Status of Women and the Alaska Department of Labor. "Women in Alaska's Labor Force" was produced in May, 1980. It did not collect any new data. It merely took what was already there (but inaccessible) and made it available to planners and other interested parties. Unfortunately, the Labor Department has never picked up on this as a regular project, so there is no available update on this material nor is there any plan to produce one.

With regard to the area of field work or primary research, I decided to explore this in preparation for today's discussion and so I did some research of my own. Of course, I am not a researcher in the technical sense of the word, but as director of the Commission I am definitely a user of information and need to be able to find facts and figures that relate to the status of women. What I found was not terribly encouraging. When I asked for studies done specifically on the effect of resource development on

women I was given one or two references which might be helpful. One of the references was a newspaper article which ran in an Anchorage newspaper several years ago!! Not what you might consider serious research. While I have the impression that had I been looking for research on the impact of development on wildlife, on the environment or on the economy I would have found volumes of data, the material on people, specifically on women, was sorely lacking. I understand that the Bureau of Land Management has been conducting needs assessments of communities where development is planned or occurring, and of course many of the issues addressed in such studies will include some women's concerns. Exploring the impact of development on such areas as family structure, family roles, and cultural continuity, will include some women and their concerns and needs. Research done on the Fairbanks experience or on Seward's response to oil development such as that conducted by ISER (Institute of Social and Economic Research) and others does in some instances address the specific concerns and situations of some of the women involved. But here, as well as in the earlier topic I discussed, I believe the lack of baseline information or specific studies reflects a basic attitude toward women which shouldn't be surprising as it permeates the predominant society in which we all developed. Women are not yet considered or treated by research efforts as they should be. That is, their status—who they are, what their needs and concerns are, what impact will do to their lives and to their work—is not yet accorded a serious enough place in the questions posed by researchers, planners and policy makers.

Certainly this is changing. At the Commission we consider ourselves one small part of a very large and unstoppable effort to secure for women, and for people in general, their proper place in policy decisions. This is one reason I am so pleased to be talking to you all today about this very issue. I would like to offer you the challenge of beginning to make this kind of information available to the policy makers on a regular basis. I hope some of you may be responsible for seeing that in all needs assessments, women are treated as a singular and important reference point from which research questions are posed. I hope you will join with us in our effort to persuade the administration and the legislature that we need studies on the economic and employment status of women in Alaska so that affirmative action programs will have some real meaning. This year the Commission will be contracting for the first phase of a baseline data project on the status of Native women in Alaska and we hope to secure legislative approval to continue that project next year as well. We believe that there is a great need for such information in Alaska and hope that you, the professionals in the field, will use your influence to see that the viewpoint of and impact on women is seriously addressed in the studies and projects on which you help pose the research questions.

The Socioeconomic Impacts of Resource Development on the Elderly

Terry L. Haynes

Introduction

Elderly residents of energy boomtowns and other communities affected by resource development comprise one group about which little has been documented in the social impact assessment literature. The available information is in many cases speculative, inconclusive and even contradictory, but it does suggest that older persons ordinarily have little to gain and much to lose in a boom economy. This paper outlines some specific problems experienced by the elderly in areas where large-scale development has taken place or is scheduled to occur, both in and outside of Alaska. On the basis of this slim data base and my own field studies in Alaska's Upper Tanana region, I will propose several general strategies for mitigating socioeconomic impacts on elder Alaskans, which may result from resource development activities in the 1980s.

Papers by Larson (1980) and Davenport and Davenport (1980) concisely describe the impacts of energy development on the elderly in western boomtowns and do not differ markedly in content from this presentation. With the addition of data from socioeconomic studies conducted in Alaska during the Trans-Alaska Pipeline (TAPS) era, however, this overview brings the issues closer to home and perhaps in a context more meaningful to an Alaskan audience. Furthermore, impact mitigation strategies in Alaska must be particularly sensitive to factors which, collectively, may be less critical in other states (e.g., the absence of local government in some small communities, ethnic and cultural diversity, and an inadequate service infrastructure in much of rural Alaska).

In this presentation I am defining boomtowns as those communities that experience rapid, short-term economic and population growth resulting from a major construction project or natural resource development. Examples include construction of hydroelectric power plants in the Southwest, oil shale development in Colorado and open-pit mining in Montana. The problems confronting elderly residents in boomtowns vary from place to place but usually include a variety of economic, social and human services impacts.

Economic Impacts

High rates of inflation accompany large-scale projects in nearly every case documented in the literature. The basic economic principle of supply and demand accounts for this: boom communities characteristically have sufficient goods and services, in most cases, to meet the needs of the existing population. An influx of newcomers, many of whom will be earning high wages on the development project, compete with local residents for available goods and services. Merchants may raise prices in their eagerness to capitalize on this economic windfall. Retired persons and other consumers with fixed incomes are the first to feel the pinch, since their limited purchasing power is further eroded when prices of essential goods and services rise. Two-thirds of the senior citizens surveyed in one Colorado boomtown, for example, cited inflation as one of the their most serious problems (Larson 1980:35).

Housing shortages are common in boomtowns, and newcomers can afford to pay higher rent than local residents (e.g., Primack 1980:8-9). Senior citizens often own their homes and as a group may not be so directly affected as are other residents. But the economic boom may result in higher property taxes to generate income for municipal services, and the cost of home maintenance is likely to rise

(Davenport and Davenport 1980:30). The problems don't stop here. In response to a housing shortage in one small town in Georgia, near the site of a nuclear power plant construction project, older homeowners rented rooms to young construction workers as a means of supplementing their incomes. As expected, conflicts often arose when the young renters—whose interests and values differed from those of their landlords—disregarded their rental agreements and were asked to leave (Fennell 1977:410).

A five-year study conducted in Illinois compared the economic status of older persons in two rural communities. One town was experiencing a major construction project, while the second, though similar to the first, was not affected by development. The study found that: (1) elderly residents in the industrializing community had the smallest increases in dollar income of any age group in either community during the five-year period; and (2) retired persons and older persons with jobs in the industrializing community had substantially lower raises in dollar income and percentage increase than did their counterparts in the control community. In this instance, industrial development resulted in a decline in the economic status of older community residents. The study did not assess ways in which the development might have had other kinds of positive or negative effects on the elderly (Clemente and Summers 1973).

The elderly who operate businesses or have other jobs in boom communities face problems comparable with those confronting retirees, as a boomtown impact study in Colorado indicates:

> Those who own or manage businesses may lose customers or even have to close their businesses because they cannot compete with the mass-volume chain stores and more modern shops that are opened, or because they cannot adjust their style of business to the demands of the new population. As employees, the elderly may not be able to compete with younger, more skilled migrants, and older public officials, police officers, etc., are often replaced with younger persons who have had work experience in larger towns (Moen et al. 1981:77).

Social Impacts

As bad as the economic impacts may be, older boomtown residents are often more concerned with social impacts resulting from population growth and a faster pace of life. A larger population brings more traffic and probably more noise, crime and violence—all of which pose obvious problems to the community at large and especially to the elderly (see Primack 1980:10; Moen et al. 1981:79). The elderly may become more isolated and find their usual network of informal resources disrupted or destroyed (Brown 1977:5), as community residents who otherwise would visit and aid them become intensely involved in the economic boom and adopt new values consistent with the boom economy (Bates 1978:6). The situation in one Montana boomtown illustrates the problem well:

> Over the years the community had evolved very effective and satisfying ways of ensuring that the elderly members were looked after or contacted frequently, were made to feel that others in the community cared about them, were helped to develop meaningful roles for themselves well beyond the point where they really felt they could make substantial contributions to community life. . . . As members of the community became more and more busy with their occupations and businesses and as more and more people worked and worked longer, the informal life-support systems of the aged began to break down. The general stress of this situation began to lead the younger people, who had helped to make the life-support system for the elderly work, to turn inward on themselves and on their immediate families, and to concern themselves primarily with the impacts of change on their own individual and familial ways of life. In effect, this change led to a kind of abandonment of the elderly, not by conscious design but because there were more and more reasons and excuses (attributable to the faster pace of life being created) for not being able to participate in the informal life-support system for the elderly. As a result, the elderly tended to be neglected as well as to be squeezed financially. This state of affairs began to prey on the consciences of a number of people in the area. The breakdown in the informal life-support system of the elderly was attributed to the immigration of the construction workers and other newcomers (Gold 1979:121).

Human Services

The pressures imposed on human services in boomtowns compound the other problems with which older persons must contend. The inadequacy of health and social services in many rural communities, especially in the areas of geriatric medicine and counseling, lessens their ability to cope with a rapidly expanding population (Davenport and Davenport 1980:31). Available services frequently are redirected to younger, transient and short-term residents (Larson 1980:36), rather than consider the special circumstances of the elderly.

Another important consideration is the reluctance of some older persons to seek assistance for their needs from formal helping programs and agencies. Many older rural Americans, for example, have conservative values and resist action that might threaten their independence or increase their reliance on government or "give-away programs". Consequently, a move to establish subsidized housing for the elderly in one Colorado boomtown failed because no one would admit to needing financial assistance, although most elders knew someone who met the eligibility requirements (Moen et al. 1981:78).

Elderly Alaskans and the TAPS Experience

Studies of Alaskan communities directly impacted in the mid-1970s by TAPS construction identify a range of difficulties that confronted older persons living along the pipeline corridor. In Fairbanks, for example, the major problems identified in one senior citizen survey included inflation, housing, transportation, medical care, safety and security. Although these affected persons of all ages, several reasons were given for their having had a greater impact on the elderly: (1) The elderly generally had lower and often fixed incomes, which did not keep pace with pipeline-related inflation; (2) life styles, poor health, and the absence of public transportation prevented many senior citizens from playing active roles in public hearings and policymaking directed to their concerns; (3) limitations of age, health, and income collectively restricted the range of alternatives available to senior citizens for coping with impact problems; and (4) although an adequate number of agencies and programs directed at meeting the needs of older people were operating, at least during the latter stages of the impact period, they were poorly coordinated and lacked effective referral systems (Dixon 1975 and 1978).

Another study focused on the Native (Athabaskan Indian) population in Copper Center during the TAPS project and devoted some attention to the elderly (Reckord 1979). Some changes occurring in that community were partially a consequence of the Alaska Native Claims Settlement Act of 1971 but became more pronounced during pipeline construction. For example, the influence of elder leaders reportedly waned when younger and better educated Natives took charge of managing village corporations and other economic affairs. Before the TAPS era, elderly Natives were among the few village residents with stable incomes, which afforded them a certain amount of social status, prestige and authority. During TAPS construction, however, many younger persons earned high salaries and were less reliant on elder kin for assistance (Reckord 1979:206). Not only were the elderly left out of this pipeline prosperity, according to one report, but they also had a more difficult time finding transportation and assistance with shopping, paying bills and maintaining their homes (cited in Reckord 1979:180).

A physician and long-time resident of Glennallen, another TAPS corridor community, reported these and other problems as major concerns among older persons throughout the Copper River valley.[1] He noted a direct relationship between pipeline inflation and a decline in the standard of living among some senior citizens; other residents witnessed breakdowns in their traditionally strong family networks when younger members obtained pipeline employment. Increases in alcohol-related problems—including auto accidents, domestic violence and neglect—affected both white and Native elders, as did longer waiting periods in stores and at the hospital. On the other hand, some older persons secured jobs on the TAPS project and derived tangible economic benefits that helped to offset the inflation felt throughout the region.

Senior citizens in Delta Junction, with whom I talked in 1981 about TAPS impacts, complained mainly about problems that affected all local residents: dusty conditions created by increased traffic on unpaved roads; hazardous driving conditions on narrow and poorly maintained roads; inadequate telephone service; long waiting lines in the bank, post office and stores; and inflated prices for goods and services. Minor conflicts arose between some local residents and newcomers whose life styles

[1] *Dr. James Pinneo 1981: personal communication.*

differed from those of longtime Delta Junction residents. As in the Copper River valley, some older persons worked on the TAPS project; and most owned their homes and thus were not seriously affected by the housing shortage.

The only published information available to me regarding the TAPS impact in Valdez is derived from a general socioeconomic study. It does not focus specifically on the elderly but concludes that only short-term problems occurred there, because Valdez had: (1) a "relatively elaborate service and institutional infrastructure" prior to the impact period; (2) a positive community attitude toward the TAPS project; and (3) the availability of state impact funds to bolster service and staffing needs (Baring-Gold and Bennett 1975). Long-time older residents of Valdez may disagree with this assessment, given the intensity and duration of impacts in that community.

Elders in the North Slope Borough probably have experienced more continuous change since oil was first discovered at Prudhoe Bay than their peers elsewhere in Alaska. A recent report prepared for the Alaska OCS Socioeconomic Studies Program describes the dilemna confronting Eskimo elders in periods of rapid sociocultural change: to adapt violates certain traditional values, but to reject change outright lessens their ability to manage it and to perpetuate important traditions to the younger generations. The power of elders on the North Slope—as was the case in Copper Center—declines in the new institutional world, which often is not flexible enough to incorporate their concerns. Their power now appears to be restricted to that associated with being the repositories of cultural traditions and values. This OCS study also noted the potentially greater vulnerability of middle-aged Eskimos to loss and conflict in the course of rapid change, for they participate more actively in two very different worlds but fit poorly in each (Worl, Worl, and Lonner 1981:80-84).

Opposing Viewpoints

Thus far I have painted a rather gloomy picture of what confronts many older persons living in boomtowns and other communities impacted by resource development. The actual situation obviously varies a great deal: some elders may contend with many problems, while others are hardly affected at all and may actually thrive during the boom period. Some western energy boomtown researchers even suggest that the elderly may experience fewer problems than other age cohorts as they are more capable of dealing with changes occurring in their communities.

One sociologist finds the actual evidence insufficient to support claims that the elderly are among the most negatively affected of all groups in boom communities. Based on his field research, he cites three factors that offset declines in the economic well-being of older boomtown residents: (1) Some older persons are "set in their ways" and thus have a source of internalized continuity in their lives at a time when many external changes are taking place; (2) the elderly he knew were well buffered—that is, they were surrounded by a number of good friends and were not isolated; and (3) many elders recognized the importance of growth to their communities—it meant they would not become ghost towns and that jobs would be created for younger residents (Freudenburg 1982:161-162).

A second sociologist and her colleagues concur with this assessment. They found many elderly residents in two Colorado boomtowns acknowledging the importance of growth despite the attendant problems, for these reasons: (1) The elderly are accustomed to change and have experienced changes during their lives that young people cannot imagine; (2) they have endured severe poverty, having lived through the Great Depression; (3) development raised the standard of living in the community and created jobs that might reduce the outmigration of younger family members; and (4) some elders capitalized on the boom by selling land to developers for a good price (Moen et al. 1981:80-81).

Although I cannot agree entirely with these assessments, a very important point is made: we must be careful not to overlook the strengths of older persons and assume that all changes occurring during an economic boom will be bad or affect them adversely. Perhaps the worst strategy is attempting to insulate elders from all changes and increasing their dependence upon agencies and human services programs. On the other hand, to ignore the fact that problems will occur and not be easily dealt with by vulnerable older persons is an equally faulty stance. Social impact assessment researchers must assess both the positive and negative consequences of resource development on older community residents and not oversimplify the situation on the basis of very general field inquiries with community leaders or a handful of active and affluent senior citizens.

Recommendations

Steps can be taken to minimize the number and severity of problems likely to confront elderly Alaskans in boom communities in the 1980s. These recommendations, and those presented by Larson (1980) and Davenport and Davenport (1980), can form the basis of socioeconomic mitigation programs in a variety of settings. Although my ideas are based primarily on research conducted in the Upper Tanana region and described in a study completed for the State Pipeline Coordinator's Office (Haynes 1981), they are general enough to have applicability to other regions and types of resource development. They are not listed in order of importance.

(1) One resolution supported overwhelmingly by Alaskan senior citizens attending the 1981 White House Conference on Aging in Anchorage addressed the importance of research directed to the impacts of resource development on older Alaskans, and the subsequent identification of impact mitigation strategies. Support for such studies can be sought from state agencies engaged in socioeconomic planning activities, Native corporations, and other local entities.

(2) The Older Alaskans Commission (OAC), which has administrative responsibility for many senior citizens' programs in Alaska, must acknowledge the special circumstances facing aging services providers in boom communities. OAC policy might be amended to make provisions for impact funding to such programs, if necessary, to ensure the presence of a formal support network for the vulnerable elderly.

(3) The state and local communities must insist that the developer provide timely and detailed project information, so that sufficient lead time is available for planning new and expanding existing services. Developments may not voluntarily do so, unless they anticipate having a long-term relationship with the community or communities to be impacted (as will be the case with the U.S. Borax mining operation near Ketchikan).

(4) Senior citizens should be represented on community and regional planning and advisory boards created in response to resource development. Their input is especially crucial for, but often absent from, environmental impact statements and social impact assessments. Impact mitigation planning is most effective when based on the active involvement of the elderly, and not only by younger persons with good intentions but whose ideas are not based on documented needs or concerns.

(5) A skills inventory should be completed which identifies the talents and employment interests of older persons who are interested in jobs that will be available during the boom. Older workers should not be discriminated against simply on the basis of age.

(6) Public safety and crime prevention measures must be implemented to take into account the special needs and concerns of older residents. For example, an awareness program could be developed by public safety officials working in conjunction with aging program personnel and senior citizens themselves.

(7) A specified percentage of any tax or royalty revenues derived from the development can be earmarked for human services programs and especially those serving the elderly. In cases where communities lack formal governments or are part of the Unorganized Borough, funds can be allocated according to a formula recommended by local planning boards. The elderly and other persons who otherwise derive few direct benefits from the socioeconomic boom should be among the primary beneficiaries of such revenues.

(8) An Impact Information Center (IIC), which has responsibility for monitoring development activities and implementing corrective measures, should be established in the regional center in the area being impacted. IIC staff should be particularly sensitive and responsive to problems brought to their attention by senior citizens. The IIC can take the lead in impact mitigation by coordinating efforts between the developer, the state, and human services providers.

(9) Coordination of aging services with other human services programs must be a high priority in impacted communities. The idea is not to ignore or to undermine existing informal helping networks, but to ensure that alternatives are in place for those whose well-being may hinge upon their having access to formal services. Aging program staff can perform useful functions by scheduling appointments for elders at times when waiting time is minimized, for example, and by expanding transportation services to facilitate access to community services and businesses at other then peak utilization hours.

These are, of course, very general recommendations and must be tailored to specific geographic contexts and development situations. A senior citizen from Fairbanks recently reminded me of the importance of developing specific mitigation measures which are based on documented needs and not merely those areas in which impacts are projected. One example was pointed out at this conference by John Gilmore. An agreement established between a developer and an energy-impacted community in western Colorado stipulates that elderly residents are to be protected from rising housing costs beyond those attributable to normal inflation. The success of this strategy, of course, will depend upon the establishment of appropriate and effective monitoring procedures.

The elderly are important resources in their communities and are too often ignored in the course of large-scale development. Contrary to the misguided assumptions of some planners and developers, long-time community residents are not likely to move away unless given no choice. Instead, they should be encouraged to participate actively in the boom community and fill leadership roles that may become available when younger residents are preoccupied with economic endeavors.

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Identifying Social Effects in Forestry Decisionmaking
Lessons From the Past and Prospects for the Future

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Introduction

Social factors are an increasingly important consideration in the allocation and management of the Nation's natural resources. Decisionmakers, as well as the public, are demanding information regarding the effects on people that result from natural resource decisions. Social impact assessment attempts to provide information on social values, social concerns, and social effects for use in the decisionmaking process. Nearly all resource management agencies are improving their technical capabilities to conduct social impact assessment. This paper will discuss the experience of one resource management agency, the Alaska Region of the U.S. Forest Service, in social assessment efforts. But first, a little background is necessary on the social and political context within which management decisions on Alaskan National Forests take place.

The Forest Service presence in Alaska goes back to 1907 when the Nation's two largest National Forests were established. The Tongass National Forest is comprised of approximately 16,954,000 acres and covers the majority of Southeast Alaska's panhandle. The Chugach National Forest consists of about 5,940,000 acres and encompasses Southcentral Alaska's Prince William Sound and the eastern third of the Kenai Peninsula.

The National Forests in Alaska are characterized by a multitude of natural resource management opportunities. On the Tongass National Forest in Southeast Alaska, recent legislation has mandated that 4.5 billion board feet of timber be offered for sale every decade. Misty Fiords and Admiralty Island National Monuments contain some of the most spectacular scenery and provide some of the best remote recreational experiences of any area in the United States. The abundant fisheries resource provides employment opportunities as well as a variety of quality recreational pursuits. One of the largest molybdenum mines in the United States, a few miles from the city of Ketchikan, is expected to begin a 70-year operation within five years. At full capacity it is expected to produce 60,000 tons of ore per day which will supply approximately 18 percent of the world's molybdenum demand. In addition, Alaskan National Forests contain significant deposits of copper, nickel, iron, gold, and silver; and petroleum exploration and development is occurring in offshore tracts adjacent to the National Forests. National Forest watersheds provide water for power generation and other industrial and municipal uses. Tourism is increasing in Alaska where many people from foreign countries and the "lower 48" visit Alaska's National Forests to view moose, brown bears, bald eagles, and glacial icefields from small floatplanes, cruise ships, and ferry boats. Finally, National Forests in Alaska contain 5.4 million acres of Congressionally-designated wilderness areas.

As might be expected, this highly diversified natural environment provides for a wide range of cultural variation and lifestyle differentiation. Tlingit, Haida, and Tsimshian Indians inhabit a number of communities in Southeast Alaska, while Alaskan Eskimos and Athabascan Indians live in villages and communities in Southcentral Alaska, some of which are in close proximity to the Chugach National

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Forest. After enduring decades of public policy aimed at assimilating them into the dominant culture, many Alaskan Natives are advocating a revival of their cultural heritage. This renewal is manifesting itself through such things as teaching Native culture (e.g., languages and dancing in public schools for all ages, Indian law, legends, and history), the desire to protect cultural sites such as burial grounds and petroglyphs, and a continued reliance on hunting and fishing for subsistence purposes.

In addition to Native communities, Alaskan National Forests provide employment and recreational opportunities to people engaging in a wide range of lifestyles from the relatively cosmopolitan urban settings of Anchorage and Juneau (the State capital), to the solitary existence of individual trappers and prospectors living in the Alaskan bush. In between are communities heavily dependent on logging and the manufacturing of forest products, fishing communities, and small subsistence settlements, each with relatively distinctive community identities and lifestyle orientations.

It is perhaps inevitable that such a multiplicity of opportunities would result in conflicting demands in that demands reflect social values. Demands for wilderness; for forest product-related employment; for commercial, sport, and subsistence use of fisheries; and demands for other goods and services provided by the natural environment all reflect a variety of social value systems.

As pressure for development increased, conflict over the allocation and use of natural resources in Alaska intensified. As late as the early 1970's, over 97 percent of the land area in the State was still owned by the Federal government. The people of Alaska began agitating more actively for the Federal government to: 1) identify areas of land to be retained in protective status, 2) identify areas of land to be opened up for development, and 3) accelerate the conveyance of land to the State and to Native groups as directed by the Statehood Act and the Alaska Native Claims Settlement Act.

Since the National Forests contain resources of National, regional, and local significance, conflict over the allocation and management of the National Forest land was especially intense. This conflict was most evident in Forest Service planning efforts as well as in the Congressional deliberations taking place concurrently in Washingotn, D.C. As competing demands become more acute, it became necessary to develop and implement methods to identify more comprehensively and more precisely the social values held by National, regional, and local publics. To achieve this within such a complex diversity of cultures, lifestyles, conflicting social values, and resource management opportunities, social analysts in the Forest Service planning process must draw on a variety of social science methodological tools and analytical techniques. To gather and provide information to resource managers and the public concerning the social effects of natural resource decisions, the Forest Service has drawn on data and expertise from State agencies, the University of Alaska, private companies, Native corporations, and other Federal agencies. The remainder of this paper will discuss, compare, and contrast selected social impact assessment tools and techniques used in the Forest Service's land management planning process in Alaska.

Social Impact Assessment in Multiple-Use Planning on Alaska's National Forests

The National Environmental Policy Act requires that Federal agencies assess the social effects of resource management activities significantly affecting the environment. The Alaska Region of the Forest Service implemented these requirements by means of regional direction provided first in the Southeast Alaska Area Guide (USDA Forest Service, 1977) and, most recently, in our Regional Plan (USDA Forest Service, 1982). Specifically, regional direction requires that planning efforts in the Alaska Region conform to the following policies:

(1) Identify and display economic and social impacts of programs and/or management alternatives in environmental analyses where significant changes in outputs between alternatives are considered. Give particular emphasis to industries which are dependent on National Forest program outputs such as timber, fisheries, and tourism.

(2) Forest Service activities will be coordinated with local communities in the following manner:

   a. The plans and concerns of local communities, as represented by their governing bodies and the public involvement process, will be incorporated in alternatives developed at all Forest Service planning levels.

b. Community preferences will represent an integral factor in Forest Service decisions where communities and residents may be significantly affected.

c. Alternatives developed during the planning process must reflect community needs and preferences as expressed through the public involvement process prior to starting the environmental impact statement procedure. Examples of community needs might include areas required for recreation or subsistence activities, aesthetic considerations, lifestyle options, transportation system options, and community growth goals.

To conform with the foregoing regional direction, the Land Management Planning Group has undertaken a variety of social impact assessment projects to improve information for decisionmaking. In so doing, the Forest Service has drawn on methodological tools, analytical techniques, and outside expertise from a number of social science disciplines, most notably sociology, anthropology, and psychology. If one lesson has emerged from our social impact assessment experience in Alaska, it is that no one discipline can provide the complete picture. This is also consistent with the contents of a number of recent textbooks and other publications (Finsterbusch, 1980; Bowles, 1981; Haussmann, n.d.; Finsterbusch and Wolf, 1977) in the field of social impact assessment which address the methodological and analytical contributions of many disciplines.

Politics is the process of allocating scarce resources between competing values. As such, the political nature of issues being decided in the Alaska Region made it necessary for social assessment efforts to focus on tools and techniques which elicit and identify social values for use in decisonmaking. The guiding principle of recent social assessment activities has been to try to insure that all salient value perspectives are identified and represented in the planning process. We have met with uneven success in achieving these objectives but we have learned valuable lessons in the process which relate to doing a better job.

With this in mind, I would like to turn to the specific tools and techniques which we in the Alaska Region have found helpful for accomplishing social impact assessment in a variety of planning efforts. All of the methods we have used possess strengths and weaknesses regarding the quality (e.g., precision and reliability) of information they provide, their suitability for implementation within the context of Alaska's unique physical and sociocultural environment, and their compatibility with Administrative constraints, such as time, costs, and personnel.

Social Surveys

Social surveys are a standard data collection device which, if properly conducted, yield information generalizable to an entire population from information obtained from respondents picked at random.

To get a more comprehensive understanding of the relationship between the natural environment and residents' quality of life, a number of State and Federal agencies cooperatively funded the Alaska Public Survey in 1979. During the survey, 2,888 randomly-selected Alaska householders responded to a one-hour long, structured interview concerning their recreation use (e.g., travel patterns, favorite and most-frequently visited sites, activity preferences, and recreation satisfactions), their motives and satisfactions with living in their communities, their reliance on subsistence food-gathering activities, their attitudes about Forest Service policy issues and management activities, and their socio-demographic background characteristics (Clark, Johnson, and Field, 1981).

The analysis of data from the Alaska Public Survey has resulted thus far in two major reports (Alves, n.d.; Clark and Johnson, 1981) which summarize the Survey's findings from Southeast and Southcentral Alaska. Information obtained to date has been used in site-specific planning efforts (e.g., Admiralty Island National Monument planning process and Chugach National Forest Land Management Plan), as well as more programmatic planning processes (such as the Regional Plan).

Social surveys are important tools for conducting social impact assessment, but in addition to their advantages they also have a number of limitations. In terms of their effectiveness in providing high quality information, social surveys are perhaps the best techniques that we have used, depending on information needs. A well-designed, carefully-constructed survey instrument can be administered to any societal level (community, region, National). In addition, it is one of the few techniques (because of the random selection of respondents) which taps the attitudes and values of unorganized constituents who don't write letters or attend public meetings. Finally, although survey instruments are usualy highly

structured, they can be refined through pilot tests to probe for information being sought by decision-makers.

Unfortunately, the structure of social surveys often limit their usefulness. Problems we encountered in administering the Alaska Public Survey involved both sociocultural factors and administrative factors. Alaskans are often employed in seasonal jobs, such as fishing, logging, mining, tourism, or construction. Fishermen are often at sea for weeks at a time and they often have to depart within a few hours' notice of an opening in the season. Loggers and construction workers will often take extended winter vacations (or, when the market is depressed and unemployment is high, extended summer vacations). Miners are often situated in remote, inaccessible field locations. The seasonality of labor and the transient nature of a large part of the labor force wreak havoc with sampling frames, often requiring their frequent modification. Respondents living in randomly-selected households may not be home when an interviewer calls on them.

Cultural factors also detract from the effectiveness of structured social surveys as a data collection instrument. Language barriers, distrust of non-Native interviewers, and a reluctance to divulge information concerning such things as productive hunting and fishing sites, archaeological artifacts, or subsistence activities, often inhibit the use of structured surveys in Native communities.

In even their most routine application, social surveys are technically complex, expensive, and time-consuming. They require highly-trained researchers and statistical analysts. In addition, they must withstand a laborynthine agency and OMB approval process. Their application is further complicated by unique sociocultural factors which must be taken into account when employing these methods in Alaska.

With all their limitations, however, social surveys remain the most reliable method to acquire comprehensive, in-depth information on social values and public attitudes.

Ethnographic and Key Informant Interviews

Ethnographic and key informant interviews are usually associated with anthropological field work and individual community studies. They are useful for identifying a broad array of information, including social values. Usually characterized by less structured interview schedules, these methods yield important information for use in the planning process (Spradley, 1979; Tate, Bohemeier, and Bohlen, n.d.).

In order to provide information in support of the Tongass National Forest Land Management Plan, the Forest Service contracted with the University of Alaska's Institute for Social and Economic Research to conduct interviews in representative communities in Southeast Alaska. Completed during 1978, this project was designed to identify major social issues and community preferences through non-structured interviews with formal and informal opinion leaders in Native and non-Native communities. Interviews were conducted in ten communities with populations ranging from under 100 to approximately 20,000. These communities were Craig, Game Creek, Haines, Hoonah, Juneau, Kake, Ketchikan, Kupreanof, Petersburg, and Tenakee Springs. In addition, case studies of greater depth took place in the communities of Haines, which had recently suffered a sawmill closure; Tenakee Springs, a small, quiet town facing large-scale timber harvesting nearby; and Ketchikan, the community most likely to be affected by a large molybdenum mining development.

Interviews were conducted with a variety of people, most of whom held formal roles within their communities. Most prominent were city and State officials and other political leaders, representatives of formal (often interest group) organizations, and heads of Native corporations and private businesses. The number of people interviewed in each community ranged from 5 each in Tenakee Springs and Kake to 17 in Juneau.

Although no consensus emerged on the optimal land allocation or best management practices for the Tongass National Forest, the interviews evidenced widespread agreement concerning key issues which respondents desired to see addressed by the final forest management plan. The chief concerns of those interviewed revolved around four major topic areas: 1) the need to achieve a balanced output of resources from the Tongass National Forest, 2) the need to provide more recreation facilities, 3) the importance of Forest Service programs for economic diversification and community stability, and 4) the importance of protecting fish and wildlife habitat in Forest Service management activities. (Institute for Social and Economic Research, n.d.) In addition, a wide variety of community-specific values were identified.

Like the more structured survey methods, ethnographic and key informant interviews are not without their problems. Although they provide extremely useful information, they are fairly sophisticated methodological tools requiring highly-trained expertise.

The major assumption behind these techniques is that by interviewing selected individuals in positions of formal and informal power, it is possible to identify the value positions held by broader segments of the community which the individual actors represent. In order for this method to provide valid results, however, care must be taken to insure that the views articulated by individual actors represent more than their personal views or the views of small elites of which they are members. This problem can usually be mitigated by interviewing a variety of power actors in a community, thus increasing the likelihood that all major value positions are surfaced.

A major limitation of these techniques in both Native and non-Native communities is the difficulty in identifying informal leaders who may possess far more knowledge and wield far greater power than individuals occupying formal roles. This problem may be largely overcome if time is available to employ some combination of the four most reliable methods—positional, reputational, decision-making, and social participation—for identifying community leaders. However, this process can be extremely time-consuming and expensive.

Another problem emerges primarily in Native communities. Distrust of outsiders is firmly grounded in historical experience; among those not the least distrusted are anthropologists and archaeologists. Thus, a major disadvantage of ethnographic interviewing in Native communities can be the time involved building trust and communication channels with members of these communities, regardless of whether they are power actors or not. One solution that appears to have worked reasonably well in the past is to hire an individual living in the community to serve as a contact, or liaison, between community residents and agency personnel. (This, of course, also has its own set of advantages and disadvantages.)

Perhaps the most significant barrier to conducting ethnographic and key informant interviews is the relative scarcity of skilled expertise. To get reliable information using these methods requires sensitive, highly-trained individuals. Professionals skilled at employing these methods are often not available, especially on the short-term contractual basis necessary for timely input into agency planning processes.

In summary, there are some formidable barriers to conducting ethnographic and key informant interviews in Alaskan communities, not the least of which are the time and money involved, and the patience required in communicating the results to natural resource professionals. But in terms of an in-depth, qualitative understanding of community dynamics and social values, these techniques have the potential to produce the most valuable information. For its part the Forest Service has hired archaeological and anthropological expertise, both as part of its permanent staff and on contract. But to date their principal responsibilities involve the identification and management of historic and cultural sites. Perhaps the model that presages the future is the Bureau of Land Management's Socioeconomic Studies Program in Anchorage. This staff unit is composed of social scientists, including ethnographers and anthropologists, who have responsibility for conducting social impact assessments related to petroleum exploration and development on the outer-continental shelf of Alaska. (For examples of reports produced by the Socioeconomic Studies Program, see Bennet, *et al.*, 1979; Reckord, 1979; Alaska Consultants, Inc., 1979.)

Public Involvement in Land Management Planning

The National Environmental Policy Act and the National Forest Management Act require intensive public involvement as part of land management planning. A major source of information concerning community preferences and public values is developed through the formal public involvement process.

As it relates to planning and decisionmaking, the NEPA-mandated public involvement process can be briefly characterized as follows: 1) a need for a specific agency action is perceived (for example, to provide a plan for off-road vehicle users, to conduct a timber sale, to recommend wilderness classification for a certain area, or to build a fish hatchery); 2) "scoping" sessions are held with the public and other government agencies to identify public issues and concerns about the project; 3) a draft environmental impact statement containing a proposed action is developed and distributed for public review and comment; and 4) a final environmental statement is produced and released containing the approved action (developed in response to public review). Public participation activities employed in this process have two major objectives: first, to provide environmental, economic, and social information to the public

regarding the alternative actions, and second, to solicit public views and opinions regarding the alternative actions. Information thus provided helps decisionmakers determine a final course of action which is both socially acceptable and politically defensible.

A number of critics have raised serious questions about this process (for specific critiques of Forest Service programs, see Fairfax, 1975; Twight, 1975; and Ostheimer, 1977). For example, citizen participation activities conducted in conjunction with this process often miss unorganized publics who may feel unrepresented if their high-salience issues and values are ignored. In addition, interest group representatives have been known to appeal to their members to flood the agency with postcards, form letters, and petitions, when they get the (sometimes justified) impression that public involvement activities are little more than vote-counting exercises.

In spite of these and other problems, public involvement efforts have brought a broader and more inclusive spectrum of social values into the decisionmaking process.

Generally, public involvement activities utilized during this process emphasized workshops, public meetings, and requests for written review comments of draft environmental statements. Problems emerged in the early days of public involvement concerning how to use information provided by the public (Hendee, *et al.*, 1973). Line officers and resource staff specialists argued that the lack of systematic procedures for analyzing, summarizing, and displaying public involvement information hampered its utility in decisionmaking.

In response to this problem, Forest Service researchers applied content analysis techniques to public involvement data. They developed and, through numerous applications, refined this process for use in public input analysis. This process, named Codinvolve, uses content analysis to identify relevant information contained in public input and to summarize and code it on edge-punch cards. (Stankey, 1972; Hendee, Clark, and Stankey, 1974; Clark, Stankey, and Hendee, 1974).

Used primarily with written information (e.g., meeting transcripts, letters, petitions, and reports), Codinvolve is a systematic process which uses a codebook, trained coders, and a system of reliability checks to minimize subjectivity and interpretation. Codinvolve attempts to summarize the opinions people hold on particular issues as well as the reason they offer to support their opinions. Consideration of the reasons why people hold certain values is what takes public involvement out of the vote-counting realm and provides the opportunity for exercising professional judgment. Codinvolve has been used on a number of planning efforts by the Forest Service in Alaska and has most recently yielded valuable information in the Tongass and Chugach National Forest planning processes (USDA Forest Service, 1979b; 1980a).

But as with the analytical techniques previously described, Codinvolve also has certain advantages and disadvantages. (For important discussions of the pros and cons of the Codinvolve system, see Fairfax, 1974; Clark and Stankey, 1976; Ostheimer, 1977; USDA Forest Service, 1980b.) Among its major strengths is that it is systematic. When carefully applied, it objectively produces information that is reliable (replicable), visible, and traceable—important attributes given the often highly-politicized nature of the decisions being made. Although the information it provides is less comprehensive, Codinvolve analysis is less costly, less time-consuming, and requires less specialized expertise than structured interviews or ethnographic/key informant interviews.

Codinvolve is *not* public involvement. It is an analytical tool which analyzes, summarizes, and displays information for decisionmaking. Problems in its application arise more often through misunderstanding than from technical inadequacies of the system itself. Codinvolve has been misperceived in the past as somehow providing ultimate answers. Correctly perceived it provides another set of technical data which receives consideration in the decisionmaking process along with environmental, economic, and other social data.

In implementing the Codinvolve system, it is important to keep Ostheimer's observations in mind:

> . . . .Codinvolve has been substituted for more important aspects of public involvement, perhaps because they are more difficult to master. Codinvolve may delude Forest Service personnel into thinking they have carried out effective public involvement merely because they have used a sophisticated evaluation tool. Codinvolve instructions warn that the procedures are not simple, so this "difficulty" encourages an illusion of "really working at" public involvement. It is far more important for the Forest Service to know its constituency and keep high-salience publics up-to-date on Forest Service actions as an ongoing process. (Ostheimer, 1977, p. 19.)

Our experience in the Alaska Region suggests that when kept in perspective and conscientiously applied, Codinvolve can provide very useful, although limited, information for decisionmaking. In an article drawing on their experience in over 30 studies using Codinvolve, Clark and Stankey concluded:

> We are encouraged by the success of this venture on several accounts. Effective analysis of public input does seem to have made a difference in the many applications of Codinvolve completed to date. (Clark and Stankey, 1976, P. 235.)

Numerous authors have discussed the contributions that public involvement can offer in social impact assessment (for two articles specifically addressing forestry, see Holden, n.d.; Quint and Caplan, forthcoming). But one problem we have encountered in achieving the full integration of public involvement and social impact assessment is methodological and may require further research.

As noted above, public involvement is an important source of social data. For example, public involvement information can be used as an indicator of the salience of various issues. It can also reveal the geographic distribution of public concern as well as the extent to which issues are addressed by formal groups as opposed to unorganized constituencies.

But problems have been encountered in using citizen participation as a social data collection tool because public comments are frequently too general or simply lack relevance to the planning issues being addressed. Other times, people's perceptions of social impacts and other social concerns may remain unarticulated altogether. What is needed is a method whereby public involvement activities are restructured so they can be used to identify and make more specific underlying values and interests, and to surface them for consideration in the decisionmaking process.

Toward this end, the Forest Service in Alaska has contracted with a forest sociologist at the University of Washington, Dr. Robert G. Lee, to develop procedures for using public involvement more effectively as a social data collection instrument.

As natural resource agencies are increasingly constrained by administrative restrictions on the use of social surveys, social analysts may have to rely more and more on public involvement as a major source of social data. Our experience in Forest Service planning efforts in Alaska suggests that if certain problems can be overcome, public involvement holds much promise for decisionmakers in terms of enhancing their understanding of the social environment.

Panels of Experts

One technique that has been useful in planning processes where time and money are of the essence is to convene a panel of experts. Most recently, panels of experts have provided judgments of anticipated social impacts during the RARE II effort in 1978-79, and the 1980 RPA process.[1] In both cases the social impact assessment began with the development of a social data collection package put together by social scientists from inside the Forest Service and from outside consulting firms. Then, panels of experts (consisting of local line officers, natural resource professionals familiar with the affected communities, and a Forest Service social scientist and economist) used the social data and their knowledge of the communities and the planning alternatives to identify potential social impacts. Finally, a summary of the experts' estimates were included in both the draft EIS for RARE II and RPA.

During the public comment period of the environmental impact assessment processes, reviewers of the documents were encouraged to validate, modify, or correct the analyses arrived at by the panel of experts and to provide their own perceptions of social impacts. In both instances, feedback during the public review process was helpful in more clearly identifying social impacts—both positive and negative—and in selecting the preferred alternatives.

This technique has a number of advantages which lend themselves to use in agency planning pro-

[1]*RARE II is an acronym for the Forest Service's second Roadless Area Review and Evaluation. This was a Nationwide inventory and analysis of National Forest roadless areas which resulted in recommendations for wilderness classification, nonwilderness uses, or, in some instances, further planning. A recommendation was made for each of the nearly 3,000 roadless areas studied.*

RPA refers to the Assessment and Program the Forest Service must prepare periodically in response to direction contained in the Forest and Rangeland Renewable Resources Planning Act (Resources Planning Act, or RPA, for short). Both the RARE II and RPA Program Environmental Impact Statements were broad programmatic documents containing a number of different alternatives. In both cases, it was the social effects of those alternatives which were analyzed by panels of experts in the Alaska Region.

cesses. First of all, it is the least time-consuming and least expensive method of those we have employed. Second, it provides a diversity of viewpoints in situations where it may be impossible for one person to know all the facts; in addition to the data that are provided to the experts for evaluation, they each bring their own knowledge of and experience with the social environment to bear on the deliberations. Finally, this technique has the notable attribute of flexibility. A panel of experts can respond relatively quickly to modifications in alternatives as they are refined through successive iterations by planning them.

Two important lessons were learned by Forest Service planners in the instances where panels of experts were used to identify the social impacts of alternatives. The first was that expert judgment is not a substitute for, but is a supplement to, more rigorous social analysis. They can be very helpful but should not be relied upon as the only social assessment method. For certain exercises such as identifying research needs or developing future scenarios, a panel of experts may be the best method available and relying on it alone may be entirely justified. Often because of the short time frames involved, information provided by panels of experts is not as rigorous and definitive as data provided more directly by other methods.

Secondly, panels of experts function most efficiently when they are operating under certain rules governing their behavior. Delphi methods and nominal group techniques are fairly sophisticated tools which provide systematic procedures for behavior in small groups (Delbecq, *et al.*, 1975). Among other things, these procedures minimize the extent to which the personal, rather than the professional, values of experts influence the group's evaluations. These methods are designed to maximize the productive efficiency of panels of experts and should be employed whenever expert panels are used in the social assessment process.

Future Direction of Social Impact Assessment

Citizens of the United States are becoming increasingly concerned about the allocation and management of public sector natural resources. More and more, this concern is resulting in active involvement as people organize themselves to influence natural resource decisions.[2] For whatever reason, whether it is the jobs provided by the timber industry or whether it is the solitude provided by wilderness recreation experiences, the lifestyles of millions of people are affected by decisions regarding public lands. In an effort to be more responsive to social effects resulting from its decisions, the Forest Service is continuing to institutionalize programs in various Regions for the professional conduct of social impact assessment. (See, for example, USDA Forest Service, n.d.; Holden, 1980; Bowen, *et al.*, 1979; and Tremaine, 1981.) In addition, national direction in the form of a handbook for integrating social impact assessment in National Forest planning is being developed under the auspices of the Program Leader for Social Impact Assessment in the Washington, D.C., office.

We need to be constantly striving to improve our capabilities for identifying and tracking the existing and emerging social values of all our publics. But now that mechanisms focusing on the identification of social values are being institutionalized, we feel it is important to move toward a more comprehensive approach to social impact assessment. In the Alaska Region a program responding to National and Regional direction in social impact assessment has been approved for development and implementation (Muth, 1981). This program focuses on the development of a data base, assessment methodologies, and procedural guidance. Specifically, the approach being developed for use on Alaska's National Forests includes the following program elements:

A. Socioeconomic profiles of communities within close proximity to Alaska's National Forests. It is the intent to move away from traditional socioeconomic overviews (Logsdon, *et al.*, n.d.; Rogers and Hart, 1978), which are likely to be static and quickly outdated, and towards a more com-

[2]*For example, the Forest Service RARE II effort in 1978 generated sizable public comment. Nationwide, a total of 264, 903 individual inputs were received in response to the draft EIS. They represented the signatures of 359,414 people. (Sometimes more than one person, a husband and wife, for example, signed one letter.) Contrasting this with the public response to the RARE I draft EIS in 1973 indicates greatly heightened public interest in National Forest land classification issues. The RARE I draft EIS attracted a total of 6,843 individual inputs signed by 15,607 people. Moreover, while the proportion of personal letters to form-type responses was over seven to one in RARE I, nearly two-thirds of the RARE II input was form-type response. Thus, organized units of society such as environmental interest groups and industry associations evidenced much greater involvement in RARE II than in RARE I. For further discussion, see USDA Forest Service, 1979a.*

prehensive, computerized data base which can be kept current and easily accessed by planning teams. Community profile information will include population statistics (such as age and sex pyramids, racial composition, etc.); kinds of municipal services provided by a community; availability and types of transportation and communication facilities; educational institutions; health services; recreational opportunities; quality and availability of housing; occupational skills in the community; unemployment rates; and so on. These profiles will provide immediately available, current information for use in planning and decisionmaking.

B. Sociocultural maps. When interacting with interdisciplinary teams composed largely of resource professionals, it is often helpful to provide graphic displays in order to illustrate complex relationships between the social and natural resource environments. For this reason, sets of sociocultural maps will be developed which display the following information: location of communities; recreation use patterns; archaeological, cultural, and historic sites; permanent facilities, such as dams, mills, airfields, recreation developments, and transportation routes; land ownership patterns; and resource use and development areas (timber harvests, mines, anchorages, etc.).

C. Scalogram analysis of community institutional structure. An emerging body of theoretical and applied social research suggests that certain structural properties (especially institutional complexity) of social systems exert important influences on the direction and magnitude of community development and growth (Young and Young, 1973). We will be pilot testing a process (which combines macrosocial accounting with Guttman scaling) in an attempt to validate these hypotheses empirically using Alaskan communities as case studies. We hope to identify relationships between community social structure and quality of life. The implications of these studies are that natural resource decisions affecting the structure of a particular social system (independent variable) may result in unintended consequences (both positive and negative) on the quality of life (dependent variable). This work is currently in the exploratory phase but completion is anticipated by the end of 1982.

D. Staff papers on Native cultural values and on lifestyle differentiation. A staff paper will be developed which identifies and summarizes traditional Native cultural values with specific reference to those values most likely affected by natural resource decisions. Information of this type will increase the sensitivity of resource planners and managers to native cultures. Knowledge of these cultural values will eliminate cultural conflicts which unnecessarily arise out of employee ignorance of how those values are affected by forest management activities.

Although the professional social science literature is far from conclusive, preliminary work suggests that "lifestyles" can be characterized in terms of a combination of consumption patterns and attitudes. A second staff paper, drawing on this literature, will explore the feasibility of developing "Alaska lifestyle categories." If such categories can be developed, they may prove useful in determining the extent to which people engaged in various lifestyles are affected by Forest Service management activities.

E. Procedural guidelines. Regional supplements to national manuals and handbooks will be developed to provide additional direction to field units in conducting social impact assessment. They will be tailored to account for the unique social, cultural, political, and environmental conditions of Alaska.

F. Social analysis training sessions. Training packages will be developed and instituted which will contain information for local line officers, planners, and resource specialists. Training packages will include: 1) exposure to social assessment requirements contained in National and Regional direction, 2) overview explanations of social assessment concepts, methods, and analytical techniques, including the kinds of information they provide and their relevance to decisionmaking, and 3) a summary presentation of information contained in the social data base. An explicit objective would be to sensitize line and staff personnel to the importance of considering social values in decisionmaking.

In summary, social impact assessment is maturing as a field of social scientific study. But as recent criticisms (Wilkenson, *et al.*, 1980; Meidinger and Schnaiberg, 1980; Peterson and Gemmell, 1977) point out, there is considerable room for improvement.

Currently there is a need for a critical reassessment of the assumptions, theory, and broad methodological approach to conducting social impact assessment. Methodological and analytical tools are often poorly situated to the tasks at hand. It may be timely for the profession in general to shift from a methods-centered approach to a problem-centered approach. The state-of-the-art of social impact assessment resembles a body of methodology in search of an integrating conceptual framework. It may prove worthwhile to refocus research efforts away from the development of more sophisticated methodological and analytical tools and toward the theoretical underpinnings of social impact assessment. Understanding why and how social change occurs will be immensely helpful for practitioners in interpreting and incorporating social assessment information into decisionmaking.

Important breakthroughs in theoretical and applied research will only be achieved by adhering to standards of professionalism and scientific rigor. While the research community continues to advance the state-of-the-art of social impact assessment, practitioners must be committed to keeping abreast of professional developments.

The social impact assessment program in Forest Service planning efforts will continue to draw on these developments. But, we also recognize that a complete picture of social reality is often impossible to attain and that sometimes the best we can do is triangulate on the truth. We remain committed to drawing on a variety of social science disciplinary perspectives in this endeavor. We plan to integrate information provided through social analysis with information provided by the Alaska Region's ongoing economic impact assessment effort (Mehrkens, 1981a; 1981b) and a well-designed, well-executed public involvement program in order to increase our understanding of social effects resulting from natural resources management decisions.

Greater involvement in social impact assessment by natural resource management agencies is needed in order to understand the impacts of allocation and management decisions on people. This understanding is necessary to mitigate negative impacts and enhance positive ones. As Shannon (1981) has succinctly observed, "Good social impact analyses are crucial to socially responsible and politically supportable resource decisions."

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Summary of SESP Sociocultural Studies

Charles W. Smythe

The purpose of the SESP (Socioeconomic Studies Program) Sociocultural Systems Analysis is to collect and analyze information suitable for assessing the effects of potential OCS (Outer Continental Shelf) oil and gas development on Alaskan coastal communities. Until recently, such analyses were comprised of a compilation of available baseline data and the projection of the effects of hypothetical development scenarios on critical issues and trends identified in the baseline. At present, sociocultural studies focus more on field data collection and impact assessment in crucial areas which are not predetermined by hypothetical scenarios. Additional special studies address particular topics significant to impact identification or collect baseline data which fill critical information gaps in the available sources. The scope, methods, major findings and applications of these studies will be discussed below.

With the exception of a few small towns and regional centers, Alaskan coastal communities are rural, geographically isolated villages with 100 to 500 residents. Normally, villages are 80-95 % native and are comprised of social groups which were, historically, more widely dispersed in the local environment. Subsistence hunting, fishing and gathering of resources in the surrounding ecological zones is the basis of the economy and the focus of the cultural traditions in these communities. Each village is located in proximity to a characteristic set of resource concentrations from which food and other items are acquired. Villages vary with respect to the set of resources on which they depend, as well as in their cultural traditions, but they are similar in one important respect which distinguishes them from the more urban areas in Alaska: there is a high degree of cultural integration between the economic, social, and political components of society.

In traditional Alaskan native society, social relationships and economic exchange are integrated into one undifferentiated system. Every social relationship has an economic component and every economic exchange takes place in a social context. Interpersonal interaction is organized and regulated by the kinship system and associated cultural rules of distribution and exchange of subsistence products and labor. The cultural principles and values that regulate subsistence production and consumption are internally coherent and cohesive. As the externally-based monetary economy has grown in the state, adjustments have been made in the rural subsistence-based economy. The adoption of more efficient technology (rifles, snowmachines, aluminum boats and outboard motors), and new job opportunities, bring about changes in local economic systems. New cultural and social patterns develop as new economic activities are joined with old rules and traditions. Some areas of Alaska have undergone more rapid changes due to special circumstances. In the Alaska Peninsula region, for example, local fishing economies have changed substantially since the institution of limited entry. On the North Slope, the Borough government has altered village economics through major programs (such as CIP) funded by tax revenues derived from Prudhoe Bay.

In most regions there is a larger town which serves as an administrative center for the villages in the region. State and federal agencies often have offices in these towns, and they provide links to the statewide transportation system. Regional centers have a greater ethnic diversity and a more mixed economy than is found in the smaller villages. Nevertheless, traditional, economic, social and cultural organization exists among the native populations of these towns much as it does in the villages. Rural communities do not exist in isolation from each other; there are economic and social network linkages

among village populations and between villages and the regional centers and beyond. These networks have undergone changes as the monetary economy has grown and as rural residents have adopted new administrative roles in formal organizations within the region.

The purpose of baseline sociocultural studies is to describe past and existing conditions and trends of change in cultural systems within communities or regions. The scope of these studies does not include every aspect of historical and contemporary cultural organization but is limited to those patterns and issues that are expected to influence future conditions and responses to change derived from potential OCS development. The focus of the research is on the compilation and analysis of data from available sources. Since most of the available sources of cultural information are historical, the limitation of available data is a signficant constraint in describing conditions. To compensate for this problem, the attempt was made to locate investigators who had conducted recent sociocultural research in the study communities. In this way, baseline studies often include the results of the most recent research and capitalize on the investigators' knowledge of contemporary issues.

The common methodological approach among the different sociocultural studies is that culture is comprised as a system of inter-related and interacting elements. Using this approach, investigators described the major system components (kinship and social organization, politics, technology, economics, religion, values and ideology). Depending upon the quality of the data and depth of analysis, researchers specified the inter-relationships among the cultural variables. The virtue of this approach is that, theoretically, it is possible to describe the system as it functions in the present and to analyze the ramifications of trends of change in certain components on other system elements and the system as a whole. Another property of this approach is the ability to incorporate variable rates of change into the analysis and to assess the effects of rapid culture change on cultural systems.

Several theoretical orientations were utilized by different investigators in baseline studies. These orientations specified the direction of causality in the interactions between the major system components or sub-systems (social, structural, ideological and techno-economic). The most common approach was cultural ecology, in which the dominant factor influencing cultural patterns is socioeconomic and techno-economic adaptation to the environment, which in turn is a major conditioning factor on the cultural system as a whole. This approach was felt to be relevant because the primary cultural characteristic of rural Alaskan communities is their subsistence orientation, and because investigators viewed the potential interaction between OCS activities and the subsistence regimes as very likely. Another theoretical approach used by several researchers did not specify dominant variables prior to the study but derived such variables from empirical findings and significant issues identified in the data collection phase. One other approach emphasized the ideological connections between cultural variables and advanced the concept of "structured change" which combined an analysis of historical trends with that of ideological structure. This approach was an attempt to go beyond the theoretical orientations to culture contact and change (acculturation and modernization) utilized by earlier investigators.

In their applications, the theoretical approaches were valuable in indicating significant types of variables and their inter-relationships. However, the identification of specific mechanisms and relationships among the elements in the descriptions of cultural systems as a whole was less successful. This problem was partly a result of the broad scope of these studies, in which researchers were asked to identify all issues and trends of change in cultural systems subject to OCS impacts. Most investigators were able to identify some specific mechanisms and linkages in their areas of specialization, but frequently were not able to expand their level of detail to the cultural system as a whole. This problem was in part due to the limitations in the available data discussed above.

Investigators were usually most successful when their studies were community-specific or limited to about five communities in a region. Substantial problems of scope were encountered when a region of twenty to thirty communities was studied. Anthropological approaches work best in smaller environments when boundaries between internal and external systems can be explicitly delimited. In larger regions with many communities, such boundaries are not well-defined and often shift according to context, creating theoretical problems for a functional analysis. Large gaps in available data are more significant in the application of these approaches in larger regions.

Following the description of past and existing issues and trends of change in sociocultural systems, impact assessments are performed to project these conditions forward in time with and without OCS development. The general procedure for this impact assessment is to formulate methods and assump-

tions about variables, their inter-relationships and rates of change by means of which the analyses would proceed. The initial forecast is a 20-year projection of expected conditions if no OCS activity were to occur. This is followed by an impact analysis of the effects of three OCS development scenarios on this forecast. The scenarios consist of statewide and regional population and employment figures based on hypothetical low, medium and high levels of OCS technological development activities at likely locations, all of which are determined by other SESP studies.

The theoretical approach to impact assessment is a continuation of the concept of culture derived in the baseline as a system of integrated elements, impacts on which both singly and in combination will be analyzed to develop an assessment of effects on the system as a whole. The major methodological approach is that each scenario will introduce changes in the system, and comparison of conditions following the impact event with conditions immediately preceding it will provide a measure of the impact. Figure 1 below represents this approach:

Condition A Event Condition B

The difference between condition A and condition B reveals the effect of the impacting event. In this case, condition A is derived in the non-OCS forecast.

The application of this approach was useful for identifying types of significant impacts on cultural sub-systems. If the investigator had substantial research experience in the study area prior to the study, the analysis was more detailed in certain areas of expertise than analyses which were derived solely from the available data. However, the general weakness of most impact analyses is the inability to trace the ramifications of particular impacts throughout the system as a whole. Directions of causality among system elements and relative weights that each element contributes to the system are not explicit. If the relationships among the variables and the weightings of specific variables were more formalized, it would be possible to analyze the effects of different assumptions and levels of OCS impacts. In Alaskan study areas, however, the level of detail in the available sociocultural information severely limits the quality and depth of analyses in the different cultural sub-systems.

The major findings of these studies are very similar at a general level, with predictable differences due to economic and cultural differences among regions and sub-regions. The principal areas of impact and change include:

1) effects on the local resource base, with consequences for the economy and culture;
2) effects on the local economy, including increased rates of change, inflation, and pressures on the adjustment between subsistence-based and monetary economies;

The large-scale influx of boomers and OCS workers into the state will bring a series of impacts on local communities. As the population composition changes in rural areas or regional centers, significant inter-ethnic problems and burdens of adjustment would occur. Such population shifts would alter the predominance (and preservation) of Native social structures in regional centers or, in primarily non-Native towns, the predominance of customary and highly valued small town relationships. Increase in sport hunting and fishing would put additional pressures on subsistence resources and use areas. Such competition for resources would encourage the formation of special interest groups to limit or eradicate the subsistence priority in rural communities. Sudden population increases will exceed the capacities of human service delivery systems.

The reader should bear in mind that the major findings summarized here amount to a very general, almost a canned approach, to sociocultural impact assessment. There are important regional and sub-regional cultural differences throughout rural Alaska that must be included in the application of this approach. I have emphasized here the social and cultural aspects related to the economic system and have advocated inclusion and development of these elements in the studies during my tenure in SESP. The evolution and changes in sociocultural approach in SESP have been influenced by these concerns.

The sociocultural baseline studies have been extremely broad in scope and were expected to encompass all issues and effects on local communities and regional centers excluding infrastructure and human service demands in the regional towns. Level of detail and analytical focus was sacrificed for broad coverage which, in later studies, included very large geographical regions as well. To such problems is added the limitations in available data discussed earlier. Specific changes in approach have been adopted to improve analytical capabilities. Since the economic sub-system is a critical area of impact, with lack of a clear separation between socioeconomic and sociocultural systems, recent studies are designed to focus explicitly on socioeconomics and the linkages to cultural elements. Local socioeconomic systems studies have been re-defined to examine effects on regional economic processes and inter-linkages between local populations and to include specific cultural elements which are determining factors in such systems. Two recent special studies in the Yukon Delta and the Alaska Peninsula have investigated the socioeconomic systems and linkages to social and cultural elements in particularly unique subregions with a high dependence on salmon fishing.

In addition to a greater definition of and a focus on major impact issues in regional studies, more special studies have been designed and implemented which have focused on key areas of impact. The following topics are the subject of recent or on-going study: effects on subsistence systems, social institutions and culture due to disturbances in resource harvesting; effects on local, sub-regional socioeconomics (baseline studies in the Yukon Delta and Alaska Peninsula mentioned previously); description of the role and function of cash and employment in subsistence-based economies; and analysis of two communities, Nuiqsut and Unalaska, subject to unique and particular impacts prior to OCS development effects. In all of these studies, and to a lesser extent in the regional impact studies, substantial fieldwork is encouraged to build upon and expand the existing data base in these areas, thereby avoiding problems deriving from the limitations of available data.

A contributing factor in the development of some special studies has been the issue of the agency need for a regional approach, yet a high degree of cultural and geographic diversity among communities in the larger regions, which leads to problems of representativeness among communities in the region under study. In some special studies, sub-regions were identified which were comprised of communities of socioeconomic and cultural similarity and geographic proximity. In the regional studies, the proposed resolution of this problem was a community cluster approach. Such analysis would proceed by identifying clusters of communities with cultural similarities, social ties, and geographical proximity, and then choose communities within such clusters with a specified degree of representativeness on which to build the regional analysis. Unfortunately, this approach has not been tested at this time.

Within the sociocultural area, the need for information which is not available in the existing data base will continue. Without a more adequate understanding of existing social and cultural elements, it is not possible to estimate magnitudes of change and effects of OCS developments. For example, the model of sociocultural impact assessment described above pre-supposes a very traditional type of social and cultural organization. In reality, economic, social and ideological structures are different today, but the existing data in most baseline studies is insufficient to describe the new forms, their ramifications on other system elements, and their geographic distribution, thereby making the task of impact assessment of new OCS developments on rural populations very problematic and, in practice, very generalized. Change has not occurred at the same rate and with the same focus in different regions, and the diversity of economic, social and cultural characteristics of Alaskan populations is significant. I am suggesting that our studies need to develop more adequate primary information on existing social and cultural conditions which is capable of describing the diversity among populations within OCS regions and which has a focus on dynamic economic, social and ideological structures in the context of changing cultural adaptations.

Local Socioeconomic Studies

Jack R. Heesch

Introduction

The purpose of this paper is to attempt to succinctly summarize the purpose, role, uses, and changes which the local socioeconomic studies have either served or experienced since the inception of the Socioeconomic Studies Program (SESP). The paper will not give the specific findings of the socioeconomic studies which have been conducted over the past six years, although some details may be provided for purposes of clarifying identified trends of findings which have influenced policy direction.

The local socioeconomic study has focused on existing and future demographic and economic conditions. Particular items of interest have included composition and seasonality of employment/unemployment, skill and income levels, sector characteristics of the local economy, and composition and trends of the population. The socioeconomic study also has included an analysis of land use patterns, the composition of housing, land status including current development constraints, land availability, and community facilities and services.

Until the most recent granting of socioeconomic studies contracts in the spring of 1982, socioeconomic studies have tended to focus on the regional center, or sub-regional center(s), most likely to be directly impacted by the activities associated with OCS (Outer Continental Shelf) oil and gas exploration, development, and production. Given the unique isolation of the vast majority of Alaska's coastal communities, coupled with the notion that industry would, for practical reasons, choose to locate its operations relatively close to, or in, communities with existing infrastructure which could be utilized by industry, the major regional centers and, in some cases, sub-regional centers, have been selected for study.

Occasionally, communities which did not have these characteristics, but which were considered as possibly vulnerable, were studied. This is particularly true in the case of the joint Federal/State Beaufort Sea sale (sale BF) where the communities of Wainwright, Nuiqsut, and Kaktovik were studied, although none are considered regional or sub-regional centers, and were probably also never considered likely candidates by industry.

The political organization of the sale area/study region often dictated the scope of the socioeconomic study. Most of the regional and sub-regional centers throughout the state are incorporated communities, i.e., first or second class cities, or home rule municipalities. In some cases, the study region also encompasses an organized borough government. In those cases, the socioeconomic study has examined the fiscal effects of the proposed action on that governmental entity.

Socioeconomic studies have provided input into six environmental impact statements, either draft or final, to date (i.e., sales BF, 55, 46, 60, 57 and 70). The use of the study results in the statements has been varied, although utilized to some degree in each.

The likelihood of OCS-related impacts generally defines the degree of discussion of the subject community. The more likely impacts are, the greater the degree of discussion in the impact statement. These discussions generally included a synopsis of the baseline conditions identified in the study, the forecast of the non-OCS, or base, case and a discussion of the potential impacts.

Methods

The local socioeconomic study process has been generally organized to include a description and analysis of the baseline, or existing, conditions of the subject community. This description includes a historical analysis which provides a context for understanding the current conditions and also provides a basis for determining continuing trends.

The next phase entails the development of a detailed set of assumptions, methodologies and standards to be used in projecting and evaluating future changes in the various socioeconomic systems. These are developed for the non-OCS case, and, where different, the OCS impacts case.

Finally, the forecasting and analysis is conducted by applying the developed assumptions, methodologies and assumptions, in combination with the anticipated development scenarios. These impacts cases are comparative to the non-OCS case and generally focus only on those areas where negative effects are likely.

In conducting the studies, researchers have been directed to identify, locate, and obtain data and other information on the relationship between OCS development in the proposed sale area and socioeconomic characteristics of the subject community. The purpose has been to establish an understanding of current and future socioeconomic conditions and the experiences, attitudes, plans, and actions of the subject communities. Specifically, the studies have focused on the following:

1. Population composition consisting of historical trends (within a realistic time frame), current populations and population growth prospects at the community level. Where annexations or other unique changes in populations occur, these have been noted and explained to the extent possible. Also, where possible, characteristics of the population including age by cohorts and sex, racial composition, migration trends (where identifiable), education levels, and family size and composition have been included.
2. The economy, including composition of employment, unemployment, seasonality of employment, recent trends and changes in the economy, occupational skills, income levels and a brief sector analysis of the current influences of oil and gas, government, the fishing industry, tourism, and the Alaska Native Claims Settlement Act (ANCSA).
3. General land use patterns and existing or proposed land use and CZM (Coastal Zone Management) plans.
4. The composition of housing, including housing supply and the number of homes, trailers, or apartments. To the extent possible, information on the condition and use of housing, particularly vacancy characteristics, together with the demand for housing and its effect on infrastructure should also be sought.
5. Development constraints including topography, land availability, and land status with particular focus on the consequences of state and federal land selections under ANCSA.
6. Community facilities and services with particular focus on the present use and capacity of these subsystems to respond to changes. These facilities and services include:
   A. Public Safety
   B. Health and social services
   C. Education
   D. Recreation and tourism
   E. Utilities including:
      1. Water
      2. Sewerage collection and disposal
      3. Electric power
      4. Solid waste disposal
      5. Communications
7. Fiscal characteristics including capital improvements and annual revenue expenditures.

Based upon this research and analysis, and taking into account the developed methodologies, standards, and assumptions, the future conditions of the socioeconomic systems in the absence of OCS activity is projected and analyzed. This analysis of change has included the documentation of the significant factors affecting change and the reasons why change occurs.

Impacts Analysis

For each petroleum development scenario for the sale area, the various socioeconomic systems of the subject community are projected and analyzed. These projections and analyses of conditions with OCS are developed using the assumptions and methods previously developed. Significant factors affecting change are documented and reasons why changes may occur are cited. The potential impacts on the subject community's various socioeconomic systems resulting from each petroleum development scenario are identified and described in detail. The sequence of events forecasted for each of the scenarios is compared with existing conditions as well as conditions expected to result without the planned lease sale. These analyses included an assessment of the probable direct and indirect causes and effects of both beneficial and adverse impacts arising from potential OCS development.

Geographic Study Areas

Local socioeconomic studies have been conducted for the Joint Federal/State Beaufort Sea (sale BF), Eastern Gulf of Alaska (sale 55), Western Gulf of Alaska-Kodiak (sale 46), Lower Cook Inlet-Shelikof Straits (sale 60), Norton Sound (sale 57), and St. George Basin (sale 70). Communities which have been studied include: Barrow, Wainwright, Kaktovik, and Nuiqsut in addition to the North Slope Borough (sale BF); Yakutat and Cordova (sale 55); Seward and Kodiak (sale 46); Homer, Kenai/Nikiski, Soldotna and the Kenai Peninsula Borough in general (sale 60); St. Paul, Cold Bay, and Unalaska/Dutch Harbor (sale 70). Baselines have also been conducted for both Bethel and Dillingham.

Findings

Overall, the effects of OCS oil and gas development on the local socioeconomic systems have been generally quite limited. The possible exception is Nome, in the Norton Basin (sale 57).

Local socioeconomic effects have been tied to increased population growth within the study community and the community's ability to absorb that growth. In general, population growth has not been great and, for the most part, with the exception of Nome, this growth has not been beyond the capacity of the community to absorb. Indeed, the residents of the communities may have different opinions, but the study results have almost uniformly indicated that the rate of population growth in the communities has not been greatly accelerated.

This slightly accelerated growth is a result of essentially three causes. The first is direct OCS employment resulting in in-migration to the community. Second is in-migration related to secondary employment as the result of resident direct OCS employment and the increased economic activity associated with OCS development. Finally, and to a much lesser degree, job seeking in-migrants to the subject community from the surrounding region did somewhat contribute to the accelerated growth pattern. In most every case studied, the base case, or non-OCS forecast, has had a higher population growth rate and concurrent socioeconomic systems demands, than has the OCS case forecast.

Specific impacts have been more or less limited to several areas of concern. These have included: land use and land use planning; housing and related utilities; public protection, including police and fire; and local government revenues and expenditures.

Many of Alaska's coastal communities have limited useable land for expansion. Most of the land within the jurisdiction of the local government is either being utilized, is unable to be developed, or would be too expensive to develop. Land beyond the jurisdiction of the local government, but nonetheless adjacent to the community are, in most cases, beyond the authority of any planning body. Growth in these areas is uncontrolled, although it obviously has direct impact on the adjacent subject community.

By and large, surplus housing does not exist in the Alaskan coastal communities which have been studied. In fact, much of the existing housing being currently utilized in these communities is considered substandard. Overcrowding exists in many of the communities.

Public services to these existing housing units is also problematic. While water services generally exist to almost all housing units, sewer service frequently does not. Frequently, the existing water and sewer systems are strained to capacity and have little room to accommodate additional growth.

Fire and police protection are often at minimal levels. In many cases, fire services are provided by a volunteer force. Often, fire fighting equipment is inadequate in that the units are either insufficient or outdated. These problems are compounded as the water systems are not capable of sustaining minimum flows for fire fighting severe blazes or fires in large structures. Also, fire fighting capability does not extend beyond the boundaries of the local community, leaving those populated areas just beyond the local jurisdiction without protection. Police protection is generally at minimal levels. In some cases, there is no local police protection and existing police services are provided by the Alaska State Troopers. Where local police services are provided within the local jurisdiction, the population just beyond that jurisdiction causes additional strain on the local services.

Increased pressures to provide services causes increased fiscal pressures on the local governments. While the expenditures of local government are assumed to remain constant on a per capita basis, revenues do not increase proportionately. While revenue sharing funds do increase on a per capita basis, the tax bases of the communities do not expand in that same ratio, leaving the community with a shortage of funds. Exceptions are the cases of organized boroughs which are able to take advantage of the increased tax base provided by industrial facilities.

The local socioeconomic studies, while being both important and useful, have been somewhat limited. While focusing on the socioeconomic aspects of the regional centers, i.e., the demographic characteristics, the economy, and the community's infrastructure, these studies have generally ignored the cultural aspects of the community and the relationship of the community to the balance of the region. Additionally, the sociocultural studies which have been regional in nature, have generally glossed over the socioeconomic characteristics of the region and have ignored any regional economic considerations.

The limitations of these studies have made it difficult to conduct any regional analyses in that we have not been able to determine the regional effect of impacts on the regional centers. There has been no way to determine the extent of any "rippling effect" regional center changes might produce. We have also been unable to determine what effects the increased economic activity within the region, related to OCS activity, might have. We have also been unable to predict the economic effects on a mixed subsistence/cash economy.

To begin to rectify these shortcomings, the local socioeconomic study has been expanded to a local/regional socioeconomic study, which has also incorporated many of the aspects of the sociocultural studies.

These latest series of studies have been expanded to include an examination of, at least, the following:

- Employment activities and interrelationships within the region. This shall include a detailed accounting of employment, self-employment, and/or non-wage income, governmental transfer programs, and other sources of income such as Native Corporation payments.

- Economic activities within the region including the production and transfer of goods and the provision of services requiring regional interaction.

- Relationships between (1) the need for cash to pay for subsistence participation fuel, electricity, and maintenance of housing and village facilities; (2) the availability and seasonality of wage labor employment or other cash sources; and (3) the scheduling of subsistence harvesting and ability to utilize subsistence resources given the need for cash in the village.

- Subsistence activities and patterns including an accounting of subsistence production by season, estimates of cash income to support the necessary technology, seasonality, forms of individual and/or household production and sharing of harvest products, interrelationships with commercial harvest and manufacturing pursuits, and other sources of subsistence resources.

- Social organization and integration dynamics unique and particular to the study region or where differences exist to subregions, including patterns of kinship, inter-marriage, factionalism, social relations in harvest and distribution of renewable resources, and participation in regional planning, regulatory, corporate and governmental activities.

Migration patterns of residents including temporary relocations, but within and beyond the region resulting from subsistence pursuits, employment opportunities, kinship, and any other reasons for such migration.

This approach is currently being utilized in two study regions: the North Slope Borough, related to sale 87, Diapir Field; and Norton Sound, related to sale 100, Norton Basin. While the results of this work are forthcoming, initial activities and findings are encouraging in that this approach will provide much needed information to the Alaska OCS Office.

Anchorage Impacts:
SESP Evaluation
Marsha Bennett

Introduction

As the transportation and distribution center of Alaska, Anchorage is Alaska's fastest growing and largest city. Although not the oldest settlement in Alaska, Anchorage's topography and other locational advantanges have encouraged a series of booms, beginning in 1914 when the original city took shape as a tent city for construction of the Alaska Railroad. With the buildup of the military and the Port of Anchorage in the 1940's and 1950's, and the discovery of oil in the 1960's, Anchorage became the regional headquarters of the oil industry and with it, the central hub of the growing oil economy. Banking, finance and insurance sectors of the economy have also prospered, as have Universities, professions and retail and wholesale trade. Along with this dynamic growth, boom town problems of alcohol and drug abuse, domestic violence, and violent crimes have encouraged growth in services and programs to combat these problems, but continue to give Anchorage a "frontier" image and ambience.

Housing and infrastructure growth have followed a boom pattern, with periods of shortage and scarcity followed by spurts of growth. These growth characteristics have given the city both a dynamic, energetic character and a somewhat patchy, haphazard urban design, as speculative, boom-dominated decisionmaking has often been substituted for a more rational planning process.

Recognizing the importance of Anchorage as the transportation and distribution hub and "oil capital" of Alaska, SESP has, from the outset, built in an Anchorage Impacts component to its systemic studies program. Starting with Technical Report 12, "Anchorage Socioeconomic and Physical Baseline", and Technical Report 13, "Beaufort Sea Impacts on Anchorage", the demographic, economic, physical, governmental and organizational structures of Anchorage have been described and updated, together with impact projections for the Beaufort, Gulf of Alaska, Lower Cook Inlet, and St. George Basin lease sale areas (Technical Report 13, 48 and 61 respectively).

Utilizing MAP (Man-in-the-Arctic Program) model projections, forecasts of likely growth under varying scenarios of OCS impacts have been projected and compared with non-OCS cases, with particular emphasis on potential growth in demand for educational, public safety, recreational, health and social services personnel and/or facilities, housing and utilities. These yearly updates have provided the Anchorage planning and business community with one set of benchmarks for school, housing, and other physical planning, particularly in light of the paucity of data and targeted or specialized nature of most Anchorage overviews. Within SESP, Anchorage baseline and impacts volumes have provided an urban contrast and a methodology for addressing OCS impacts within an urban context, which compliments impact assessments completed for coastal communities and regions of Alaska, particularly in the area of socioeconomic assessment.

Methods

Beginning with Technical Report 12, Anchorage baseline and yearly updates have been completed by the same firm, Policy Analysis, Inc., headed by Dr. Richard Ender of the University of Alaska, Anchorage. Utilizing University-sponsored survey data, Census and Department of Labor statistics and other State, Federal and Municipal data sources, Policy Analysts has described the demographic and

economic composition and growth patterns of Anchorage, portrayed changing attitudes toward growth and services, and documented government revenues and expenditures, health and social services, educational facilities and services, police and State Trooper services, fire protection, leisure and recreation patterns, land use, utilities and transportation in Anchorage. Where national standards for governmental services are available or appropriate, Anchorage services are compared. For the most part, however, Anchorage governmental structure and services, population and economy, are described and updated within the local context. For example, Technical Report 12 forecast the following general trends in 1978:

— Increasing diversity of service demands;
— Increasing extension of urban services to less populated areas of the Anchorage bowl;
— Increasing demand for major capital expenditures for facilities usually found in large urban centers; and
— Increasing incidence of public safety, social services, transportation, health and other service problems generally endemic to large urban areas.

A matrix of non-OCS and Mean OCS projected impacts on Anchorage infrastructure for the most part shows low to moderate growth with mildly stimulating economic effects (Technical Reports 48 and 61). See attached Tables 1, 2 and 3 from Technical Reports 13, 48 Volume II, and 61 for additional details.

Table 1: Non-OCS Case
Cumulative Ratio of Service Requirements to Populations

		1980 194,636	1985 234,393	1990 254,910	1995 283,070	2000 322,608
Education:	Primary/Secondary - Number of Manpower/Facilities	1,557	1,875	2,039	2,265	2,581
	Public Postsecondary - Number of Credits	63,011	85,790	101,324	122,290	147,106
Public Safety:	Police - Manpower		356	387	430	490
	State Troopers - Manpower	29	35	38	42	48
	Fire - Manpower	286	345	375	416	474
Leisure:	Play Lots	77	93	101	113	129
	Neighborhood Parks	19	23	25	28	32
	Softball Diamonds	65	78	84	94	107
	Basketball Courts	389	468	509	566	645
	Swimming Pools	19	23	25	28	32
	Skating Rinks	6	7	8	9	10
	Community Centers	8	9	10	11	12
Utilities:	Water - (Millions of Gallons per Day)	39.5	47.6	51.7	57.5	65.5
	Sewer - (Millions of Gallons per Day, Wastewater Generated)	31.5	38.0	41.3	45.9	52.3
	Electricity					
	Telephone					
	Solid Waste					
Housing:	Units	65,297	78,635	85,518	95,145	108,230
Health:	Bed Needs	376	453	493	547	624
	Primary Care Physicians	243	292	318	353	403
Social Services:	Day Care Space	2,919	3,515	3,823	4,246	4,839
	Unemployment Claimants	12,651	15,235	16,569	18,399	20,969
	Low Income Housing Units	3,017	3,633	3,951	4,396	5,000
Transportation						
Financial Capacity and Capital Requirements						

Source: Technical Report Number 13, Beaufort Sea Anchorage Impacts Analysis.

Table 2: Moderate Base Case - 5% Scenario
Cumulative Ratio of Service Requirements to Impact Projections

		1980 0	1985 457	1990 3,404	1995 4,735	2000 5,831
Education:	Primary/Secondary - Number of Manpower/Facilities		3	25	34	42
	Public Postsecondary - Number of Credits		173	1,377	2,051	2,729
Public Safety:	Police - Manpower		0.8	6.1	8.5	10.4
	State Troopers - Manpower		0.0	0.3	0.5	0.6
	Fire - Manpower		0.7	5.5	7.6	9.4
Leisure:	Play Lots		0	1	2	2
	Neighborhood Parks		0	0	0	1
	Softball Diamonds		0	1	2	2
	Basketball Courts		0	1	2	2
	Swimming Pools		0	0	0	0
	Skating Rinks		0	0	0	0
	Community Centers		0	0	0	0
Utilities:	Water - (Million Gallons Per Day)		0.1	0.5	0.7	0.9
	Sewer - (Million Gallons Per Day,		0.1	0.4	0.6	0.7
	Electricity - (Megawatts)		1.6	14.6	24.1	35.6
	Telephone		1.5	13.0	20.5	28.5
	Solid Waste - (Tons Per Day)		1.5	13.0	20.5	28.5
Housing:	Units		150	1,128	1,607	1,980
Health:	Bed Needs		1	7	10	12
	Primary Care Physicians		1	4	6	7
Social Services:	Day Care Space		8	61	85	105
	Unemployment Rates (cumulative)		8.2	7.2	7.6	7.7
	Low Income Housing Units		11	86	122	150
Transportation						
Financial Capacity and Capital Requirements						

Source: Technical Report Number 48, Volume 2, Gulf of Alaska and Lower Cook Inlet Anchorage Impact Analysis.

Table 3: Mean Scenario
Cumulative Ratio of Service Requirements to Mean Scenario Projections

		1980	1985	1990	1995	2000
		0	714	9,184	7,362	8,034
Education:	Primary/Secondary - Number of Teachers	0	.12	83	oo	72
	Number of Classrooms	0	9	62	50	53
	Postsecondary - Number of Credits	0	590	4,807	4,250	4,950
Public Safety:	Law Enforcement Manpower	0	3	19	15	1o
	Fire & Rescue Operations	0	1	12	10	11
	Paramedics	0	0	2	2	2
Leisure:	Play Lots	0	1	3	3	3
	Neighborhood Parks	0	0	1	1	0
	Softball Diamonds	0	1	3	2	3
	Basketball Courts	0	1	4	3	4
	Swimming Pools	0	0	1	0	1
	Skating Rinks	0	0	2	1	2
	Community Centers	0	0	1	0	1
Utilities:	Water - (Million Gallons Per Day)	0	0.2	1.4	1.2	1.3
	Sewer - (Million Gallons Per Day,	0	0.2	1.2	0.9	1.0
	Electricity					
	Telephone	0	663	4,409	3,533	3,856
	Solid Waste - (Tons Per Day)	0	3	823	18	21
Housing:	Units	0	503	3,418	2,747	3,010
Health:	Bed Needs	0	3	18	14	16
	Primary Care Physicians	0	2	11	10	10
Social Services:	Day Care Space	0	25	162	130	142
	Unemployment Rates (cumulative)	-	3.5	7.4	7.4	7.2
	Low Income Housing Units	0	36	249	199	219
Transportation						
Financial Capacity and Capital Requirements -						
General Government (1980 millions of dollors)		0	1.0	8.0	7.1	8.4
Education (1980 millions of dollars)		0	.9	o.8	5.9	6.8

Source: Technical Report Number 61, St. George Basin Anchorage Impacts Analysis.

Change of Approach

The current Anchorage baseline update and impact assessment for the Diapir Field, lease sale 87 area, is being conducted by Kevin Waring Associates, with a Draft Final Report due February 28, 1983. The updated baseline will be self-contained rather than an addendum to previous baseline documents, and an additional section of the report will deal with growth management capacity of the community of Anchorage for both public and private sectors. The methods, standards, and assumptions to be used will be similar to those used by Policy Analysts, Ltd., particularly in use and analysis of data and in applications of standards for measuring infrastructure impact. Additional effort will be addressed to qualitative thresholds of significant impact, and to institutional and financial capacity of the community to respond to growth demands (i.e., growth management).

Unanswered Questions

A sociocultural analysis of Anchorage as a social community, as an urban design, and as an organization of neighborhoods with distinct histories, sub-cultures and populations has never been undertaken under SESP auspices, nor, in fact, by any other funding source. Similarly, the growth of Native organizations and populations in response to the Alaska Native Claims Settlement Act has only minimally been covered in past Anchorage studies. Anchorage baseline updates and impact assessments also, for the most part, consider the Anchorage metropolitan area home. These workers and their families are little understood by social and economic analysts, in part because their residency is counted away from their place of work. School enrollments, housing demands, government service demands, and certain interrelated social characteristics which attend boom-town growth, and are associated with long working hours and regularized absence from families and children, are masked by our inability to identify and selectively study these workers and their families. Hopefully, future studies will address some, or all, of these issues.

Primary Social Field Research in Socioeconomic Monitoring

Steve McNabb

In this paper I plan to discuss some characteristics of strategies for the identification and diagnosis of socioeconomic events and impacts relevant to OCS monitoring. I am going to skirt the issue of OCS impacts per se in favor of a more discursive treatment of socioeconomic events in a larger perspective, not in order to avoid OCS issues for any special reason, but because the data I wish to describe pertain to far more general conditions; nonetheless these conditions, the data that reveal them, and the methods used for assessing them are directly relevant to OCS monitoring. Furthermore, I plan to use this discussion to make a 'pitch' for a certain kind of monitoring research, a form of research that is critical in the Alaskan case. I will begin with a general discussion of some basic and general characteristics of scientific measures of socioeconomic conditions and changes in those conditions; this dicussion will situate the perspective I will advocate in the larger scheme of things, so that the position I advocate later makes sense.

When I speak of basic characteristics of socioeconomic measures, I mean that there are basic "tests" which socioeconomic measures should pass in order to be considered worthwhile measures of the events or conditions to which they refer. And when I speak of socioeconomic measures, I am not referring to tools that may be used for forecasting or projecting likely future conditions based on past or current ones. Rather, I am speaking, rather loosely actually, of types, orders, or collections of social data that can be used to identify and diagnose socioeconomic events. Identification for my purposes refers to what anthropologists typically term "provenience": the what, where and when of a given condition. By diagnosis I do not intend a meaning any more technical than the empirical implications and portent of a condition.

Incidentally, I am using the term socioeconomic measure in lieu of what may seem the more appropriate "social indicator", because these measures I will discuss, especially as they are used to account for, assess, or otherwise identify various dimensions of empirical primary data, have not been validated at several points in time, as is the standard scientific requirement for social indicators, nor am I sure just what socioeconomic variables cluster around these measures; that is, I am not sure what range of conditions they may measure, and measure well, if at all. They are speculative indicators, or perhaps more properly, hypothetical and provisional indicators of broad socioeconomic conditions.

Be that as it may, there are several tests that any such socioeconomic measures should pass in order to count for good measures. Some of these are as follows:

These measures should have a formal as well as an empirical grounding in that they should reflect real conditions, and should thus be factual. They should match real conditions as they are measured and experienced along some standard dimension. By formal grounding, I am referring to the grounding in logic and a body of theory that lends itself to interpretation and understanding. For instance, increases or decreases in barometric pressure are meaningful to weather prediction because there is a body of climatological theory that links barometric pressure to real weather conditions; thus both empirical observations and a logical framework for interpretation are embodied in these data and the uses to which the data are put. Formal properties are those principles of structural, processual, logical, analogic and digital, and other properties and relations that represent a context within which empirical events can be explained and understood. For socioeconomic events, then, the empirical dimension refers to

actual observations, while the formal dimension refers to that larger interpretative framework within which empirical events are couched, contextualized, and explained. Thus employment and unemployment rates are empirical observations, but make no sense unless they can be integrated within a larger perspective relevant to economic theory. To return to the barometric pressure example, barometric pressure may be a systematic empirical event, but unless we know what increases or decreases in this pressure mean in the larger picture (i.e. within a theory of weather), there is little reason to measure it. The same is true of rates of employment and unemployment.

Especially relevant to OCS and related impacts and monitoring of these impacts is the power to distinguish on the part of socioeconomic measures. These measures should be sensitive enough to distinguish between generic types of events of which OCS or similar development events are only one type or one representative; between events or impacts that are clearly non-OCS or non-development in origin, and those that clearly are OCS or development in origin; and, ideally, should be able to distinguish between the underlying conditions under which these events are promoted, inhibited, or maintained, be they OCS related or not. This power to distinguish, naturally, takes on different forms in proportion to the administrative priorities of agencies charged with addressing different issues; in some cases, strategies need to distinguish between only natural and human interventions, between events of internal and external origin, and so on. In any case, the sensitivity of the measure for distinguishing between events is nearly always a critical element underlying the development of a monitoring strategy.

The measure should also be reliable and valid, or at least should strike a balance between the two properties. The two measures are not necessarily coterminous, and in fact seldom match. For instance, a highly valid model may encompass many facts and many variables, but may exhibit such a high margin number of air conditioning units, the number of cable TV hookups, or the number of 4 wheel drive vehicles in rural communities may well measure something reliably every time, and may distinguish between certain conditions quite well, but the something that is measured under given conditions may be trivial compared with the other elements that need to be measured.

The measure should also be reliable and valid, or at least should strike a balance between the two properties. The two measures are not necessarily coterminus, and in fact seldom match. For instance, a highly valid model may encompass many facts and many variables, but may exhibit such a high margin of error that projections based on the model are seldom on target; the model is valid, but unreliable. On the other hand, a model may be very reliable, in that comparable values and comparable assumptions produce comparable results every time, but may account for very little; such a model is reliable but not valid.

I feel I may have already strayed too far afield, for in fact I am not going to address all of these characteristics, those of reliability and validity, distinctiveness, non-triviality, and so on. But I do intend to address real and tangible concerns relevant to OCS and other monitoring, and so feel that at least a minimal overview of the key common denominators of good strategies should be addressed. There are other key denominators that should be mentioned before moving on, since the concern here is for strategies that are in fact tangible, realistic, useful, and sound. These are as follows:

Monitoring strategies must meet three other basic requirements if they are to be useful; they must be scientifically sound, administratively feasible, and financially economical. There are many other requirements that could be mentioned here, but these are primary and embrace, at least in part, most of the others.

In brief, the approach should be scientifically sound. It should be replicable, it should be grounded in formal as well as empirical principles, it should be valid, and it should be reliable. In addition, it should be administratively feasible; the approach should not be so arcane or intangible that it cannot be carried out by another monitoring team and evaluated using current standards. In fact, this requirement sounds much like another common requirement for scientific acceptance. Finally, the approach must be economical. Many potential scientific schemes for monitoring research are prohibitively expensive, and it is unlikely that many of these methods will be adopted for bureaucratic use. It is possible that some methods will be administratively feasible while uneconomical, while others will be infeasible but economical, although it is much more likely that the former rather than the latter will be more common. All of these concerns underlie the development and adoption of a monitoring strategy by a governmental entity.

This discussion leads directly to the position I wish to advocate, for it is clear that a government-

sponsored monitoring strategy, as has been the case with social indicators and other monitoring in the past, will necessarily need readily available, secondary, aggregate data from archival and agency sources. These data, because they are so readily available, provide the key to feasible and economical methods; but are they scientifically sound, and in the long run, even economic and feasible?

The pitch I want to make is as follows: primary, that is to say on-site, long term, intensive field research is a necessary and central component of monitoring work that should be done in any Alaskan situation; it is a form of research that is critical to any and all understandings of how local populations adapt to change, respond to stress, and accommodate to institutional transformation and shift. The necessary role of this primary research will be clearly stated and demonstrated in this paper; the relation of this sort of research to the secondary, aggregate data will be explained; and the final and crucial integration of the secondary, and the primary, personal, ethnographic data will be illustrated. But first I wish to speak to the secondary data we would otherwise prefer to use in monitoring research.

The first chart I will introduce is a time series of employment in the Kobuk region, ranging from January 1975 to December 1979, a five year time series of 60 observations (Figure 1). You will note that there is an employment peak in recorded, covered employment during the summer of 1976. In Figure 2, you will see that there is a complementary peak in unemployment during the same period, summer 1976. Similar employment and unemployment peaks occur elsewhere in the data record. This is a very curious observation, of course, that peaks in employment match peaks in unemployment. Many factors could account for this odd situation, including employment inmigration, recording lags in either the employment or unemployment time series, and many other reasons, including various recording artifacts or administrative changes that could have affected the time series. In this case, it is likely that the seasonal movement of people out of the search for employment during the winter, combined with other effects, produces the complementary peaks. Nonetheless, it is clear that time series with a large sample population, that should otherwise be considered valid and reliable data sets, are troublesome; the trend tendencies are counterintuitive, and we cannot really be sure what these data sets mean, how they were collected, and what erratic recording problems are hidden in them.

Perhaps we can look farther afield for socioeconomic data that can cast some light on current trends and conditions in the Kobuk area. The next chart (Figure 3) illustrates non-accidental violence as recorded by health officials in the Kobuk area; here we see a sharp drop after the third quarter of 1979 yet the Kotzebue area crime totals (which should not show a necessary correlation, but a presumed one with the health violence totals), shown in Figure 4, bear little if any relation with the previous figures. The health violence trend line accounts for over 50% of the variance in that distribution, whereas the crime trend accounts for less than 2%.

The Kotzebue youth and family services, social services case load is displayed in Figure 5; Kotzebue accounts for fully half of the population of this region. We see here a trend line that accounts for over 50% of the variance in the overall distribution. Yet, if we move less than 60 miles away to a nearby village, Selawik, we find the distribution displayed in Figure 6 for the same period, for the same social service cases. Although the trend may seem similar in terms of peaks and valleys, this trend line accounts for less than one half of one percent of the variance in the Selawik distribution. What this means is that, even though we may identify trends that seem consistent and cohesive in the major hub towns, such as Kotzebue, these same trends, that nonetheless account for half the regional population cannot account for the individual villages within the region. These large scale, major, large sample data do not seem to provide adequate data for any single community in the region to which they refer, except perhaps the major hub communities.

Let us now look at some empirical data for a small village of about 280 people within this larger Kobuk region. It is here that I will begin making my pitch for the primary, field-oriented research approach, and will begin it by displaying the sort of first-hand, empirical data that can be obtained at this level. Figure 7 displays a fishing record of a sample of seven families in Kiana during the summer of 1975. Fishing activities are charted against other community activities that may be political, ceremonial, or economical in type or origin; no assertion is made regarding the cause and effect of any activities or their consequences. That is, although various community activities are charted against lowered fishing levels, I do not intend this fact to state that the given activity caused lesser fishing levels, or that lesser fishing levels caused the given activity; they simply co-occurred. Examination of the first fishing record shows that a whole mosaic of community activities was carried on in conjunction with subsistence activities. Examination of Figure 8, however, shows a different story at the end of the summer. The

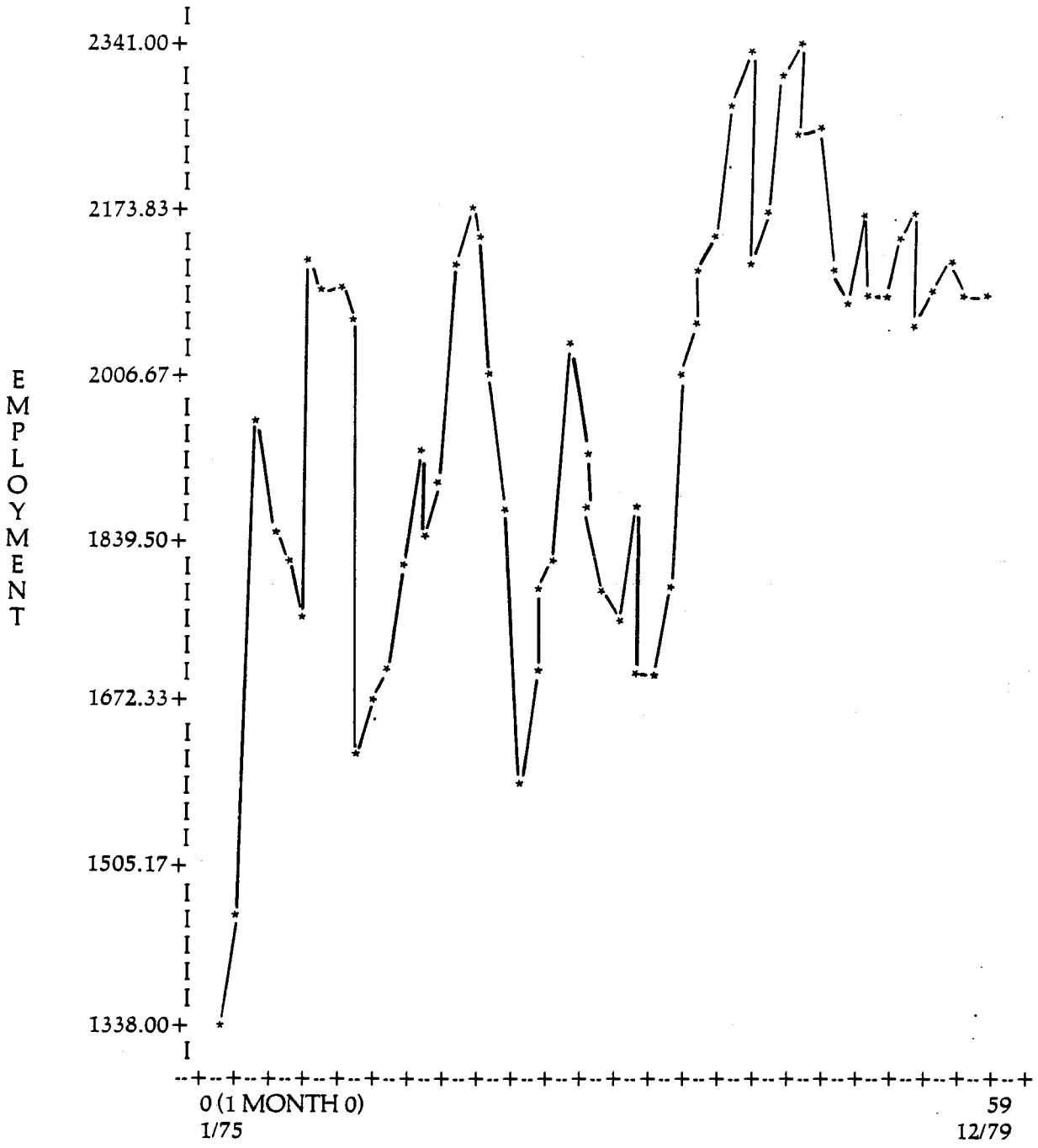

Figure 1. Kobuk Employment, 1975-79

Source: Alaska Department of Labor

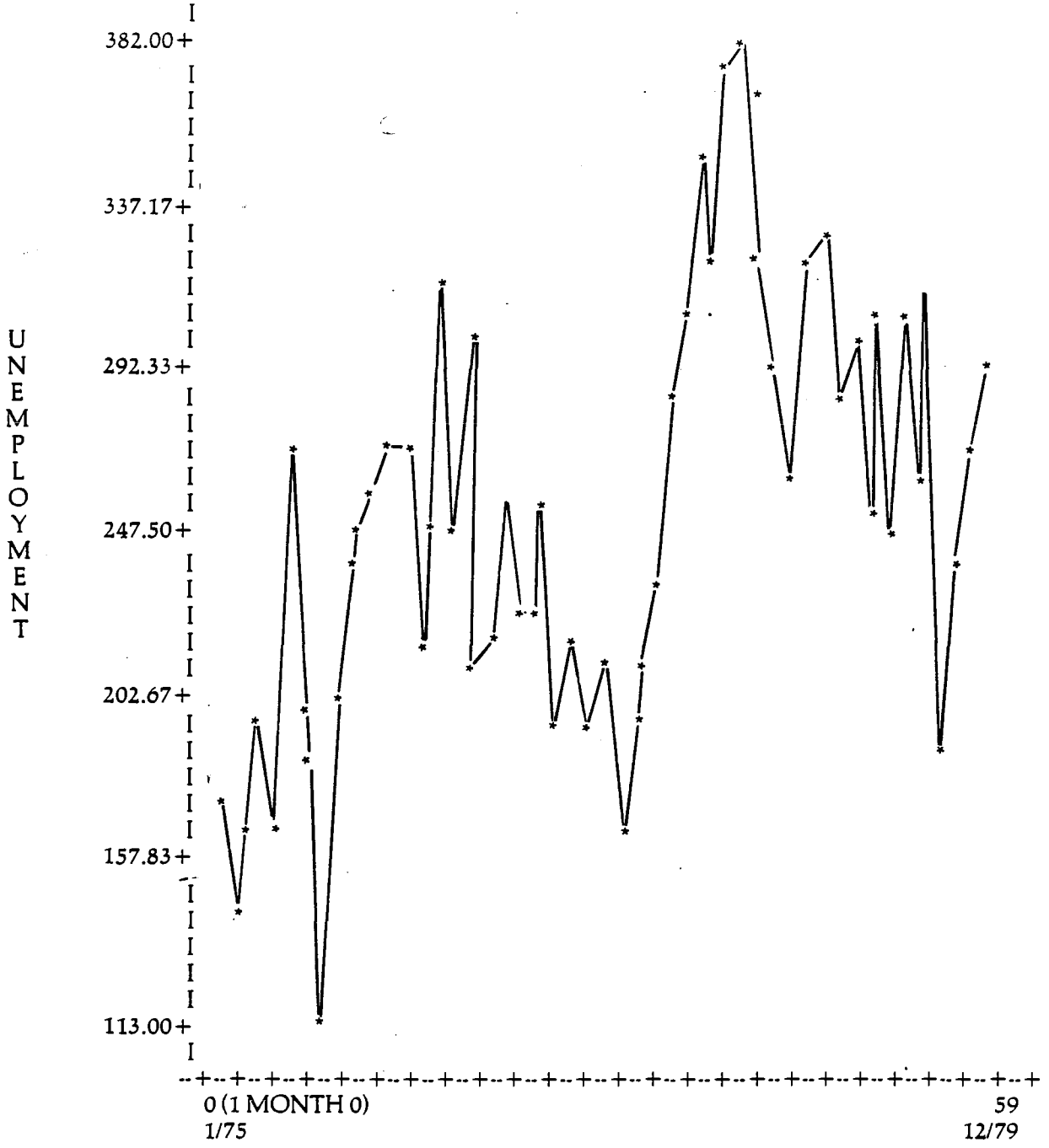

Figure 2. Kobuk Unemployment, 1975-79

Source: Alaska Department of Labor

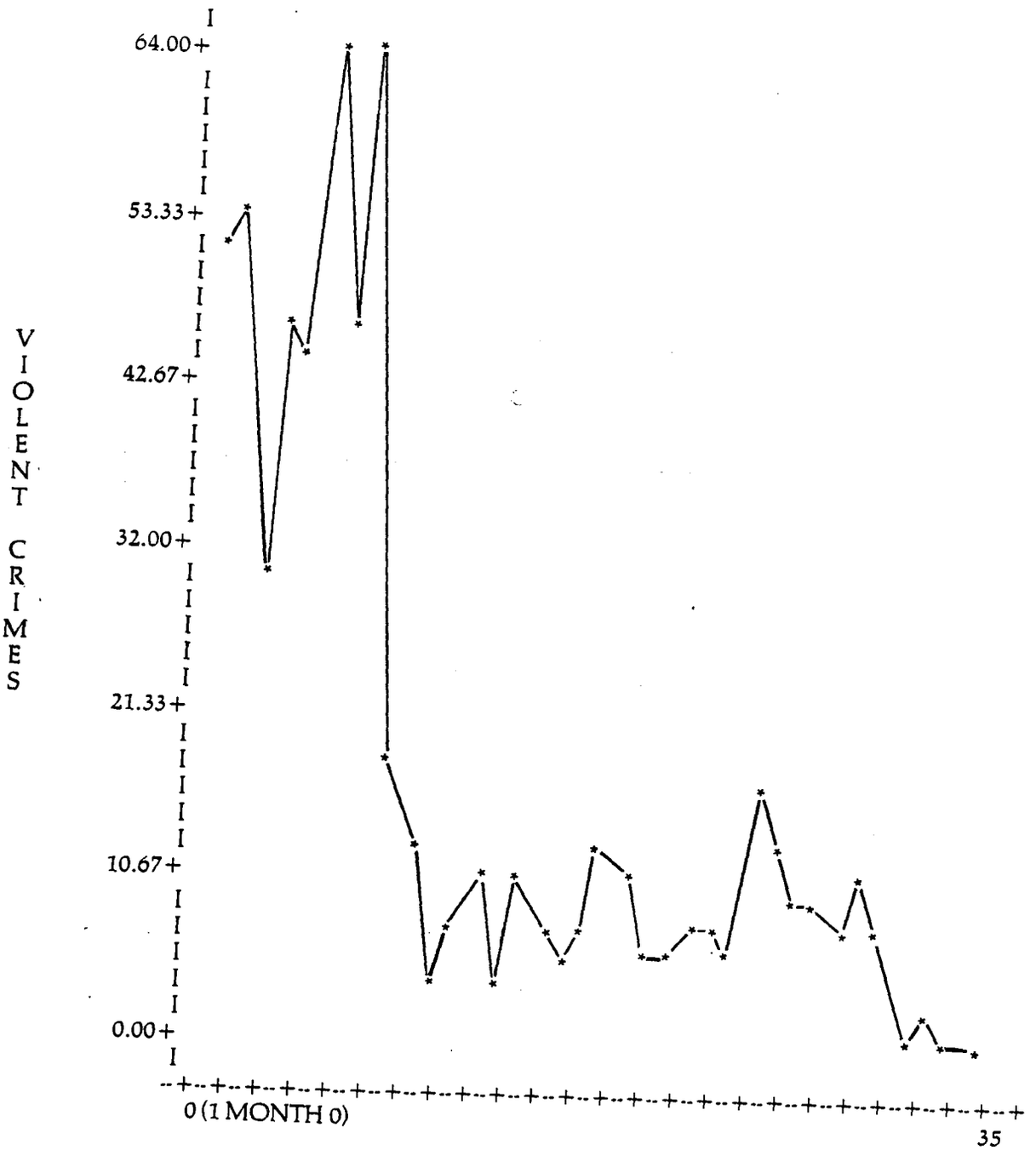

Figure 3. Non-Accidental Violence in Kobuk Area, 1979-80

Source: Indian Health Service and Patient Care Information System.

Note: Least squares trend line accounts for 52.38% variance.

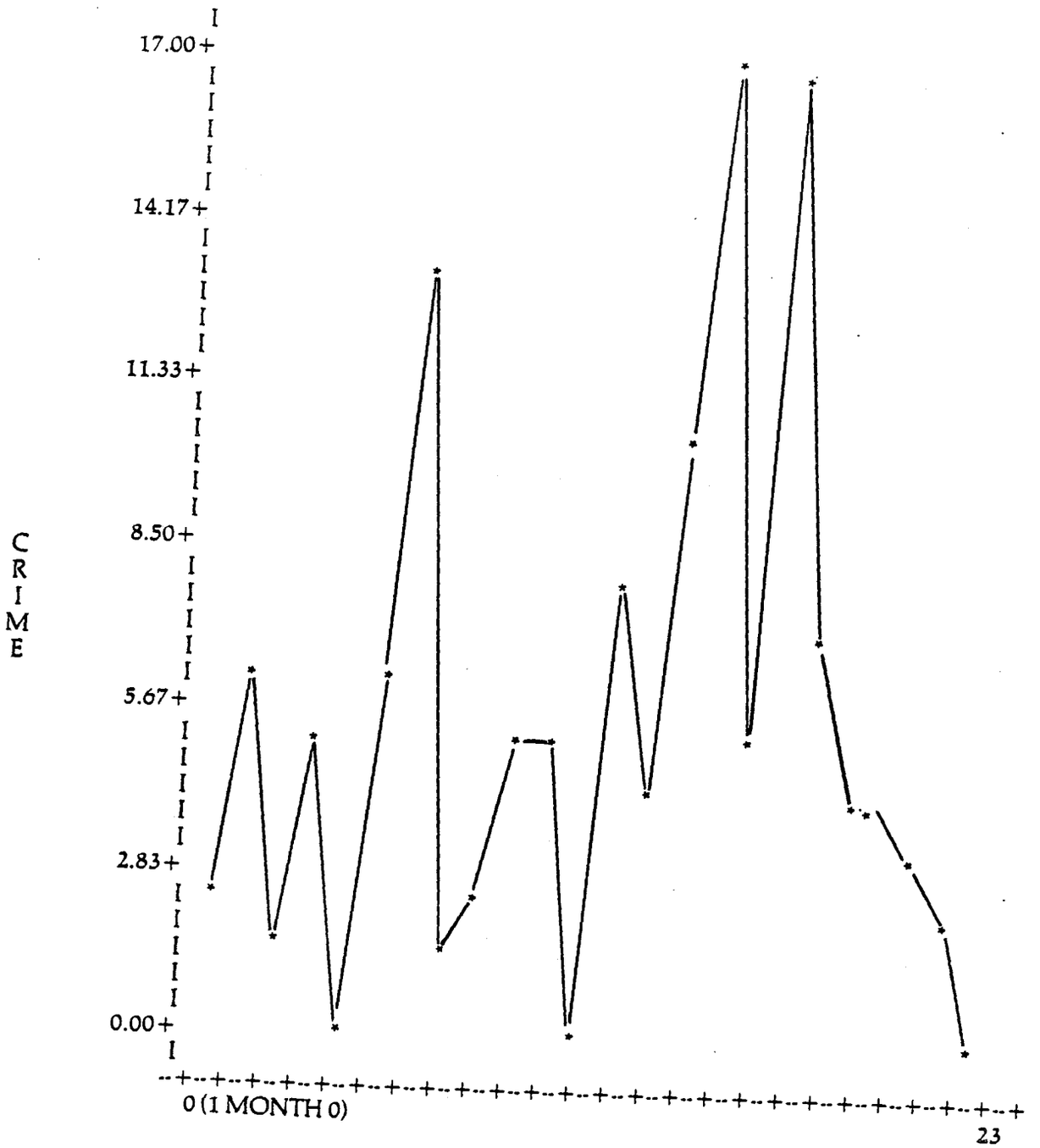

Figure 4. Health Violence in Kotzebue Area, 1979-80

Source: Department of Public Safety and Kotzebue Police Department.

Note: Least squares trend accounts for 1.3% variance 1980-1981 (24 months).

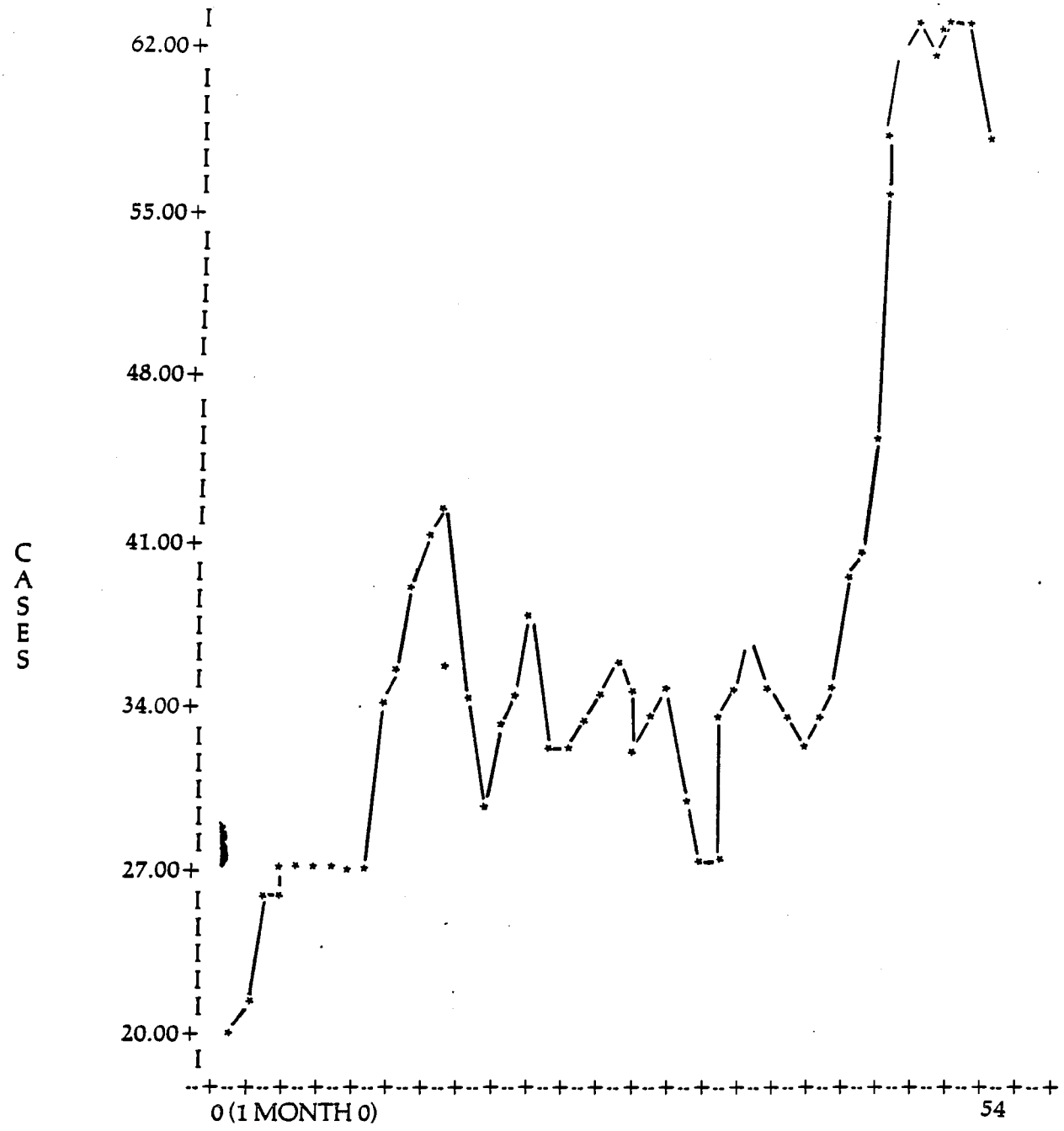

Figure 5. Kotzebue Youth and Family Service Case Load, 1977-81

Source: Division of Health and Social Services and Division of Family Services, Kotzebue 1977-1981 (55 months).

Note: Least squares trend line accounts for 53.52% variance.

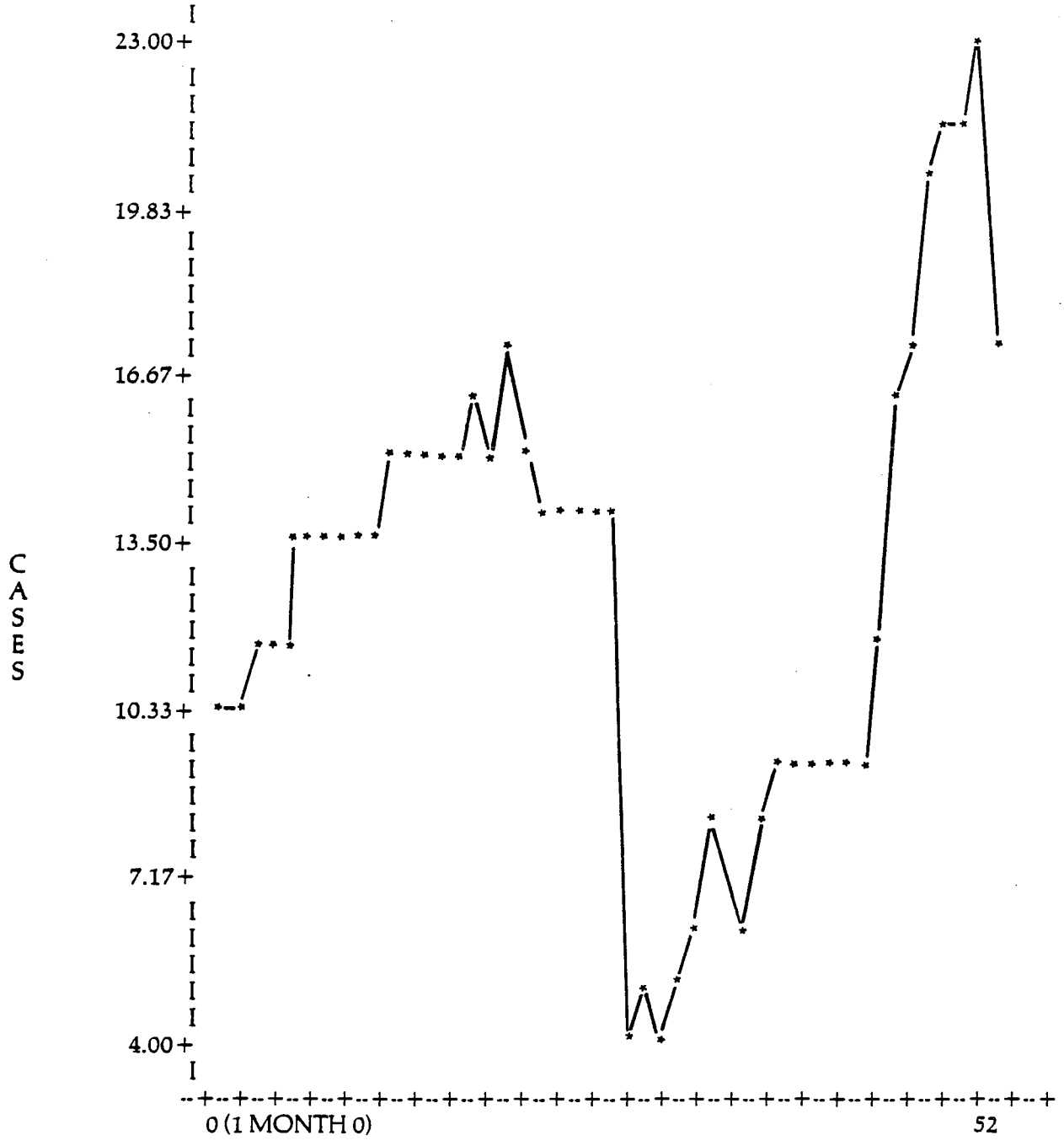

Figure 6. Selawik Youth and Family Services Case Load, 1977-81

Source: Division of Health and Social Services and Division of Youth and Family Services, Selawik.

Note: Least squares trend line accounts for 0.39% variance.

fishing record during this summer was poor by comparison, and by the end of the summer residents were leaving Kiana in order to secure jobs or other activities in Kotzebue, Fairbanks, and other locations. This is clearly apparent at the end of the fishing record. (Refer to Table 1 for an explanation of the community events that coincided with the given fishing results, shown in Figures 7 and 8.)

You will recall that the aggregate employment and unemployment data showed no such indication of any data ripple during this period that would substantiate such a primary data finding (i.e. that of a subsistence, and thus economic impact). Are there other aggregate data sources that would bear this primary, field-based observation out, or not?

The primary, field based record showed, if we can interpret it correctly, local uncertainty and agitation late in the summer. Let us examine other data, secondary aggregate data, to see if these findings are born out. Third quarter average wages in Kiana show a drop compared with other, previous years (Figure 9). This obvious and dramatic decline would seem to be good corroborative evidence of the economic impact demonstrated in the primary ethnographic data; third quarter wages are shown here, of course, because it is the third quarter that embraces the late-August impact indicated in the primary data. But average wages in a small rural community in Alaska can hardly be taken to be data with which generalizations can be developed; it is unlikely that more than two dozen residents were employed in this period, a very small number to say the least. Nonetheless, these data complement the primary findings while the larger sample of regional employment and unemployment data does not.

Table 1. Kiana Summer Calendars, 1975 and 1976

These calendars are keyed to the Kiana Fishing Record charts. The capital letters and vertical broken lines on the charts refer to other community activities and conditions that occurred during the summer fishing season. These other events are charted against the time line on the chart in order to show how all of these summer activities intersect and influence one another. The broken lines represent activities of longer duration.

1975

(A): rain, high water.
(B): barge arrives; people begin preparing nets and racks.
(C): many people leave to visit Noorvik 4th of July celebrations; 4th of July celebrations in Kiana.
(D): KOTZ radio reports first salmon in Kotzebue.
(E): 38 adults leave for fire-fighting (two crews).
(F): boating accident, lower Kobuk River.
(G): funeral in Noorvik; many Kiana families attend.
(H): BLM fire-fighting checks arrive; brief partying.
(I): another fire-fighting call; 38 adults (two crews) depart.
(J): heavy rain.
(K): berry-picking starts.
(L): BLM fire-fighting call for one more crew; 19 depart.

1976

(A): vacation Bible school parties.
(B): weather rainy, high water.
(C): planning begins for 4th of July festivities and Bicentennial celebration, hosted in Kiana this year.
(D): fourth of July, bicentennial festivities.
(E): BLM fire-fighting call for two crews (38 persons); PHS sewer work with local employment begins.
(F): Quarterly Friends Church Meetings begin in Kotzebue, Kiana participants depart.
(G): local frustration due to bad fishing harvest; some local people leave for Kotzebue and Fairbanks to look for jobs; sporadic drinking sprees erupt.
(H): complaints by residents about local bickering, feuds, and factions increase.

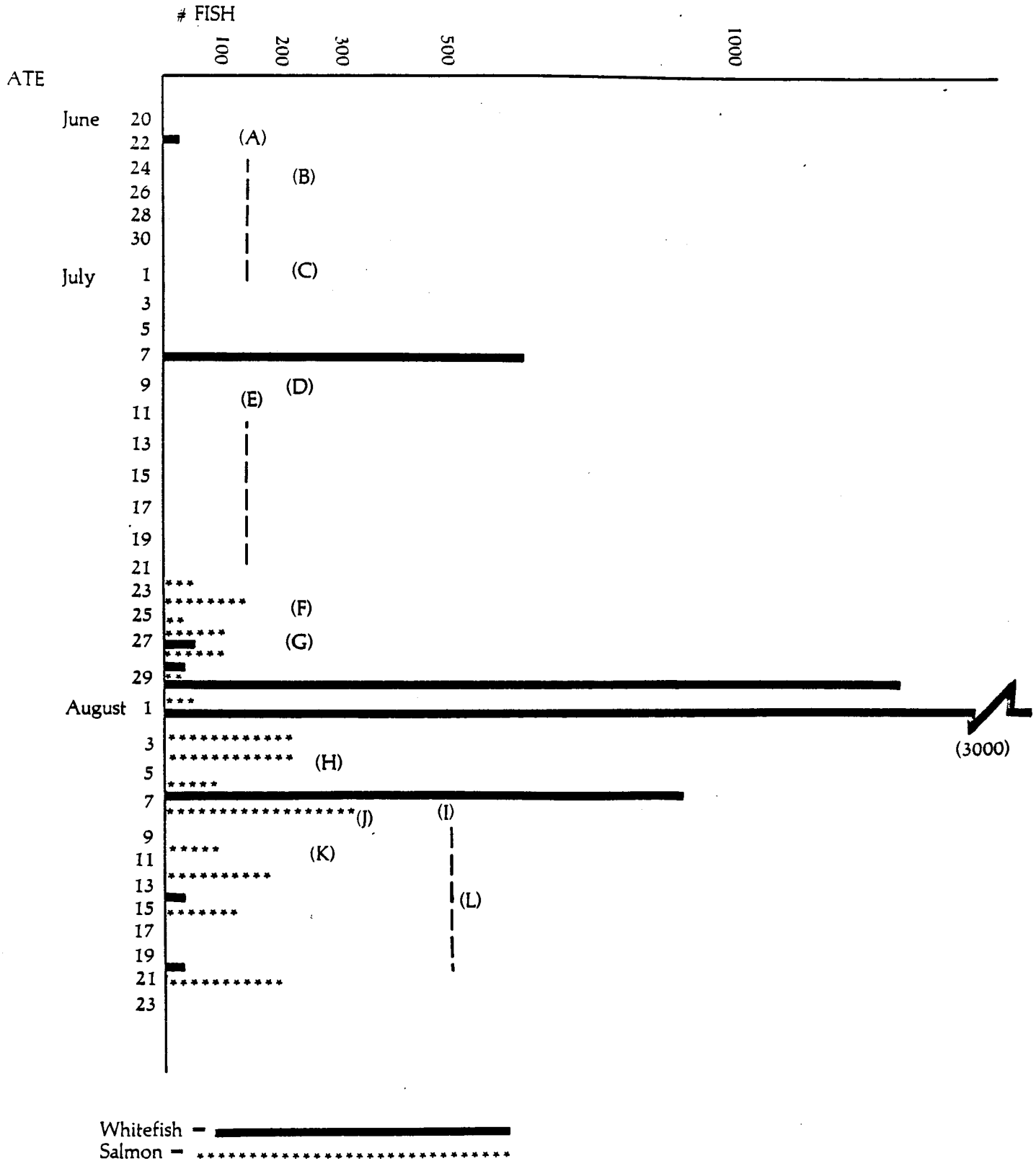

Figure 7. Kiana 1975 Fishing Record: Summer Seine and Set Nets

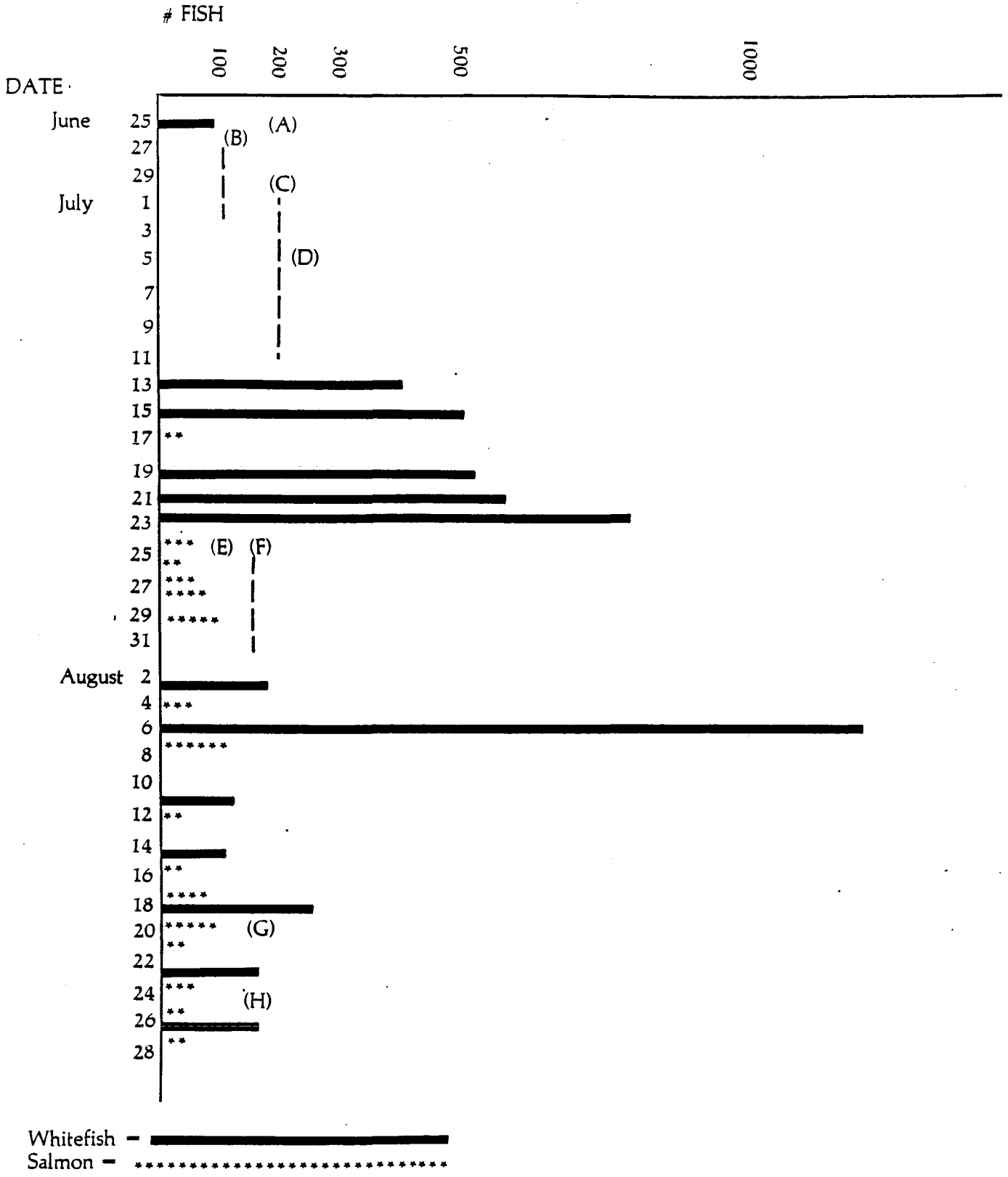

Figure 8. Kiana 1976 Fishing Record: Summer Seine and Set Nets

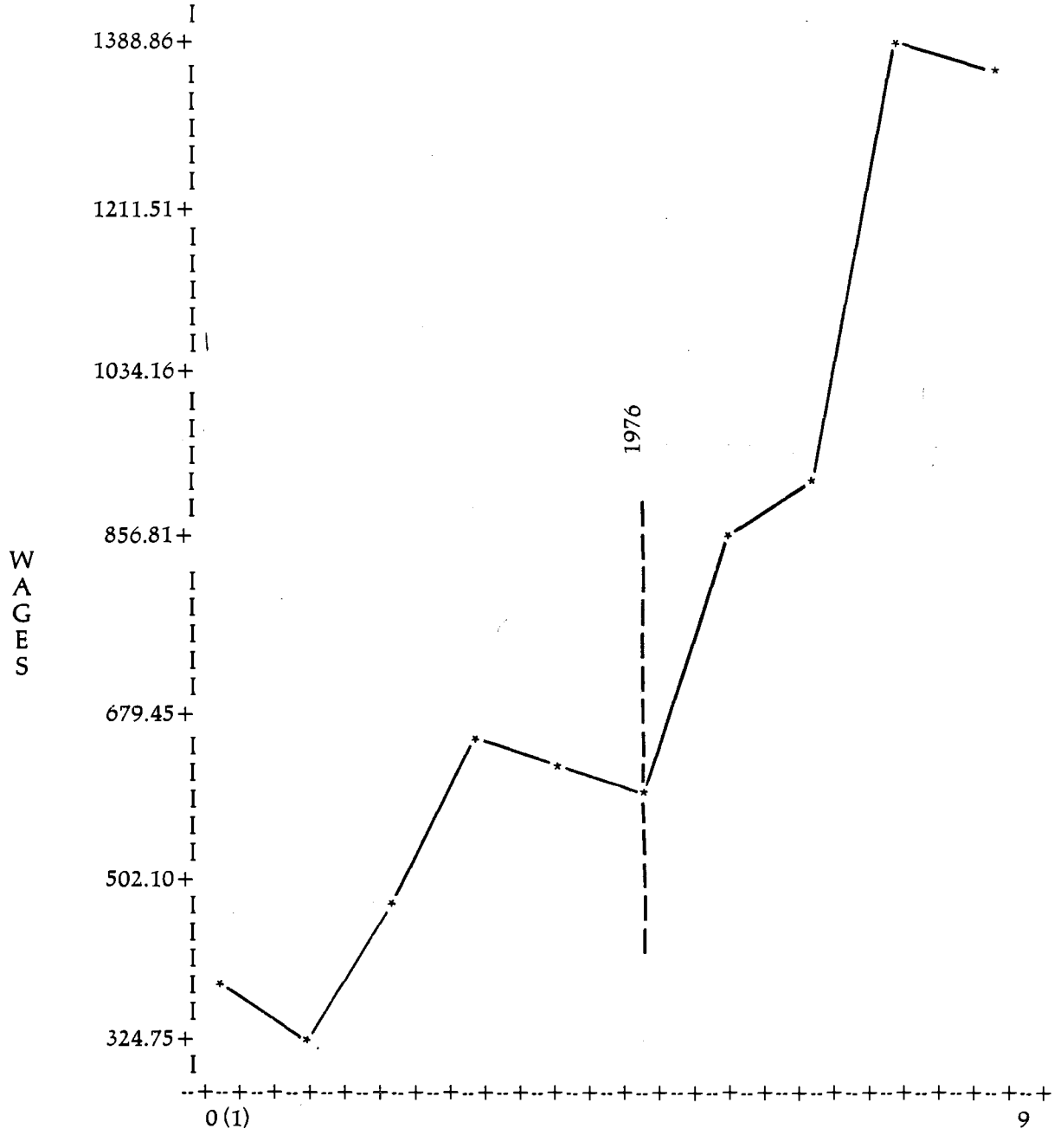

Figure 9. Mean quarterly wages, Kiana, 3rd Quarter, 1971-80

Source: Department of Labor.

Note: Least squares trend line accounts for 86.85% variance.

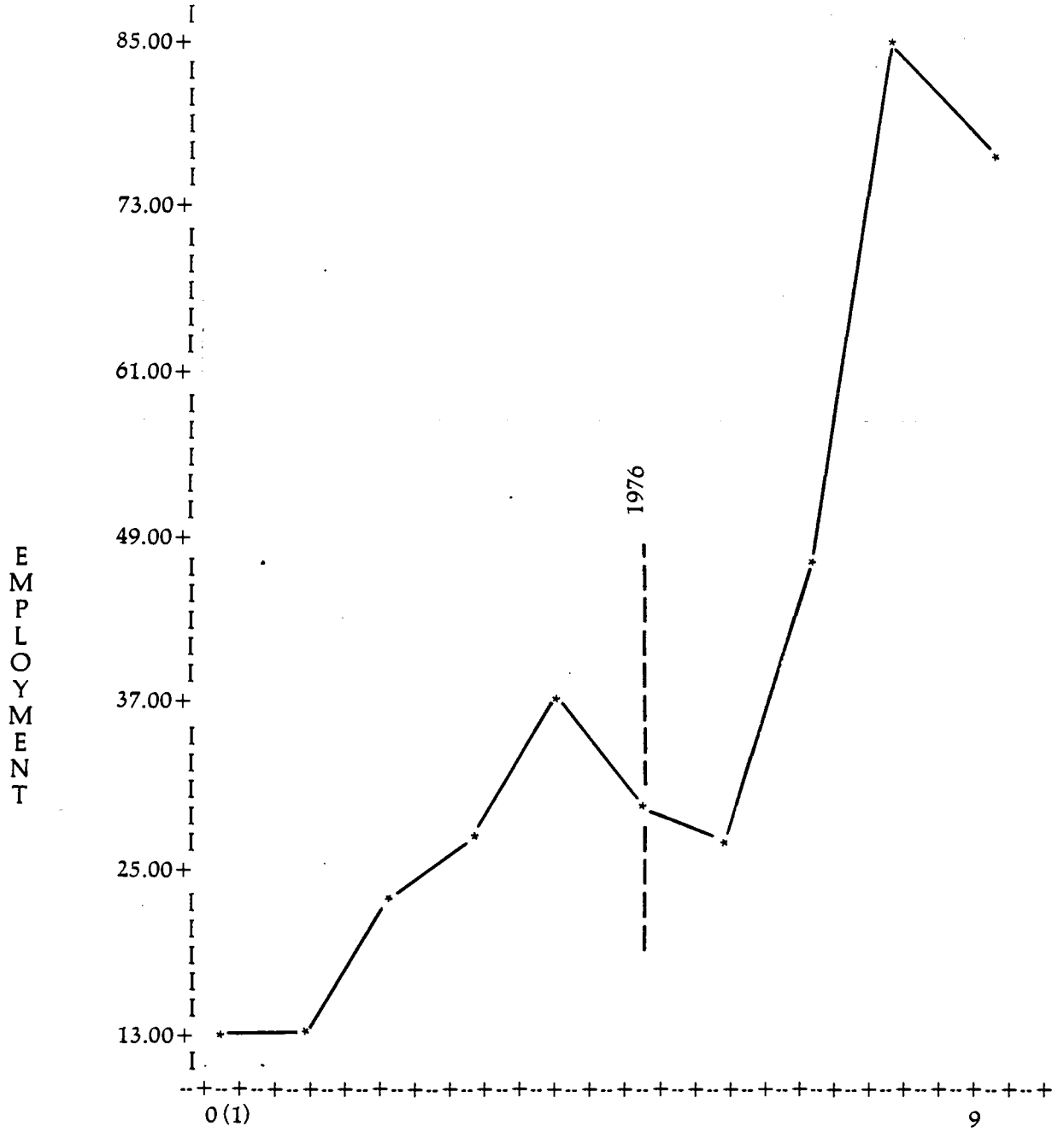

Figure 10. Kiana employment, September, 1971-80

Source: Department of Labor.

Note: Least squares trend line accounts for 76.3% variance.

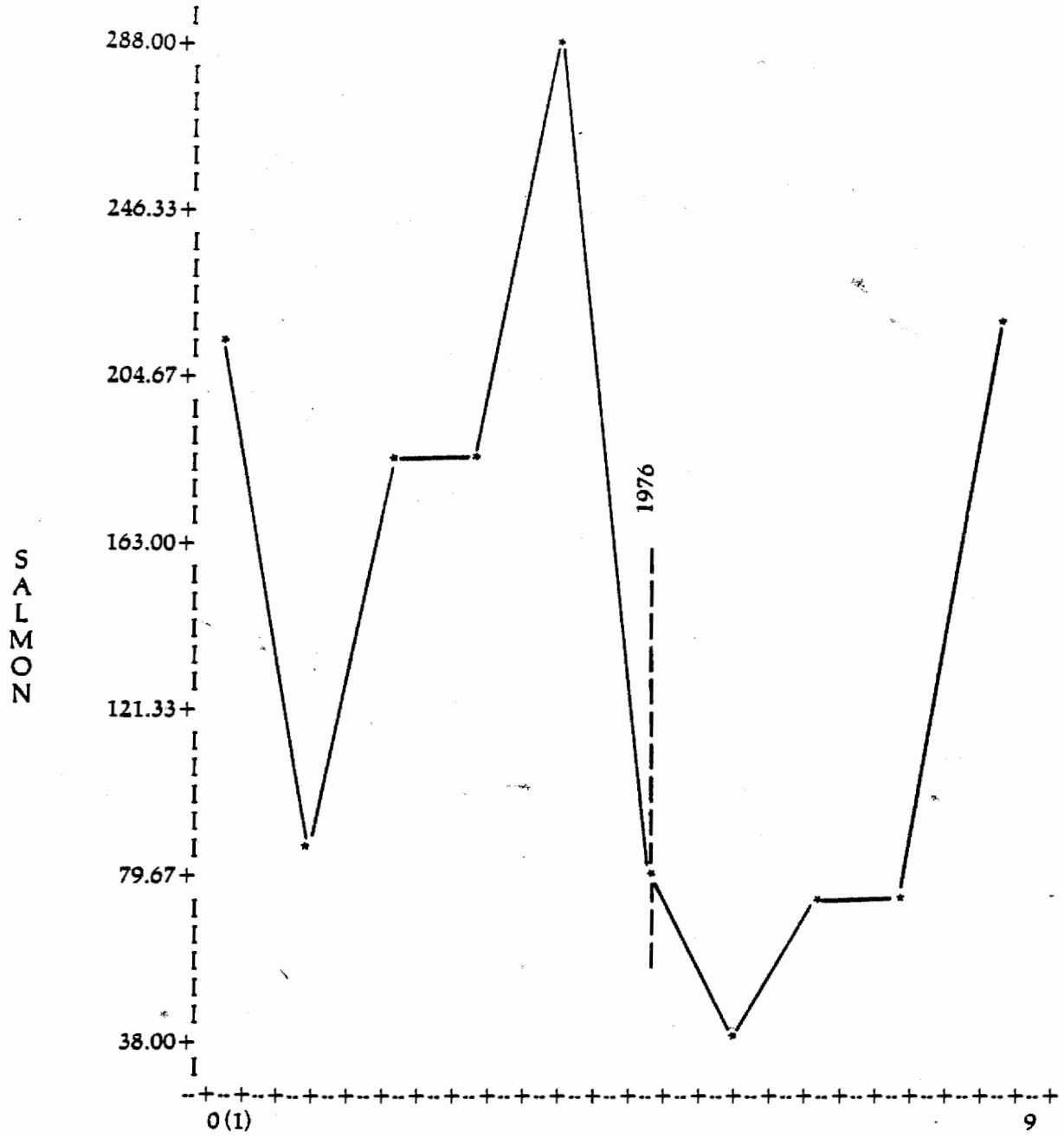

Figure 11. Kiana mean subsistence chum catch, 1971-80

Source: Department of Fish and Game.

Note: Least squares trend line accounts for 7.4% variance.

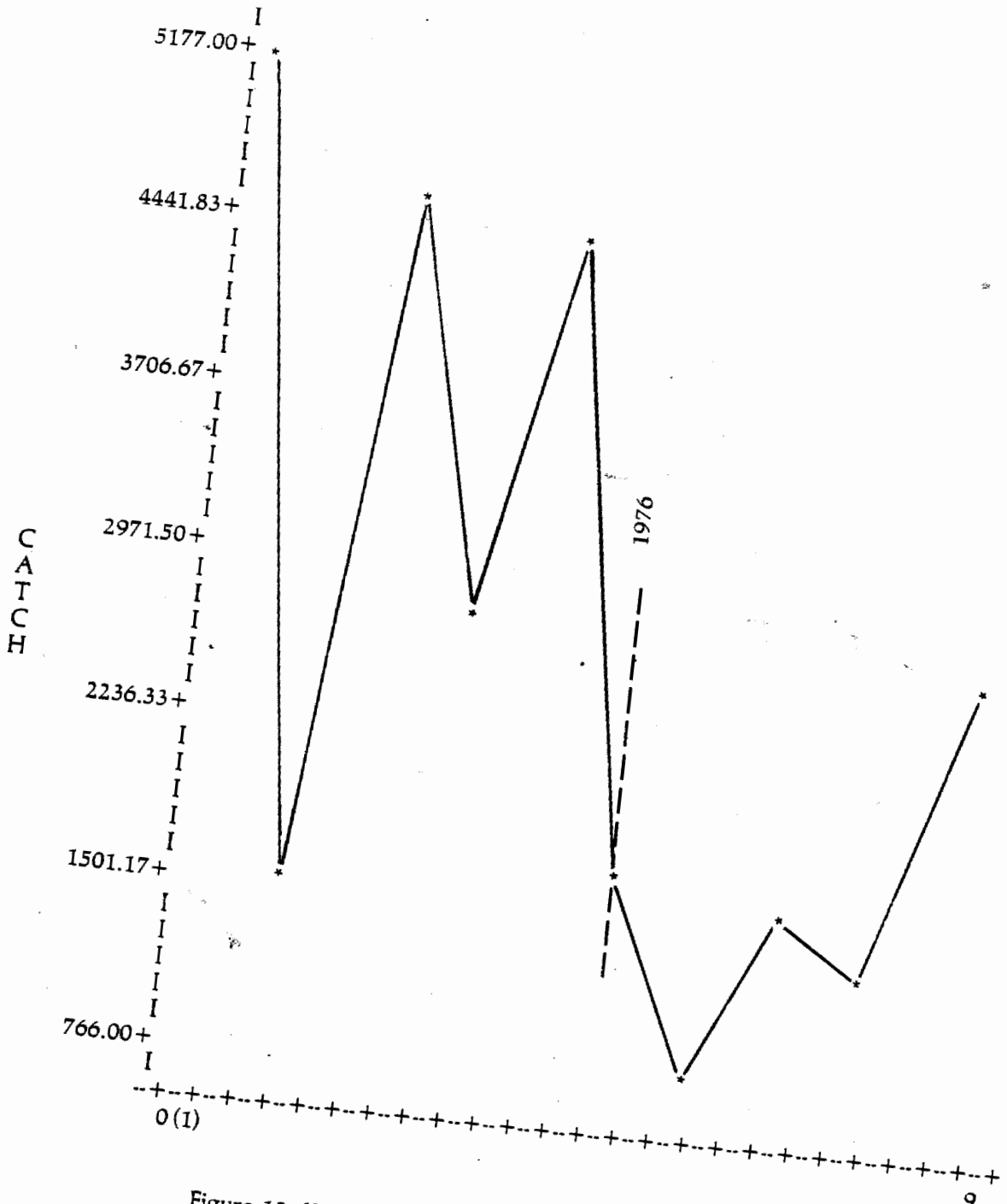

Figure 12. Kiana total subsistence chum catch, 1971-80

Source: Department of Fish and Game.

Note: Least squares trend line accounts for 32.4% variance.

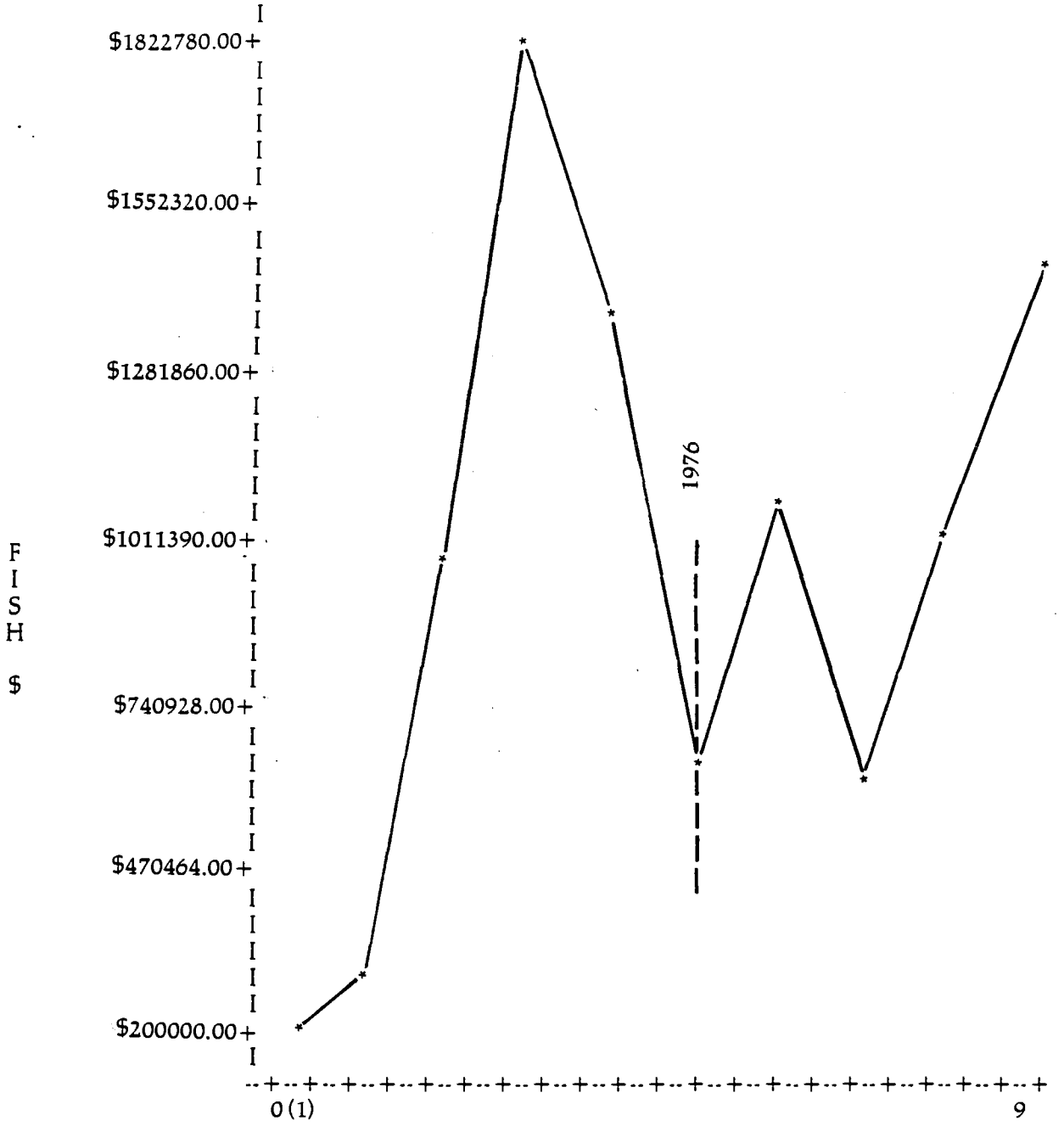

Figure 13. Total dollar value, commercial catch, chum salmon, 1971-80, Total NANA/Kobuk area.

Source: Limited Entry Commission.

Note: Least squares trend line accounts for 15.86% variance.

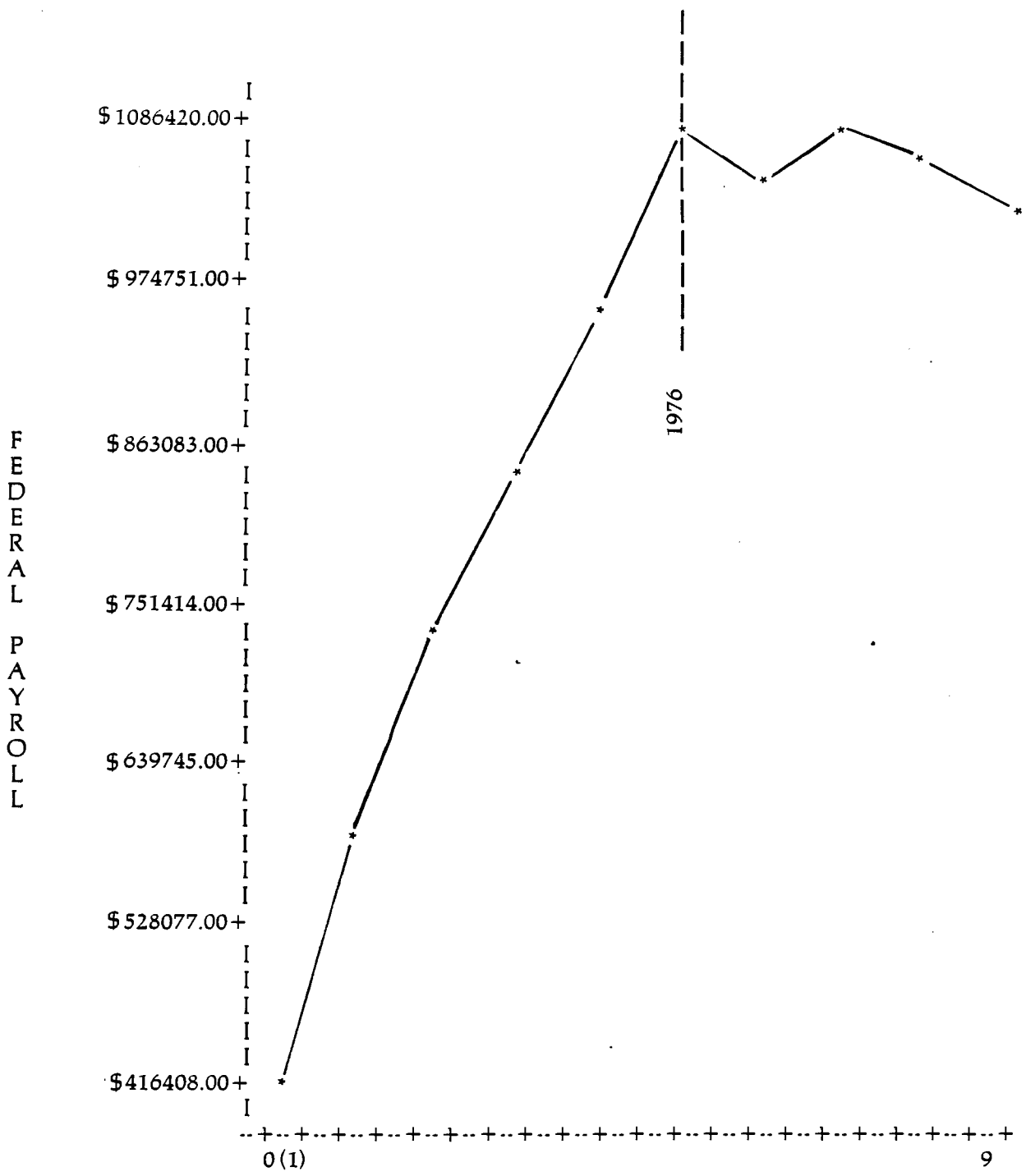

Figure 14. 3rd quarter Federal payroll, Kobuk region, 1971-80.

Source: Department of Labor.

Note: Least squares trend line accounts for 78.62% variance.

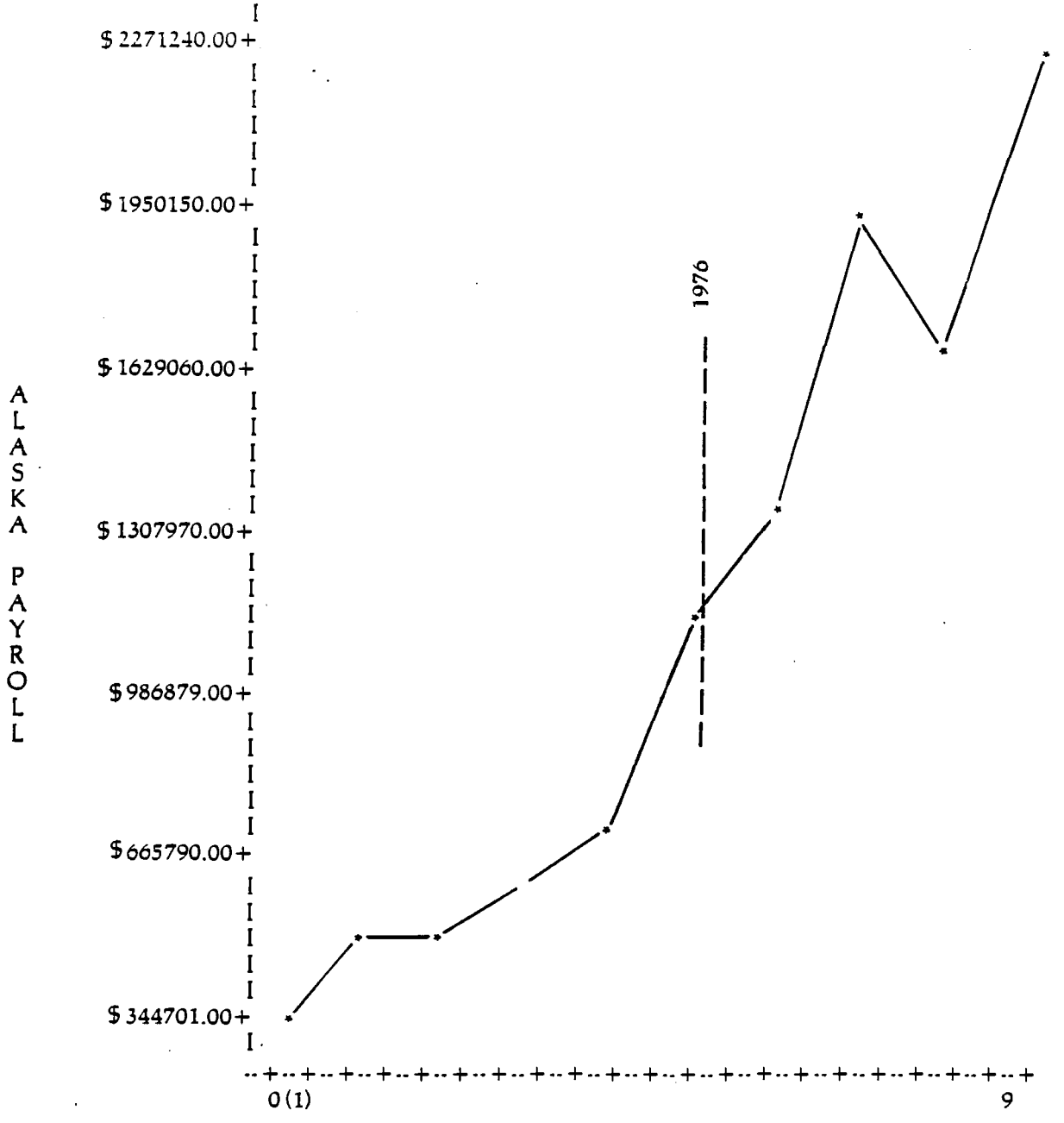

Figure 15. Kobuk region, State and local payroll, 3rd quarter, 1971-80.

Source: Department of Labor.

Note: Least squares trend line accounts for 91.05% variance.

Total employment in Kiana (Figure 10) also shows a conspicuous decline for 1976; although the same criticisms of the data (that is, a very small total N) can be leveled, it is clear that here too we find corroboration of the primary data observations that are not born out by the large sample, significant, statistically valid data sets.

Figure 11 shows Kiana mean subsistence salmon (chum) catch, 1971-80, and Figure 12 shows the total catch for the same period. These Figures clearly corroborate the primary findings, but nonetheless contain the same shortcomings of the other local, small sample data illustrated above; they represent far too few people to be representative of generalizations worthwhile for serious impact findings, at least insofar as these findings must be statistically valid. A paradox is beginning to take shape: the primary data that represent clear and unequivocal observational findings are only born out by secondary data that are statistically irrelevant, while the statistically relevant (i.e. large sample, regional aggregate data) data do not correlate with the phenomenological, ethnographic, longitudinal primary data. And now we can compare these data, again, with aggregate data for the entire Kobuk region. Looking at Figure 13, we see that the total dollar value of commercial catches of chum salmon reached a low in 1976. Here, in contrast to the region-wide aggregate data displayed earlier, we see that in fact some regional data do have a connection with localized, village-level conditions. Nonetheless, when we move on to Federal, State and local government payrolls for the entire region (which as a whole, accounts for about 80% of the regions economic activity), we see that these larger aggregate data account for no part of the localized impact or effect we have documented for Kiana, one of many small villages in the larger Kobuk region (See Figures 14 and 15).

What this means is, that by triangulation (the use of many data sources in many different connections) we can cast some real light on ongoing economic processes and certainly on economic distress, in isolated rural villages. This is the point of all the discussion above, and is certainly the point of this paper. Not only do we need secondary and aggregate sources of data in order to identify and diagnose real socioeconomic conditions in rural Alaska, but we need primary field research to give other, secondary, aggregate data research a direction, and in fact a meaning, in connection with monitoring and general research in rural Alaska. These secondary data we have discussed would exist in a vacuum, would be tangible but nonetheless meaningless, without the solid grounding that primary research provides. Let me reiterate the meaning of this paper.

The stronger, more substantial, aggregate data with a larger sample size, data less vulnerable to bias, can be compared to the primary data, but in fact this comparison yields nothing cohesive; the data are self-contradictory, do not complement one-another, and do not match. On the other hand, the primary data match the weaker, shorter time series point by point; they are consistent, complementary, and cohesive. Yet taken singly, or even in combination, these other data sets are not significant; the ripples and slumps in the trends are not great enough, are not representative of enough observations, to be convincing in a statistical sense. They remain little ripples in the data. Yet they are in fact consistent, and it is the systematic variations that match the primary data reported here. We are faced with a paradox; we can link up substantial primary data with strong aggregate data with which they do not correspond, or we can link up the primary data with weaker aggregate data that cannot be defended statistically.

In conclusion, I must first say that the connections I have posited between these data are the sheerest speculation; they are hypotheses. I do not have a way of securely and defensively associating the primary, personal data with the secondary data to which I have referred them. The aggregate data are, by themselves, vacant and uninformative, at least for the most part. I believe that the primary data provide the mechanism and the key for explaining many of the variations in the secondary data, and in turn, provide the major key, for explaining how communities and families respond to changes, accommodate to these changes, and in general make their way through life. The point of this paper is to show that primary data are in fact primary in the explanation of how people respond, and how these primary data can be used with, and in fact can explain, the meaning of the social indicators and larger aggregate data we use to assess and measure social responses.

Protecting Community and Family Networks and Cultural Values: An Indigenous View

Phil T. Penatac

Introduction: Koniag Masks and Hunting Songs

May we tell you a short Koniag Story: "A man once was unsuccessful as a hunter even though he observed the food tabus like other hunters so he made a general appeal for supernatural aid. In a dream one night he saw masks as if they were alive and heard songs sung by an unknown man. Thereafter the man sang the songs and became a great hunter. When others wished to know what his secret was, he taught them the songs and made the masks as he had seen them. And this was the beginning of these two things."

How abundant the wealth of knowledge lodged in this story! Physical acts of singing and making masks appear so easy and simple. Yet these physical acts illuminate the very wisdom which gave them birth. That deep understanding of life is gently carried from one generation to the next on the wings of the story.

There are many lessons in this tale. We choose to focus here on man's relationship to nature; we feel that such a story has great relevance for man's socio-economic condition.

Conventional SIA Approaches

The following detail the type of approaches that have typically been used in assessing social impact:

A. It has become customary for SIA's to be done by academically accepted professionals.

B. Although the field of SIA research is young, it is seen increasingly as an integral part of resource use decision making.

C. The mitigation of developmental socio-economic impacts, while maximizing resource development, is the primary focus of SIA studies.

D. SIA studies purport to utilize the most advanced social-scientific conceptual framework (theories) existing in the Western world.

E. Western theories and developer demands define what are to be considered "impact problems".

F. The method rationale may be summarized as: the performance of an objective social-scientific description and analysis of the social and economic cost and benefits of a development project. This information is for the use of development decision makers.

An Indigenous View

My perspective, as a native, lends itself to a different set of assumptions and approaches, as outlined below:

A. It has become a modern superstitious belief that SIA's be done by so-called professionals. These SIA's are authorized, either directly or indirectly, by transnational corporations as they operate through governments. For the SIA so-called professionals, the overwhelming seductive motivation is fees for services rendered, especially if this includes up-front money.

B. The majority of SIA writers do not live in rural Alaska where natural resource impacts are occur-

ring.

C. Their ingrown world-view is primitively limited. Thus, they talk endlessly among themselves congratulating each other for each new variant of their pet theories. Because their minds are so preoccupied with self-congratulation, when they do speak with people whose ancestors have lived with the land for millenia they do not hear.

D. The only natives they really listen to are the elite natives who have been thoroughly brain-washed to think exactly like they do. This assures the social scientists that they will not hear anything contrary to what they think. This communication control is great comfort to alien social scientists.

E. It's an *a priori* assumption that professionalism only exists for those educated and trained by the colonizers. People who know how to live in harmony with the land and whose ancestors did so for thousands of years are by colonized standards ignorant about man's relationship to the land.

F. SIA's are exercises in futility; they are low-priority addendas to development decisions.[1]

G. SIA's are written so as not to conflict with conventional theories of economic development.

H. It is by sheer luck not by contrivance, of course, that SIA's consistently discover that development benefits always outweigh costs. SIA writers understand completely the old slogan, "It's best not to bite the hand that feeds you".

I. The very fact that SIA's are separate from Environmental Impact Statements indicates the fragmented perception of the non-native world in which man is separated from the land. Their concept of community is a stunted version of reality consonant with their low stage of evolutionary development. The indigenous view of the world community had progressed much farther than this thousands of years ago. Following the view of our ancestors, we have learned to view the community as a comprehensive whole, whose members include: plants, animals, soil, air, water, cosmos, spirits and man. Consequently, each and every member of the community must be treated equally. Developmental studies must have as their goal the maximization of protection of the community, and minimization of man-made developments. Therefore, because of their limited concept of community, SIA's and symposiums such as these are a waste of time, talents, energies and money.

J. We should have symposiums that deal directly with natural resource developers with ample time for critique by the non-professional people who bear the social costs of their development decisions.

Conclusions

There will be a whole range of rationales given in opposition to our concept of community. We propose a new criteria for judging the impacts of development as follows:

A. That the concept of community be broadened.

B. That any man-made development rigidly adhere to a standard of equality for all members of the community.

C. That the human members of the community begin to see the gross limitations in the viewpoints expressed by the current non-native development decision makers and the elite so-called native leaders.

It should be instructive for modern social scientists that when the native hunter in the story was faced with dire human hungers, instead of changing the environment to meet his needs, he himself changed. The hunter depends upon supernatural aid for subsistence hunting. He relies on nature to provide him a livelihood. Technological exploitation of nature's resources doesn't seem to fit this native. He even experienced hunger, after "he observed the food tabus." Rather than transforming nature, this hunter calls on the spirits who tell him to change his act. The duty of man is not to change nature, but to adapt himself to nature. So the hunter taught the people how to make the masks and sing the songs and this is the beginning of these two things.

[1]—*See Nancy Yaw Davis, Alaska OCS Socioeconomic Studies Program: Historical Indicators of Native Alaska Culture Change, Technical Report Number 15 (Anchorage, Alaska: Bureau of Land Management and Alaska Outer Continental Shelf, 1978).*

Social Pollution:
Impact Mitigation and Compensation Schemes and the Indian Interest

Roger Justus and JoAnne Simonetta

Introduction

Recent studies have shown that natural resource and energy development on or near Indian reserve communities have not resulted in significant local Indian participation in project related opportunities. Moreover, such development has resulted in severe social, cultural, political, economic and ecological costs which the local Indian community must bear. This is particularly true in north-east Alberta for Indian communities closest to oil sands mining projects. The projected benefits and opportunities proved to be illusory or short-lived. The measures for enhancing local participation in project related benefits were uneven and unsuccessful from the communities' points of view.

This paper will briefly review predominant myths of resource development compared with actual experiences of Indian communities in the Athabasca Oil Sands area near Fort McMurray in north-east Alberta, Canada. It will focus particularly on the social impacts of measures to ensure significant Indian participation in project benefits. The history of mitigation and compensation intents, measures and outcomes will be examined as to the absence of real benefits accruing to the local Indian population and for the very significant and long-term social consequences of mitigation, management and compensation schemes themselves for local Indian community life.

It is the central thesis of this paper that any attempt to design a compensation or mitigation program in which the local and most directly affected Indian people have not designed the policies, programs, measures and mechanisms to identify and effectively deal with project related impacts will ultimately result in what we call "social pollution". "Social pollution" refers to the incremental deterioration of the social fabric of the community, Indian values, the Indian economy, organization and the overall ability of the community to manage itself which tend to occur when non-Indian strategies, measures and mechanisms for dealing with mega-projects and their impacts are imposed on them. Examples of this phenomena will be discussed in the light of preliminary findings of on-going impact research into the effectiveness and consequences of traditional mitigation and compensation schemes. Cures for "social pollution" in this context will be suggested.

Brief History Overview of Athabasca Oil Sands Development and Fort McKay

The Fort McKay settlement lies some 65 kilometers north of Fort McMurray, Alberta on the west bank of the Athabasca River. It is situated in the geometric centre of all existing and proposed oil sands development in north-eastern Alberta. Virtually the entire community consists of native people, either Treaty Indian, non-status Indian or Metis. The Indian economy of Fort McKay is a mixed economy which relies heavily on natural resource harvesting through the traditional activities of trapping, hunting, fishing and gathering supplemented by cash income from wage labor. In spite of major resource development in the area there is a strong reluctance by the people of Fort McKay to abandon the traditional resource harvesting activities for their social, cultural and economic values.

Prior to 1963 the community remained isolated from industrial development impacts. It was only with the approval of the Great Canadian Oil Sands (GCOS) mining project in 1963 that the hunting and trapping territories of the Fort McKay people were opened up to penetration and destruction. At that

time there were no public regulatory hearings, there was little knowledge or consideration of environmental consequences and no concern for socio-economic and community impacts for the local Indian communities.

The attempts to understand, respect and deal with Indian impacts and particularly the Indian economy were conspicuous by their absence in the case of GCOS. Participation enhancement measures were not considered as the predominant thinking during that period expected the employment, training, and contracting benefits to trickle down to the local populations including, of course, the Indians of the area. Research and hindsight has shown how disastrous this has been for the Fort McKay Indians. One of their prime camping areas for hunting, fishing, trapping and gathering has now become the site of the mine without compensation to the Fort McKay people. This part of their hunting and trapping territory was opened up to outsiders whose sport hunting penetrated far beyond the 7,500 acres of the mine lease itself into the heart of the McKay territory. Traplines were lost by expropriation, sometimes even without monetary compensation.

Impacts on the environment and human impacts for the Indian community of Fort McKay are seen by the people there as disastrous. On one hand, there has been serious environmental degradation, damages and loss to the Indian economy of the Fort McKay people. Additionally, in terms of employment and training, Indians were the last to be hired and the first to be fired. Jobs were short-term, intermitten labor jobs at the lowest skill and pay levels. A few individuals found employment but as a community the Fort McKay Indians and their interests were ignored.

While the people of Fort McKay were trying to cope with the impacts of the GCOS plant the Syncrude consortium project was approved in 1973. The Syncrude project was approximately ten times larger than the GCOS project and was even closer to the community. The competition for Fort McKay traditional lands and resources, the losses and damages to the Indian economy and the associated community impacts which began with GCOS were continued and accelerated by the Syncrude project.

By this time, public regulatory hearings were required under the Alberta Energy Resources Conservation Board; however, once again, measures to protect and enhance the Indian economy of the Fort McKay Indians were ignored. In fact, there was no attempt to identify project impacts on Indians or on Indian communities and at the time of approval there were no special compensation or mitigation plans for Indians in place. However, what is different in this project is that an attempt was made to enhance Indian participation through the Syncrude Agreement, signed after project approval by Syncrude, the Department of Indian Affairs and the Indian Association of Alberta (See Figure 1).

Following the beginning of Syncrude construction there was further exploration by most of the major multi-national and national oil companies, the development of pilot projects and another major project, the Alsands project, was given approval. The Alsands approval in 1979 followed a public hearing process in which Fort McKay intervened for the first time.

A report written by the authors in 1979 for the Cold Lake Band and the Department of Indian Affairs outlined the impacts of resource development on the community of Fort McKay. The following general conclusion was reached:

> Our findings lead us to conclude that there have been serious disruptions in the social fabric of the Indian communities in the Athabasca oil sands area which tend to be most severe for those communities closest to the plant facilities. The construction and operation of such facilities and the associated influx of "outsiders" seeking employment placed severe constraints on the ability of the Indian communities to prevent, change or even cope with the range and severity of impacts on their lands, resources and community life. The changes in the biophysical and human environments of these communities and their attendant costs have been significant, adverse and not fully understood.
>
> Overall, the Indian communities in the Athabasca tar sands regions have become or are destined to become the net losers in the resource development of the region. Attempts to identify, avoid, ameliorate or mitigate significant socio-economic and environmental impacts of these major resource developments have been, from the communities' points of view, uneven and unsuccessful. (p. 129).
>
> The main conclusion to be derived from the experience of the Athabasca Tribal Council communities. . . .is that in order to derive any lasting benefits from the proposed project the community must deal from a position of strength. A strong and dedicated leadership is required. Infrastructure, social services and related programs must be in place prior to any

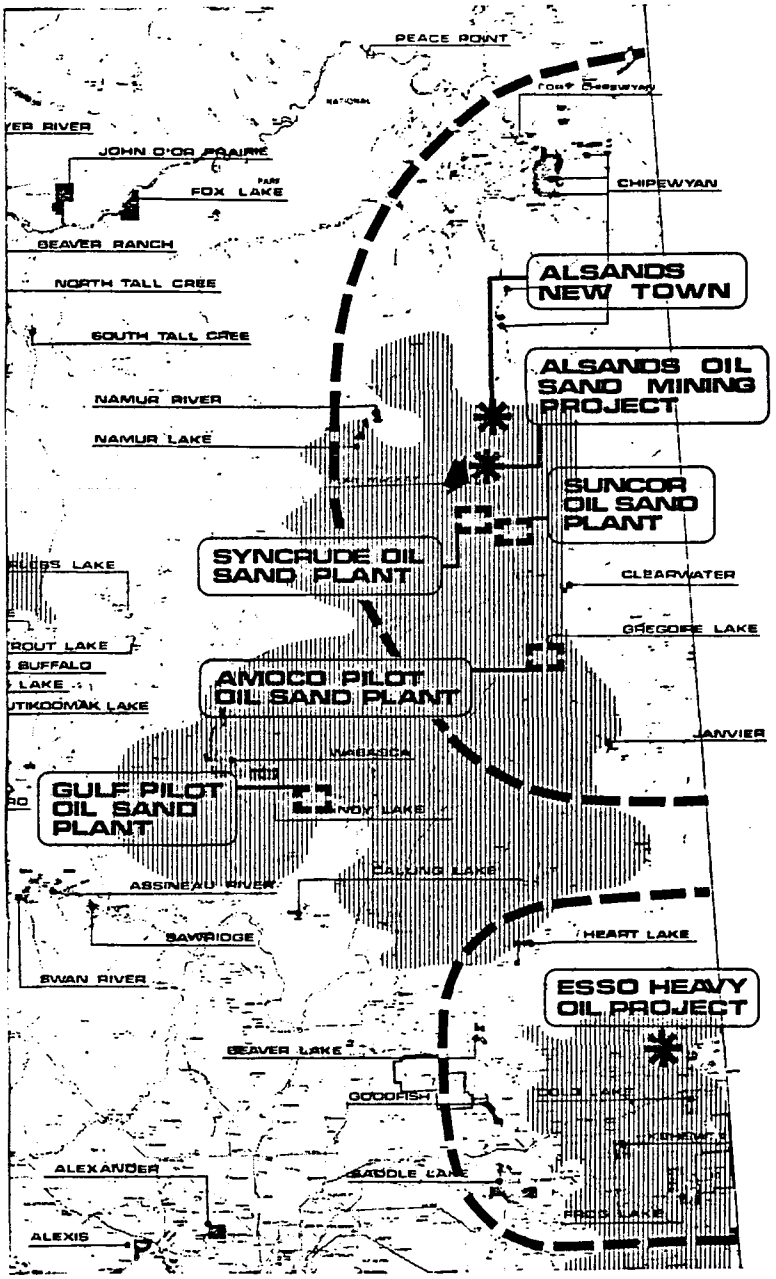

Figure 1. Relationship of Suncor, Syncrude, Amoco and the proposed Alsands Oil Sands to the Fort McKay Band and Community.

development and the Indian Bands must maintain full control over their lives, lands and resources. (p. 130).

In the following pages we will look at selected examples of compensation and mitigation schemes which were developed to deal with the impacts of resource development and the social pollution which resulted.

Syncrude Agreement, Company Policy and Practice

As already stated, the Syncrude Agreement was an agreement made between Syncrude, the Department of Indian Affairs and the Indian Association of Alberta. The agreement represents the first significant attempt to deal with the Indian interest, albeit after the project was approved and well into construction. This agreement talked only of training, employment and business opportunities, and for various reasons discussed in more detail in the authors' 1979 report, this was termed a failure for the local Indians. The company's priority of meeting the construction schedule rather than training Indians, as well as the need for relocation of Fort McKay Indians to take advantage of such an agreement, were major problems. In fact, some individual Fort McKay Indians sought and obtained employment but this is not true of the group/community as a whole. Those who obtained employment did so by paying a great social cost. Because there is no transportation system into Fort McKay those who sought employment with Syncrude (or GCOS) were forced to move into Fort McMurray and had to disrupt their family, community ties and support network. The jobs obtained were, on the whole, short-term labor jobs but often long-term enough to take a hunter/trapper off his trapline (long enough for Alberta Fish and Wildlife to re-allocate that trapline to non-locals and non-Indians). When the Fort McKay Indian left the job or was fired he was left without the traditional means of support or wage support. A previously, (prior to 1963) largely self-sufficient community was thrown into significantly more dependence on the "outside" and the result was individual and community confusion.

The community has experienced problems with alcohol, violence, family disruptions and other social problems it had never experienced before 1963 resulting in problems that would appear to have their origins in the serious undermining of the traditional culture and values of the community. This undermining has come about by forcing people out of the Indian land-based economy contingent on cooperation and sharing and into the individualistically oriented wage economy through:

1. the loss of lands to massive open pit mining, and
2. compensation and mitigation schemes which did not even attempt to protect the Indian economy or Treaty rights of the people.

When we talk about social pollution in the context of north-east Alberta we are talking about the strategy of moulding Indians to the industrial economy. Examples of this trend include:

1. Company policies which encourage moving out of the home community to take advantage of training, housing or transportation.
2. Wage employment with no provision for time off for hunting and trapping which leads to lost registered trapping areas, bush foods and increased family and community dependence on the "outside".
3. Business contracting opportunities which failed to materialize and had negligible localized benefits or stability of operation.
4. Recent rotational programs of flying in Indian workers from communities and which measure their success by the number of Indian workers and their families who subsequently relocate to the city of Fort McMurray.
5. Holding the major recruitment drives for employment during the fall season which conflicts directly with the preparation time for the trapping season and disrupts the annual harvesting cycle.

It is impossible to place a price on the destruction of a culture or a community. Yet, if left unchecked, this is the social pollution that results from externally designed compensation and mitigation programs. Fort McKay is now attempting to reverse the tide of the past 20 years.

In summary, besides removing 60 square kilometers from the use of the Fort McKay Indians in the heart of their territory and adjacent to their main settlement and hunting camp and displacing numerous traplines within what has become the Syncrude lease area, the social pollution effect serves to undermine the Indian interest in more diffuse and yet disastrous ways. While support for the Indian economy

was largely ignored in decision-making regarding project approval or in subsequent decision-making by consortium or government resource/wildlife management agencies, the strategy for promoting Indian participation in resource development through training, employment, and business contracting found favor and resulted in the signing of the Syncrude Agreement. This attempt to manage project impacts focused on policies, programs and mechanisms for maximizing employment, training and business opportunities for Indians. In doing so it was hoped that the net balance of project impacts would be positive for the region and for the province as a whole. However, the outcome of this approach was that only minimal benefits accrued to local Indian communities and in the case of Fort McKay, the localized social, cultural, political, economic and ecological consequences and costs were severe and much greater than the marginal and short-term benefits of a few jobs. Perhaps the major weakness of the Syncrude Agreement approach to impact mitigation, management and compensation was that specific measures to protect and reinforce the Indian economy and dependence on the land were entirely overlooked and went unsupported as resource development proceeded. By focusing only on employment, training and business opportunities maximization without understanding exactly what is "out there" and hence what the project would be impacting on and by ignoring impacts on the Indian economy, the attempts at impact mitigation/compensation/monitoring were seriously deficient and badly formulated.

Alberta Oil Sands Environmental Research Program

The Alberta Oil Sands Environmental Research Program (AOSERP), established by agreement between the Governments of Alberta and Canada in February 1975, is a 10 year program designed to direct and coordinate research projects concerned with the environmental effects of development of the Athabasca Oil Sands in Alberta. It has to date, spent in excess of $17 million in its four components: land, water, air and human systems.

A major intent of this research was to compile a baseline data base for the four systems which might serve as a basis for monitoring impacts of oil sands development, and to make recommendations to government. As such, the program results constitutes both information and advice.

The results of the research so far may be generalized into two statements. There have been no detectable environmental changes in the oil sands area. Any changes that might have taken place cannot be said to constitute a problem.

While the fact that industrial scale oil sands mining projects began in the early 1960s and the research began in 1975 has presented some obvious problems, a far more fundamental criticism may be levelled against this effort to monitor oil sands impacts and (hopefully) keep them within manageable bounds. That is, despite evidence that the Indian people of the area have continuously used and occupied this area for thousands of years and are intimately familiar with the land, animals and ecology of the area, their observations and concerns were never solicited in scoping the scientific research on the environment. Further, the Fort McKay people who live in closest proximity to the projects and whose Indian economy depends on resource harvesting were the logical people to consult in the initial scoping of research. When the Athabasca River, the primary source of drinking water since time immemorial became so polluted that people could not even wash their clothes in it without breaking out in skin rashes, the assertion that there have been no detectable environmental changes in the area is bizarre.

The hunters have detailed knowledge of the changes in plants and animals, the water and the air. Requests for information on the results of AOSERP research from Fort McKay in terms of answering the question "Is it safe to drink the snow melt water?" were met instead with a presentation on the structure and function of the research program by an Alberta Environment AOSERP representative that visited the community.

In short, participant observation in living with the Indian people of Fort McKay has shown a total lack of fit between the Indian observations and experiences of environmental impacts since the coming of the oil sands plants and the apparent belief by governments and industry that everything is fine in the Athabasca Oil Sands area.

In summary, this attempt to understand and manage the bio-physical and human environmental impacts of oil sands development was an attempt to deal with a situation where a major oil sands plant was given a permit to construct and operate without a full identification of the implications for either the non-Indian or the Indian interest or any adequate means for avoiding them, or dealing with them as they arose.

It was only after the second major project, the Syncrude project, was two full years into construction that the AOSERP research was started. It may be viewed as an example of social pollution in that the only information about Indians ever gathered was limited to Native employment patterns and job related issues. It has totally ignored the economy of the Indians in the area and what effect oil sands development may have had in that regard. Perhaps the most frightening omission of the program is that not one cent has been spent on research into the implications of oil sands projects for human health and safety in the area.

Alberta Fish and Wildlife Trappers Compensation Review Board and Plan

This program represents a belated attempt to deal with some of the impacts on trapping by oil and gas development which, in the greater Fort McMurray area and within the Fort McKay hunting and trapping territory, have been disastrous. The program was set up to serve the needs of trappers in particular and is basically a program of general application. The program was established in 1980 but was not started until 1981 using oil company contributions which vary from 50¢ to $1.00 per lease per acre as a fund from which to pay claims. A seven person board, on which the Indian/Native interest is clearly underrepresented, reviews and provides recommendations on claims for damages and losses after an individual trapper and an oil or seismic company have reached an impass in negotiating a settlement.

The Trappers Compensation Review Board's Plan represents an example of social pollution in that:

1. It fails entirely to recognize or respect the 'community' character of Indian trapping in the area;
2. It individualizes the problems of Indian trappers and trapping and systematically undervalues the importance of the trapline for the Indian trappers, their families and their community as a whole; and,
3. It does not take into account the rights of the Treaty Indians to freely hunt and trap as guaranteed under Treaty #8.

The Board's "rules of the game" are based on the provincial government's registered trapline system which was designed on the notion of individual right, embodied in a "senior holder" of a trapline while "junior holders" must depend on the registered "senior holder" for information about developments affecting the line, negotiations for compensation for losses and damages with oil companies or the Board, and for sharing of any compensation that is awarded. This imposed system of stratification of trapper's status and rights under provincial regulations lies in direct conflict with the Indian systems relating to the hunting and trapping aspects of their economy. Without going into detail here about the differences and sources of conflict, suffice it to say that the Indian system of land and resource use are based on the natural productivity of the land and its animal populations and the social system of the harvesters. Further, the Fort McKay community has a self-administered traditional system of land use in which areas are recognized as hunting and trapping territories of particular family groups. The registered trapline system introduced by the provincial government and administered by Alberta Fish and Wildlife Division has played havoc with the Indian system.

The Indian trapper, trapping in his usual territory, has historically had no advance warning that his trapping would be disrupted and equipment destroyed and has usually received little or no compensation. The Trappers Compensation Review Board expects a trapper, who often does not speak English, to successfully identify which company is responsible and negotiate a settlement of damages with the multi-national or its agent. This situation appears ludicrous given the imbalance of resources, information and bargaining power of a single trapper in such a situation and yet "socially conscious" resource development companies have resisted attempts at direct group negotiations where the Indian Band Council and Administration are supporting community trappers. The logical but unfortunate result of this is to effectively channel compensation claims of Indian trappers towards the Trappers Compensation Board, an institution which has almost nothing in common with Indian systems of resource management and problem resolution and which has an environment for decision-making where the collective rights of the Indians under Treaty #8 are not considered in evaluating losses and damages.

While the Trappers Compensation Review Board and Plan are a comparatively recent attempt to deal with the negative impacts of major resource development, their relevance and effectiveness in providing remedies for damages to the trapping aspect of the Indian economy for the Fort McKay Indians is negligible. By limiting compensation to cash value of fur in the marketplace and by failing to consider compensation in kind, for example, replacement or addition of lands to trapping areas damaged by oil

and gas development, the Board perpetuates the idealogy that the right and proper response to encroachment of traditional hunting and trapping territories of a group of Indians is for them to "move over". The model of trapping that lies at the basis of the provincial system of registered trapping areas is that of the individual non-Indian trapper. The non-Indian trapper's pattern of intensive harvesting of fur from a trapline, from which the government receives revenue through fur taxes, makes the Fish and Wildlife Department more disposed to consider the interests of non-Indian trappers, even when these conflict with Indian hunting/trapping territories which have existed as such for hundreds of years. Pressure has reportedly been exerted on Indian trappers to trap a certain species more intensively than the trapper believes to be in the interest of survival of that species. Such resistance has led to conflicts between Indian trappers and the Fish and Wildlife officers who effectively control the allocation of registered trapping areas, changes to their boundaries and whether trapping will be officially allowed to continue there or not by declaring an area "vacant".

In summary, the Trappers Compensation Review Board's Plan represents a policy decision which, while purporting to address long-standing grievances between trappers in predominantly Indian areas such as north-eastern Alberta, actually compounds the problems by using a model and mechanisms based on non-Indian notions of trapping, trapping rights and justice or compensation. Rather than dealing with the backlog of justice due to the local Indians in resource development impact areas, pursuing such a model will likely serve to further undermine the Indian hunting and trapping territories and the authority of the Indian communities to manage their economy and their ability to provide for their long-term survival or the achievement of a workable system for co-existence with resource development projects in their areas.

The Alsands Project and the "Alsands Agreement"

The Alsands project, a massive $13 billion oil sands mining project approximately 20 miles from Fort McKay, was approved by the Alberta Energy Conservation Board (ERCB) in the fall of 1979. While actual construction of the project has not gone ahead due to disagreements between the consortium, its members and the provincial and federal governments taxes, royalties and actual profit margins, it is useful to look at points of comparison and difference in the light of previous experience in dealing with Indian impacts and particularly the social pollution effect of impact mitigation/management or compensation schemes.

Once again, the project represented the loss of a large portion of prime hunting, trapping, fishing and gathering territory for the Fort McKay people and their Indian economy. Again, no measures to reinforce or protect the Indian economy were made a condition of project approval. Compensation payments of cash on a one-time basis were reached with individual trappers in the site area. Without exception, the failure by Alsands to provide additional trapping lands for those to be affected (as was promised) represents grossly inadequate compensation of the Indian interest. In fact, not one of the trappers considers financial compensation to be adequate for the loss of a way of life.

Once again, government and industry failed to adequately identify Indian impacts and to take steps to protect the Indian economy. Rather, the strategy that was pursued was to foster Indian participation in resource development through employment, training and business contracting. More recently, equity participation in the project has been pursued with little success.

The "Alsands Agreement", a draft agreement negotiated between the Alsands consortium, the government of Alberta and the government of Canada to cover the non-fiscal aspects of the project was prepared without the benefit of consultation or input of the local Indian people, particularly the Fort McKay people who are the closest existing human settlement to the proposed project. A basic principle of responsible development planning was violated. Once again, the people to be most directly affected by a project were not involved in the setting out of what it was that needed to be mitigated, compensated and/or monitored. Again, the measures directed at Indians were limited to employment, training and business contracting opportunities. The precision of wording in the "Agreement" with respect to these aspects was even more general in intent and substance than the Syncrude Agreement and as such represented a step backwards in addressing the true nature of localized impacts for the affected Indian communities.

As with the Syncrude Agreement, local Indians would be left out of direct involvement in the design and implementation of impact management measures and mechanisms. Further, the Agreement seemed to indicate that the Federal government would give up its authority to protect Indian rights. The Agree-

ment was silent on measures to protect the hunting, trapping, fishing and gathering rights of the Indians guaranteed under Treaty #8. The development of any monitoring requirements would be left to the Federal and Provincial governments.

On the question of infrastructure planning, the Agreement would ignore the Department of Indian Affairs' averred policy of Indians doing their own community planning and would make planning effectively the prerogative of the Federal and provincial governments. The Agreement also appeared to endorse a system of land tenure which, in the past, has meant division of communally held federal and provincial crown land into individual parcels of land upon which taxes must be paid and which could be subject to sale and alienation. Further, the land would be organized under provincial control placing the land and the people into municipal structures. This was seen as a clear attempt to destroy Indian government and the authority of Chiefs and Councils. This system of land tenure has been rejected by the Fort McKay people. As such, it represents a model which is the antithesis of the people-land relationship which underlies Indian hunting societies and, therefore, constitutes another form of social pollution.

Rather than treating the local Indian communities as governing authorities, the role of local Indian governments would be relegated to providing information, largely under circumstances determined by the provincial and federal governments and with no effective control of the design or implementation of measures to deal with impact problem areas involving Indian rights, infrastructure, business development, employment development, social support services or the environment. Operational procedures for implementing the Agreement would be left outside of the Agreement to be worked out at a later date. However, the role of the local Indian communities and the need for timing and access to the negotiating table would be determined by the Federal and provincial governments. Further, the development of a management information system to provide a basis for cooperation and conflict resolution would be done between the two governments, leaving out the affected Indian communities.

In summary, the "Alsands Agreement", in relation to the non-fiscal aspects of the Alsands project on Treaty 8 lands, was viewed by the Fort McKay Indians as an abrogation of Treaty rights and a breach of trust on the part of the federal government. The Agreement was seen by the Indians as representing the implementation of the "White Paper" of 1969 which essentially proposed the termination of Indian rights, their special land base and relationship with the federal government, and outstanding land claims and grievances while passing responsibility for Indians over to the provincial governments. Indian governments would not even be consulted in relation to commitments sought from Alsands, they were only to receive "communications". Indian control over social support services would be reduced to consideration of the need for local involvement.

The effects of the project on Treaty 8 Indian lands would have been substantial: removal of 18,000 hectares of land from Treaty 8, loss of this land for the production of the renewable resource base of the Indian economy, pollution of Treaty lands beyond the lease boundaries affecting the human, and other animal populations as well as the land, air and waters. At the signing of the Treaty, Indians were promised that they would be as free to hunt, trap and fish after they signed the Treaty as they were before. The proposed Alsands Agreement provided no protection for these Treaty rights. Instead, the Agreement appeared to further the social pollution effect by endorsing the limitation of Indian rights and, once again, encouraging the total embracement of the wage economy by the local Indian people.

Conclusions and Implications

While technology and project requirements differ in pipelines and oil sands mining and/or injection projects, there may be significant points of comparison to be made between north-east Alberta and Alaska. The Indian/Native communities, for example, in both areas differ from non-indigenous in the area in their human ecology, cultural values and community life. In both areas there is significant involvement in the Indian/indigenous land-based economy. The unique history of the communities involved will be important in determining what the outcomes of a proposed development will be and serve to orient the design and implementation of impact mitigation and compensation schemes. However, while particular aspects of impacts may differ between north-east Alberta cases and Alaska, there are recurring categories of impacts which tend to occur to nearby Indian communities from large-scale natural resource development or the construction of large engineering works. Given this recurring nature of "Indian" or indigenous impacts and the evaluation of strategies, measures and mechanisms which have been used to enhance participation in project impacts, we submit that the Alberta experience will be highly relevant at least at the level of principle. For example, the approach to impact

mitigation/compensation taken, the strategies involved, their effectiveness viz-a-vis local Indian/Native communities will help clarify the often overly optimistic assumptions regarding localized benefits and costs for those communities in situations where there has been:

1. little or no consideration given to impact mitigation/management and Indian/Native concerns; and,
2. well-intentioned efforts at mitigation/management regarding Indian/Native concerns generally, but without effective design and/or control of the measures and mechanisms by local Indian/Native communities.

Further, what is included or excluded from the project or area development mitigation and compensation schemes as they affect Indians/Natives is critical to the long-term survival of the local Indian/Native communities. The north-east Alberta research reveals that the lack of knowledge of the Indian economy and the relative absence of measures to protect and enhance it through project mitigation/management arrangements and regulatory hearings has been a serious oversight. In summing up what is known about the relative distribution of benefits and burdens of oil sands development in north-east Alberta from the viewpoint of the experience of Indian communities in the immediate area, and particularly that of Fort McKay we observe that:

1. The identification of "Indian" impacts as a basis for project planning and as a basis for the design and implementation of impact avoidance, mitigation, management and compensation and particularly regarding the Indian economy was inadequate and irrelevant to the serious consideration of the Indian interest.
2. Analysis of the original intents and actual outcomes of such innovative participation enhancement tools as the "Syncrude Agreement" shows that it had little or no beneficial effect on the local Indian communities, particularly for the Fort McKay Indians in terms of employment, training or business contracting.
3. Consideration of the history and effectiveness of schemes to minimize negative impacts and enhance positive benefits for Indian communities from nearby natural resource/energy development projects have not focused on the critical issue of the degree to which the local Indian communities and their ways of living and economy would be affected by the project(s) nor the ways in which the mitigation efforts themselves have contributed to social pollution effects and costs for local Indians at Fort McKay.
4. Impact mitigation, management and compensation schemes were more than just too little, too late; they have in fact served to undermine Indian involvement in and dependence on the land-based Indian economy which centres on hunting, trapping, fishing and gathering.
5. Any attempt to design a compensation or mitigation program in which local and most directly affected Indian people have not designed the policies, programs, measures and mechanisms to identify and effectively deal with project related impacts will ultimately result in what may be called social pollution.

There is a disturbing trend in the field of impact assessment and particularly the specialty field that is being called "impact management". This movement seems to be a response to a call by governments and industry to streamline regulatory approvals and speed up approvals which are too often based on inferior project plans, design and understandings of impacts and specific means of dealing with them. Such a view often says that impact assessments done in a comprehensive way are costly and difficult to carry out, particularly in cross-cultural situations, given the availability and quality of published data. Hence difficult impacts to understand or quantify, often referred to as the "intangible", and their consideration should be deferred until after the project has received preliminary approval based solely on justification of "need" in supply and demand terms. The human or social impacts are thus seen as secondary or tertiary in importance after "need" and "economic and technical feasibility" of the project. By dealing with the supposedly straightforward more readily quantifiable impacts of physical infrastructure, and leaving the "softer" human services, social programming considerations and human impacts until a point in time when construction commences, project approvals could be granted in stages. This is tantamount to granting approval based on only partial information about impacts and costs.

Such an approach calls for "managing impacts" after the project has been approved, often through the setting up of monitoring systems and ongoing public participation using citizens or community advisory committees which are totally divorced from the governing authority of the community to work out the details of such arrangements as the project moves ahead. This kind of thinking basically holds that rather than try to understand what effects the project itself (and in conjunction with other projects) will have on the bio-physical and human environments in a more comprehensive and serious way than has been done before and to make specific mitigation/management responsibilities a condition of the permit, it is simply good enough to hope that any unforeseen consequences will be minor and show up in the monitoring and be speedily rectified by someone. The briefest look at the history of megaprojects would indicate that this "leave it till later" approach is unwise. The experience of oil sands projects in north-east Alberta indicates that such an approach would institutionalize the grave errors that have been committed there with respect to impact identification, avoidance, mitigation, management and compensation measures. In addition, such an "impact management" approach coupled with staged approvals would perpetuate the problems which now exist in that the measures which are put in place for mitigation, monitoring, management and compensation can be as severe in their social pollution effect in the case of Indian communities as the direct bio-physical impacts themselves. Under such an arrangement the impacts of the impact management schemes themselves are not subject to scrutiny, nor are they considered together with project impacts as a totality which must be dealt with in a serious way before any approvals are granted.

In conclusion, it is our experience that errors with grave consequences for the continued survival of Indian communities are committed if there is not full and accurate identification of Indian impacts, as well as a knowledge of and respect for Indian systems and community life. Culturally sensitive development planning and decision-making make these pre-requisites. Impact mitigation, management and compensation schemes that are based on ignorance or simple lack of concern for the well-being and continued survival of nearby Indian communities in the project area are clearly not in the public interest.

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Ethnographic Program Development: A Case Study in Values, Resources and Decision Making

Robert Laidlow

The relationship among anthropologists, archaeologists and Native Peoples is rapidly evolving in many parts of North America. One factor which seems to be affecting this change is the increasing body of law which addresses traditionally anthropological issues. Religion, cultural and social dynamics, contemporary ethnic populations and antiquities left by their forebearers, have all become the subject of Federal and various State Statutes. It is this statutory guidance which directs the administration of public lands and resources by Federal agencies. Due to the pervasive role of Federal agencies in resource management in much of the Southwest, Indian-white relations are effectively reduced to Indian-U.S. Government relations for many issues. This presentation will briefly consider how one Federal agency, the Bureau of Land Management (BLM), addresses Native cultural issues as one aspect of Cultural Resource Management (CRM) program in California.

The cultural resource management guidelines for the Bureau of Land Management (8100) define cultural resources generically; that is, in a fashion which includes both material and sociocultural components. Particular attention to sociocultural values has been recently directed by the American Indian Religious Freedom Act of 1978 (92 Stat. 1996). The specific implications of this statute for the CRM programs of the Bureau, are outlined in a "Memorandum of Understanding on California Policy for Cultural Resource Management and California Policy for Native American Concerns."

Within the context of existing policy and statute, a number of problems arise due to the inherent differences between material archaeological values and the cultural and religious concerns of Native communities. I would like to briefly explore this distinction as it has affected the development of ethnographic inventory techniques and policy in Bureau programs.

Ethnographic inventory, unlike archaeological inventory, seeks not to identify things but to accurately profile values and the cultural setting in which they occur. The value of archaeological materials to the archaeologist resides not in the physical resources themselves, but rather in the potential which these hold for answering significant research questions. These research questions and the theoretical context in which they occur constitute the technical world view of the professional archaeologist. The values of cultural resources for the archaeologist are largely assigned values. These assignments are dynamic and subject to change as the prevailing theories, methodologies and analytic constructs of the discipline change.

Native American traditional cultures also incorporate a world view through which the relative value and significance of features of the natural and cultural environment are assigned. Just as the theoretical world view of the archaeologist embodies basic epistemological tenets; so too can the epistemological structure of a Native culture be revealed through the study and analysis of a system of sociocultural values. One must study not only what is culturally and religiously significant to a culture group, but why it is significant. In evaluating sociocultural values the researcher is dealing with a non-empirical phenomena whose assigned value is most frequently derived from a cultural context other than his or her own. A significant step is thus added to the research paradigm. Whereas, an epistemological context in the study of empirical phenomena is inherent in the research design, the description of a cultural group's epistemological system becomes the first step of analysis in ethnographic inquiry. Put quite

simply, if you do not know how the system works, what the rules are, and how they are applied in everyday life, you lack the basic tools for the accurate description of a cultural group.

The criteria for determining the significance (within a specific operational frame of reference) and sensitivity for which sociocultural resources are managed should be derived from the cultural group being studied. In a study area such as California, many of the basic epistemological principals of Native cultures are quite similar. If the researcher understands the basis of these similarities and their regional distribution it can greatly facilitate the identification of sensitive sociocultural values. Within large culture areas (containing numerous specific culture groups) the researcher gains an advantage in anticipating relevant materials for inclusion in the interview protocol, identifying significant site types and even the potential for developing regional predicative models of site sensitivity. At later stages in the analysis the same understanding will allow the researcher to efficiently and effectively identify management strategies for the protection, and in some cases the mitigation, of impacts to this resource base. In conjunction with many Native American traditionalists and cultural specialists the Bureau has attempted to identify culturally significant and sensitive resource values. Recognizing the prescriptions which are often associated with religion and ritual among many California Native American groups we have also attempted to provide appropriate procedural guidelines pertaining to the collection, verification and distribution of these data.

The most pervasive concern of the Native communities in dealing with Federal agencies is that specific sociocultural site data be restricted from public disclosure. Although protection of informant data is not specifically covered under any statute, it is the opinion of the Bureau of Land Management that primary data gathered in the inventory process for planning or project purposes may be withheld from Freedom of Information Act requests. Policy under the Bureau's Cultural Resource program is that raw field inventory data are considered privileged and will be released only in circumstances where it is in the best interest of the informants or the resources to do so.

Given these protections, ethnographic overviews designed to identify contemporary Native American use and traditional cultural significance of Bureau lands and resources have been conducted for many areas of the State. Specific inventories are also initiated in association with individual project actions. Consultation is undertaken with those California Indians recognized by the local Indian community as knowledgeable about traditional heritage values, or a particular aspect of the community's heritage and cultural legacy including tribal elders, traditionalists, folklorists, and practitioners of Native crafts, the healing arts, and religious ceremonies. To insure the accuracy of information collected through these contacts, the primary field data are, whenever possible, submitted for verification to the Native American consultant(s).

Consultation with Native Americans and the collection of basic ethnographic data is a significant initial step in addressing the potential effects of agency actions on Native communities. The social scientists in a Federal agency can play a valuable role in evaluating sociocultural data and its implications for resource management and decision making. If this task is performed effectively, relevant and culturally appropriate strategies may be developed to reduce adverse effects upon the Native population(s) within a project study area. Effectively addressing these issues also provides significant benefits for the agency in the form of reduced project delays, shorter time frames and fewer legal appeals.

Attempts to satisfy agency needs and address the concerns of Native communities have in some cases been far from successful. Many social science studies prepared for Federal agencies have not been prepared with attention to the process of resource management and project development (e.g. contractor does not understand federal responsibility). The result is, in many cases, an anthropological analysis which is either irrelevant to the specific management needs at hand or insufficiently articulated with methodologies inconsistent with current administration policy. Many of these problems have been effectively addressed by adding anthropologists to the professional staffs of resource management agencies. Although this is a rare occurrence, truly relevant and responsive solutions to problems which arise in dealing with Native communities must be accomplished within the laws and policies which define a Federal land manager's decision making prerogatives. Within the BLM the data collected in field inventory is summarized by the specialist and the major issues are outlined. The relationships between these issues and potential actions by the agency are then prepared for review and incorporation into environmental analysis documentation. Impacts to Native communities and resources of traditional, cultural and religious significance are thus included as an aspect of our multiple-use mandate. If mitigation options have been identified in consultation with the subject community, these are also considered

in the environmental review process. In many cases we have successfully resolved issues involving subsistence activities, collection of crafts materials and religious and ritually significant sites.

In summary, we have developed a system which can be responsive and demonstrably has reduced project delays, response-time, and other cost factors for Bureau actions which affect the California Native American community. We have experienced fewer and less severe problems in addressing these issues than most other Federal and State resource management agencies with jurisdiction in California. By developing and maintaining a high level of awareness at both the staff and management levels, we can continue to be effective and responsive.

Section V: Mitigation

Introduction

Ron Inouye

The five papers on the mitigation of the negative effects of resource development are drawn from theoretical and actual situations. The authors examine the mitigation efforts initiated by various levels of government—local, regional, state, and national. The role of Montana state government in mitigation is comprehensively treated and is interesting to relate to the papers discussing Alaska resource development and state government's potential role in mitigation. Mitigation efforts of industry are diverse and creative when presented and analyzed comprehensively.

Based on research in about 20 of the lower 48 states, Gilmore discusses the roles of federal, state, and local governments in socioeconomic impact mitigation. Metz reviews examples of industry initiated impact mitigation in categories including: transportation; housing; education; public utilities; health; public safety and recreation; and company-community interation. Helgath identifies common elements from successful mitigation programs of four major national construction projects and suggests a strategy for an Alaskan socioeconomic impact model. Owens provides background on the development and operation of Montana's mitigation efforts. Cole reviews the human impacts of large scale resource developments to identify planning processes and legal authorities to maximize benefits and mitigate negative impacts to local Alaskan residents.

Observations and Comments on the Roles of Federal, State, and Local Governments in Socioeconomic Impact Mitigation

John S. Gilmore

First, let me specify an assumption: that socioeconomic impact mitigation is not needed for every major construction project.

Sometimes there are few, if any, discernible socioeconomic problems from large projects. This paper addresses those projects which may be susceptible to significant socioeconomic impacts and where mitigation may be or is clearly important. My colleagues and I have observed that such projects are usually characterized by remoteness from good-sized towns and from large, skilled construction work forces. They are often being built in regions of very low population density, and they are apt to be projects of a large scale. They may be built in or near communities whose culture is not accustomed to or compatible with large-scale projects and sudden industrialization and the type of labor force it may be necessary to import to achieve completion of the projects.

There is one limitation: this paper is based on research in about 20 of the lower 48 states with the primary settings in the Rocky Mountain or Appalachian regions. I'm not trying to relate it to Alaska as it is now although Alaska will not stay exactly as it is at present. It may evolve, even quickly evolve, toward some of the governmental characteristics of the fast-changing, resource-rich states in the lower 48.

Mitigation Defined

Mitigation is defined here as the equitable and timely distribution of the benefits, and avoidance and/or amelioration of negative socioeconomic effects of industrial activities or projects. These are the positive and negative impacts, respectively.

Equitable and Timely Distribution of Benefits

The major categories of the potential benefits include new jobs, additional personal income, additional tax base, greater diversity of opportunities and of culture in the community (for those who consider this beneficial), and, usually, eventual improvement in public and private facilities and services. These categories can be considered potential beneficial socioeconomic effects. The potential is greater if the benefits are timely.

If many new jobs are available, they may require bringing in outsiders and their families in order to fill skill requirements before there is an additional tax base in the affected jurisdiction to generate public revenues for public services. If this occurs, then, neither the newcomers nor the old-timers may be adequately served by local government.

Even where there is a local labor pool and job preference agreements can be enforced (e.g., projects on land governed by tribal councils or similar organizations), extensive training may be necessary and may require substantial effort by both appropriate levels of government and the innovators of the industrial activity or project.

If there is greater personal income before there are more and better facilities and services (both public and private, but particularly housing), prices may be driven up and inflation affect those who are not enjoying the higher personal incomes. For instance, Rio Blanco County, Colorado, has required

Western Fuels to protect senior citizens from housing cost increases attributable to that coal company's opening of its Deserado Mine.

The potential for the benefits may not be fully realized, then, if the community and the project are not prepared to help make these effects—all of which represent change—beneficial. Furthermore, equitable distribution is no more inevitable than timeliness. To achieve equity, the beneficiaries of the positive impacts should be largely the same groups and the same people bearing the negative impacts. This is a considerable challenge to impact management. One approach to both issues is prepayment of certain taxes; Colorado has authorized prepayment of local ad valorem taxes on real property and production, and of state mineral severance taxes returnable to affected communities.

Potential Negative Effects

The positive or beneficial effects, which may even be windfalls for some communities or jurisdictions, are usually accepted quietly. The negative effects, on the other hand, are potentially damaging to both the project and the community. They can generate concern and disruption and they certainly challenge business-as-usual management on the part of both government and the project sponsor. These are the problems which can be counted upon to be well-publicized and which bring substantial social and political pressures for mitigation.

We have found three generic categories of negative impacts in the problem-type boom communities involved in our research. These are:

- Market failures—where existing private sector mechanisms for furnishing goods and services don't work.
- Shortfalls in government facilities and services—where local and possibly state governments find themselves unable to meet their responsibilities of providing for the public health, safety, and welfare of a fast-growing and changing population.
- Social and political disruption—where the normal mechanisms for accommodating population growth are unable to function under extraordinary stress.

These situations, which may exist singly but more often exist in some combination of all three, may well be aggravated by either some type of uncertainty or failure on the part of external institutions or systems which usually help support the community.

These are described in somewhat more detail in Exhibit I. These are the sorts of problems which, in

Exhibit I. Generic Categories of Negative Effects or Impacts

- Market Facilities—Where sudden increases in local demand for labor, housing, commercial capital, and public capital are not met by existing market mechanisms at any acceptable price because of risk premiums in pricing or nonexistent supply.

- Shortfalls in Government Facilities and Services—Where local (and possibly state) governments lack fiscal resources, expertise, and experience in providing the services and facilities needed to accommodate a growing population, or where governments are unwilling or unable to make the investments necessary to provide them.

- Social (and Political) Disruption—Where existing relationships and systems break down because of stresses from growth and from conflict between the existing population and the newcomers.

Complicated By:

- Uncertainty—Resulting from problems with technology, markets, management of mega-projects, project sponsor's cash flow, labor, weather, regulation, suppliers, or lack of credible information on project employment levels and schedules.

- Inadequacies and Breakdowns in Exogenous Institutions of Systems—Examples are response failures in secondary mortgage markets, governmental impact assistance programs, state-furnished transportation systems, state school assistance programs.

Source: Denver Research Institute

the lower 48 states, have been found in the Gillettes, the Rock Springs, the Grants, the Evanstons, and the Colstrips—the notorious problem boom towns. These have led to political backlash against both the firms sponsoring the projects and against incumbent elected officials. They have led to productivity failures and to project overruns in terms of time and money. These are the challenges to impact management or impact mitigation.

Some Major Issues of Socioeconomic Impact Mitigation

Three of the major issues concerning mitigation are:

- What are the roles in socioeconomic impact mitigation of the various levels of government?
- What is the role of the firm sponsoring the project or, in more complex cases, the firms sponsoring a number of projects in impact mitigation?
- Should a large-scale project go ahead (a) if mitigation costs to the project are so great that they would make the project economically infeasible or (b) if extensive mitigation is needed but is for some reason impossible?

The latter two issues are being addressed by other symposium participants or panels. The remainder of this paper will discuss the first issue raised above; that of the roles of various levels of government in socioeconomic impact mitigation.

Roles of Levels of Government

The discussion will be based on several criteria, leading to generalizations comparing roles and capabilities and on my subjective comments (see Exhibit II). The criteria are:

- Responsibilities
- Authority to mitigate or require mitigation
- Limitations observed in at least some cases
- Examples of strengths and weaknesses

Federal, state, and local government mitigation roles will be compared by these criteria. The comments on state governments are to some extent applicable to Indian tribes as court decisions continue to expand the taxing and regulatory authority of tribal organizations; however, there is so much variation among the tribal governments that it is less useful to generalize about them than generalizing about the admittedly differing state and local governments.

The federal government. Some degree of the federal government's responsibilities may result from its actions which trigger socioeconomic impacts. These include making resources available on federal lands, issuing permits for activities on federal lands or in other fields of regulation such as nuclear power plants, or in legislating changes in the siting factors relevant to the location of industrial activity (e.g., the Clean Air Act). The federal government may also bring about socioeconomic impacts as a result of the location and construction of its own facilities, such as many of the schemes for deploying the proposed MX missile system.

The federal government's authority to become at least peripherally involved in impact mitigation comes mostly from the National Environmental Policy Act of 1969 and its requirement for environmental impact statements (EISs), including discussions of socioeconomic impacts. Certain governmental regulatory processes are, in fact, based on information carried in the environmental impact statements, including regulatory actions by the Nuclear Regulatory Commission, the old Federal Power Commission and its successor agencies, and various agencies in the Department of Interior. The authority to participate in mitigation activities was granted federal agencies under the Coastal Zone Management Act, Section 601 of the Power Plant and Industrial Fuel Use Act of 1978, and in the supporting legislation authorizing and appropriating funds for such specialized projects as deployment of the Trident weapons system.

There are several limitations, practically speaking, on all of these authorities. In most cases, the lead agencies preparing EISs do not require mitigation of any impacts off the site of the activity they are acting on. The Office of Surface Mining attempted to impose socioeconomic impact mitigation stipula-

Exhibit II. Criteria and Comparisons of Federal, State, and Local Government Roles and Capabilties for Socioeconomic Impact Mitigation

	Responsibilities	Authority to Mitigate or Require Mitigation	Limitations Observed in At Least Some Cases	Examples of Strengths and Weaknesses	Author's Subjective Comment
Federal Government	Take many triggering actions, requiring mitigation.	NEPA, in some cases. Special programs.	Little or no moeny in special programs and little authority under NEPA.	General mitigation programs have inadequate political constituency. Limited responsiveness. Poor EISs.	Most resources, least responsiveness (sometimes least comprehension).
State Government	Public health, safety, and welfare. Establish structure of state and local government. Transfer federal and state funds.	Police power and broad taxing authority. May have siting, impact assistance programs.	May have inflexible constitutional inhibitions. Face reduced federal funds. Often have retention problems with good senior staff.	Legislatures often responsive, but not anticipatory. Have access to varied taxes and some land royalties.	Best balance of authority, responsiveness, and resources. Needs help from both feds and locals. Most responsiveness, least resources.
Local Government	Deliver many health, safety, and welfare services.	Police power and tax authority to extent delegated by state. Substantial role in land use control, in most cases.	Often understaffed, able to handle only routine matters. Sometimes uncooperative with other jurisdictions. Neglect nonfiscal problems. Municipalities bear public costs but can't capture project taxes.	Volatility and unpredictability can make difficulties for project and other private investors. Close to local concerns.	Most urgent and important role is cooperating in mitigation planning, implementation, and monitoring.

Source: Denver Resource Institute

tions on the Rojo Caballo Mine in Wyoming, but this effort was blocked by the Department of Interior. Other federal permitting agencies have generally been hesitant to take this authority very far.

Both the Coastal Zone Management Act capital grants mitigation program and the Section 601 program have largely come to a halt as a result of federal decisions to neither budget nor appropriate funds for their continuation. (A very partial substitute would be action by either executive or legislative branches assuring current deductibility from corporate income tax of industrial costs of mitigation.) The mitigation efforts for the Trident deployment in Kitsap County, Washington, were largely limited to money for bricks and mortar and made no provision for the costs of operating and maintaining the new facilities. Some local people found this decidedly inappropriate as delay followed delay in the deployment.

My subjective view of the strengths and weaknesses of federal impact mitigation measures includes the following comments. The majority of the members of Congress are not from nor are they representing communities which consider themselves vulnerable to negative socioeconomic impacts from industrialization. It is hard to assume that they will provide for anything but selective impact assistance/mitigation programs, such as those connected with weapons systems deployment or very large federally related projects.

So far, such federal programs have generally been based on forecasts and future-oriented assessments, and in socioeconomic matters these are usually inadequate. Also, EISs could be useful in impact mitigation, but they rarely address socioeconomic impact mitigation needs with accuracy nor attempt to place responsibilities for mitigating them. This could, of course, be improved if the EIS described longer term mitigation programs and were made more responsive to the monitoring of changes in projects and thus to changes from impacts originally anticipated. However, it is doubtful that a statement prepared by a federal agency can afford, politically, to specify the nature of many socioeconomic problems and the jurisdictional responsibility for dealing with them. There is little justification, though, for EISs parroting boom town conventional wisdom (or conventional mythology) rather than doing careful analysis and forecasting.

Finally, some of the federal assistance programs have been, at best, erratic in their application. The Coastal Zone Management Program mitigation may have been successful in some states (Alaska is usually offered as an example), but others have found it to be a bureaucratic nightmare, and the 601 program has been largely oriented to certain types of bricks and mortar construction without necessarily being responsive to local needs (e.g., for indoor recreation facilities in cold climates).

My personal, and admittedly subjective comments on federal government mitigation roles, are that environmental impact statements could be made more effective in analyzing baseline conditions and in specifying the likelihood of various types of negative impacts. They could also be greatly improved if they dealt with net impacts, allowing for mitigation efforts included in the proposed action by the project sponsor rather than producing what are often "worst case" analyses, even though they may not be specified as such. And, quite importantly, most of the statements I have read recently fail to adequately handle the beneficial effects.

Another potential federal role is in dealing with a newly developing problem: the difficulty in explaining to foreign firms and investors the need for money to be spent by a firm on mitigating socioeconomic impacts. Federal government spokesmen may enjoy credibility with foreign investors whether or not they have it with state and local government people in this field of socioeconomic impact mitigation.

My summary comment on the federal government's role is that it is the level of government with the most resources but with the least responsiveness to local needs and occasionally the least comprehension of the local situation. However, it is the only entity with the resources to provide the mitigation assistance necessary on very large-scale projects justified by and clearly identified with the national interest.

State government. The primary responsibility of state government is to provide for the public health, safety, and welfare, and some of this function (including some of the police power) is delegated to local governments. Some states have legislated roles for themselves in the siting and permitting of various projects and industrial activities and in providing socioeconomic impact assistance programs. The states also are responsible for implementing some federal programs.

The states have authority to levy many types of taxes, and some parts of their taxing authority are

also delegated to local government. The states transfer both federal and state funds to local government. They retain the authority and furnish the financing for most highway construction and maintenance, courts, corrections, and other services. Some states have their own environmental policy acts and a variety of types of land use authority which they usually share with local governments.

Some states are limited in what they can do to carry out their responsibilities with constitutional inhibitions on incurring debt or transferring state funds to local government (Utah, for instance). Many states have imposed spending limits on themselves and all presently face the decline or loss of federal funds which they have counted on in recent years. The quality of expertise available in state government varies. Many of the states find it easy to recruit bright young public administrators and planners, but it is often difficult for them to keep experienced public managers because of rigid personnel systems and salary ceilings.

Many of the states, through their legislatures, are responsive to new problems, although this is usually more in a reactive mode than in an anticipatory one. Exceptions occur if an announced future project is frightening enough (e.g., the request by a utility for enough State of North Dakota water to supply 20 coal gasification plants prompted a burst of siting and taxing legislation). Legislators can be counted upon to respond quickly if enough of their constituencies seek help. They are in a position to legislate taxes where these are politically acceptable and they often have access to royalties from their own or federal lands. Under the reserved rights concept, many states probably do not take advantage of their versatility to deal with problems.

The states probably have the best balance of authority and responsibility and resources to deal with socioeconomic impacts. However, they need cooperation from both federal and local government as well as from the sponsors of the impacting projects to be able to carry out effective mitigation. Some experimental state institutions are currently seeking to achieve this cooperation voluntarily rather than through the police power (e.g., the Utah Process, the Colorado Joint Review Process).

Local government. Counties, townships, cities, special districts, and towns have many of the responsibilities for public health and safety and some welfare activities delegated to them, plus education, streets and roads, and other locally used public facilities and services.

Local governments have some authority delegated them by the states under the police power and often limited taxing power (i.e., Wisconsin local jurisdictions are limited in capturing ad valorem tax windfalls from certain large facilities), although this varies greatly from state to state. Local governments usually administer land use controls, sometimes in concert with the states and sometimes with considerable delegation of authority to the local entity, and this authority may provide for some industrial permitting and socioeconomic mitigation stipulations by the local governments.

Many local governments, particularly in small communities, are understaffed and self-limited to handling routine matters. Elected officials may have great concentrations of available authority, e.g., county commissioners in some states may have executive, legislative, and quasi-judicial authority. However, a change in the makeup of such a small group as a board of county commissioners makes the standards and precedents which they set volatile and subject to change. Local governmental entities are often uncooperative with other jurisdictions, and it is particularly unusual for one to share its tax revenues with another. This presents a particular problem for a municipality which houses the people involved in construction and operation of a new industrial activity, but which doesn't have any ability to capture ad valorem or excise tax revenues collectible from that facility or activity.

The strengths and weaknesses of local government begin with the fact that local government is usually closest to socioeconomic problems but is apt to have the least resources for anticipating, understanding, and solving these problems. The volatility and unpredictability of local government actions in the absence of state or federal standards or requirements may make it difficult for incoming industry or any other private investors to carry out their roles effectively. Local elected officials are apt to concentrate only on negative fiscal impacts which affect their budgeting and may or may not seek help from various constituencies in identifying and dealing with other types of negative impacts.

Subjectively speaking, local governments will be most responsive (often reacting after the fact) to socioeconomic problems, but usually have the least resources with which to deal with them. An urgent role for local government is to participate and cooperate with the other parties-at-interest in mitigation planning, implementation, and monitoring.

Summary and Conclusions

I have raised three of the major issues concerning socioeconomic mitigation:

- What are the roles of various levels of government in socioeconomic mitigation?
- What is the role of the firm or, in more complex cases, the firms sponsoring projects in a given region?
- Should a project go ahead if prospective socioeconomic mitigation costs to the firm apparently make that project economically infeasible or if adequate mitigation is impossible?

This paper has dealt only with the first, the roles of the three levels of government.

The federal government during the Nixon, Ford, Carter, and Reagan administrations has not been very responsive or dependable in socioeconomic impact mitigation. Probably the simplest fix that could come by executive branch action would be more useful socioeconomic sections in EISs, but this mere compliance with existing law would require staff additions which are presumably limited by the present budgetary situation.

Local government certainly must participate and cooperate in socioeconomic impact mitigation efforts, but it's a dangerous gamble for both the incoming project(s) and the communities themselves if local governments have a lead role which gives them too much responsibility without adequate authority, standards, and resources.

The states appear to have the best balance of authority, responsibility, responsiveness, and resources. The states, however, must be able to count on assistance from both federal and local government, as well as from industry, if we are to see socioeconomic mitigation adequately protecting both communities and industrialization efforts in communities which are susceptible to significant impacts.[1]

[1]*For additional information on impact mitigation and management, see the following references:*

*Excerpted from John S. Gilmore, "Socioeconomic Implications of Changing Energy Conditions," *Regional Energy Issues: An Invitational Seminar* of the Conference Board, Denver, Colorado, March 18, 1981.

**Exhibits V, VI, and VII are based on John S. Gilmore, Dean C. Coddington, and others, *Socioeconomic Impacts of Power Plants*, Report #EPRI EA-2228, Palo Alto, California: Electric Power Research Institute, 1982.

Industry Initiatives in Impact Mitigation

William C. Metz

The mitigation of socioeconomic impacts, potential and actual, in local areas hosting the development and operation phases of a natural resource extraction and/or conversion facility is an inexact science. Conflicting opinions abound among companies, communities, consultants, experts, and state and federal government officials regarding level and type of responsibility, strategy, and effort appropriate for each new resource development. Mitigation is maturing; as more examples of mitigation efforts and their success/failure, cost, workforce effects, and project implications come to light, then a data base for analysis on mitigation efforts can be supported. Continued emphasis must be given to the fact that mitigation needs are different for each locale due to project and area uniqueness.

Attempting to determine the proper mix and optimum effort with regard to mitigation on the basis of a cost/benefit formula is haphazard at best. Industry can estimate the cost of each 1% of turnover and absenteeism (on a $1 billion project where labor accounts for 40% of a project's cost it means a $1 million loss), each day of delay for a project (over $1 million a day for a multi-billion project, including interest, contract extension penalties, and inflation), each episode of vandalism or labor strife, each percent loss of productivity or incident of management error, as well as the benefit for each reduction in percent or incident in the aforementioned. Equating the value to a project of, for example, a mancamp, transportation program, or school upgrade with either single or double rooms, used or new buses, or a new athletic field or whole new $2 million school building, respectively, with all the variations, is difficult at best.

As local, regional, state, and federal governments have become more aware of industry-wide mitigation efforts, industry fears that at each succeeding new development they will be confronted with shopping lists gleaned from efforts with other projects - "we" want one ladder truck, one ambulance, one elementary school, one community center, five playgrounds, a new road, two road resurfacings, a new sewage treatment facility, a new water tank, and housing for the elderly. A second fear is that company-sponsored mancamp, recreational vehicle (RV), and mobile home (MH) facilities and parks will become expected mitigation efforts by both workers and communities at every project. Mitigation should not be considered a windfall of free gifts or a chance to have community facilities fixed or upgraded at a company's expense. It should be considered as a joint company/community/state effort to fulfill impact area needs, to enhance an area's quality of life, to be an asset in workforce recruitment and productivity, to relieve an impact area from undue physical and fiscal burden as a consequence of workforce and sometimes secondary immigration, to be a good neighbor, and to secure necessary permits. Companies and communities need to work together in good faith, give adequate consideration to each party's limitations, desires, and financial capabilities, and negotiate a compromise of everyone's needs and concerns.

In order to achieve the most efficient and effective mitigation, careful review of local and state laws and ordinances regarding the collection and distribution of lease payments, royalties, severance taxes, fee permits, special use and service charges, and sales taxes is necessary. Adequate and timely disbursement is essential, as well as the innovative use of tax pre-payments, housing mortgage bonds, changeable debt and bonding limits, industrial loans with delayed repayments, and revised revenue assistance formulas. Permitting changes are necessary so that permits are not granted solely by states or

the host political jurisdiction, but in concert with the impact area. States need to enact enabling legislation allowing an impact area to be involved in permits and assessments of mitigation needs. Local communities are often in need of state or industry supplied technical assistance, ombudsmen, and grantsmen to prepare for change through adjustments in ordinances and growth plans and to have sufficient time and knowledge to apply for state and federal money.

A new facet to industry involvement in mitigation is taking place during these present "bust" times in the uranium, copper, silver, zinc, iron ore, molybdenum, and oil shale industries. While many communities have boomed and busted throughout American history with industries offering little assistance, this time around industries which enticed workers to relocate to remote locations during the "boom" are assessing their level of responsibility to those workers during the "bust" in these one-industry communities. This "bust" period is also changing industry and worker attitudes toward relocation inducements and will shape mitigation efforts during future developments of natural resources. Some states (Colorado, Wyoming, Montana, North Dakota, and New Mexico) have established permanent trust funds to aid communities and the state after natural resource depletion; others have or are considering plant/mine closure legislation (similar to Maine's requiring six months notice prior to closure), payment of severance pay, and donation of assistance funds for the impacted communities.

The following is a panoply of mitigative efforts which have been or are being undertaken by natural resource companies. Examples of mitigative efforts have been culled from periodicals (e.g., *Shale Country, Coal Age,* and *Engineering News-Record*), newspapers (e.g., *High Country News, New York Times, Denver Post, Daily Sentinel,* and *Idaho Falls Post-Register*), industry publications (e.g., ArcoSpark, Conoco, Exxon USA, and Coronado Generating Station), industry reports (e.g., Intermountain Power Project Socioeconomic Impact Mitigation Plan, Bonanza Power Plant Project Socio-Economic Impact Monitoring Report #1, and Tennessee Valley Authority Socioeconomic Monitoring and Mitigation Reports), state reports (e.g., Wyoming Industrial Siting Council Agreements and State of Colorado, Division of Impact Assistance, Assembled Materials), federal documents (e.g., Environmental Impact Statements and DOE, BLM, and USGS reports), literature (e.g., articles, books, proceedings, and speeches), and a personal and professional network of local, state, and industry contacts. The mitigation efforts described herein are not all inclusive and a few efforts have been halted or postponed as their sponsoring companies have closed, slowed, or postponed their respective resource development projects. Each mitigation effort is the result of a particular set of circumstances (site accessibility, labor availability, area accommodation, permit requirements, company experience, project timeframe, and community/impact area attitudes and fiscal conditions). Some mitigation actions may work for one company's development area and not at another's; some companies may not even try certain mitigation actions. The following is a review of seven types of mitigation efforts: 1) transportation; 2) housing; 3) education; 4) public utilities; 5) health, public safety, and recreation; 6) miscellaneous; and 7) company-community interaction.

Transportation. In an April 1981 survey of United States energy projects which this author undertook, twenty-four energy companies were found to be involved with or in the serious planning stages for worker transportation programs at forty-two energy project sites (power plants, coal and uranium mines, and oil shale facilities) (Metz, 1982). Other natural resource companies also are involved in transportation (Denver Research Institute, 1978 and 1979). Companies use buses, vans, and bus/van combinations; almost half of the companies in the author's survey offer free transportation to workers, the majority of the companies sought nominal fares to complete cost recovery. The company-sponsored transportation programs purport to conserve energy, reduce area traffic, aid hiring and expand the available number of potential workers, ensure competitiveness with nearby projects, encourage punctuality, reduce absenteeism and turnover, improve a worker's safety and productivity, address union and employee demands, solve parking problems, improve employee morale, serve as a negotiated worker benefit and as a corporate philanthropic gesture, meet state/local permitting concerns, mitigate community resistance to a project, and be cost effective.

The very first decision which a company must make at a project site regarding the initiation of a worker transportation program is whether the company needs to become involved. Long commuting distances and/or times combined with poor quality access roads, as at Rocky Mountain Energy's (RME) Wyoming Bear Creek Mine, weather discomforts, such as the hot summer temperatures at the Arizona Public Service (APS) Palo Verde site, fogs and black ice, around the Washington Water Power Creston

site, inclement winter weather, in the Colorado West Slope area, traffic hazards, such as wild deer and antelope, make the need apparent. Physical site inability or company unwillingness ($500 for each temporary parking space and $100 annual maintenance) to provide adequate parking can create a need. Influencing worker relocation to or from community (to Wright and Gillette, away from Douglas, Wyoming) can be achieved through a transportation program. Programs can be initiated as a recruitment tool or to counter area company-sponsored programs as are prevalent in the Rock Springs-Green River and Gillette areas of Wyoming and the Colorado West Slope. Some state vehicle liability and insurance laws curtail employee ridesharing efforts, causing industry to provide remedies. Almost two dozen energy and A/E companies have corporate ridesharing programs and due to the corporate policy of fostering ridesharing they quickly spread to rural resource developments. Employee problems (late arrivals, travel strain, injury, and commuting costs) have, on occasion, been considered of sufficient magnitude to warrant a program. Unions and worker organizations have also become more aware of this benefit and are bargaining for it. A need for a transportation program, though, can be diminished at any point in time as a consequence of company-caused efforts or independent events, such as changes involving state or local vehicle or insurance regulations, housing accommodations, community infrastructure, construction schedules, labor availability, federal or state grant or loan funding, private enterprise initiative, per diem payments, or community mitigation efforts.

If the need dictates a worker transportation program, then four factors pertaining to the mode of transport need to be analyzed - vehicle type, size, interior, and cost. Vans are flexible, able to collect small clusters of workers living in widely dispersed locations, while buses operate best when transporting a large number of workers long distances. Vans come in 12 to 15-seat capacities, buses can seat 18 to 56. Vehicle interiors range from lean to deluxe (air-conditioning, stereos, cloth seats, reading lights, adjustable backs, carpeting, panelling, and restrooms). Costs range from $9,000 to $14,000 for a new van and $35,000 to $140,000 for new buses, with used and leased vehicles as possibilities.

When determining the mode of transportation, parallel consideration must be given to six operating factors: 1) operator - should these jobs be handled in-house or partially or wholly contracted out?; 2) responsibilities - do the workers, drivers, contractors, or project management make decisions on pickup locations, passenger assignments, parking, rules, and routes?; 3) worker schedules - can adjustments be made among shifts and workers?; 4) rules - do the company, passengers, or contractors create and enforce them?; 5) maintenance - should this be handled at the site by company or contractor, off-site on employee's time, or by contractor?; and 6) drivers - are they professionals, project employees, or company employees hired by a contractor?.

Companies have varying attitudes toward the expense of transporting workers as well as expectations of cost recoupment. The 1981 per mile cost of a van program from company experience was estimated to range from a low of around $0.35/mile to a high of possible $0.60/per mile; for 600 riders using 75 vans (5 spares) averaging 73 miles per day an annual cost range of $500,000 to $850,000 is probable. Per mile 1981 bus costs were estimated to range from a low $1.30 to an approximate high of $2.50; for 600 workers using 15 buses (2 spares) averaging 73 miles per day an annual cost of $500,000 to $2,250,000 is probable. Multiple trips per day by each vehicle could reduce costs (Metz, 1981).

Industries have also become involved in other aspects of transportation including road construction and maintenance, traffic congestion, and airports. Some impacted communities have applied for state or federal funds to either fully or jointly fund many transportation network improvements.

In supporting concern over new roads and improving existing roads, resource companies have made both monetary and labor and materials contribution. Intermountain Power Agency (IPA) has funded a $46,000 traffic study of Millard County, Utah. Rio Blanco Oil Shale (RBOSC) has contributed $300,000 for the study and design of a new Colorado county road. Union, Multi-Minerals, Colony, RBOSC, Cathedral Bluffs, and Gulf Minerals have been involved in new by-passes for the communities of San Mateo, New Mexico, Parachute, Colorado, and Rifle, Colorado. Western Fuels Utah has agreed to $2.4 million to connect the isolated town of Scotia, Utah, with communities to the west. Deseret Generation and Transmission (DG&T) is reimbursing Uintah County, Utah, for new road construction. Utah Fuel prepaid sales and use tax of $7 million to have the State of Utah construct a 13.5 mile highway. Texasgulf and Western Fuels have committed $1 and $1.6 million, respectively, to developing mine access roads in New Mexico and Colorado. In improving and maintaining existing roadways, companies such as Washington Public Supply System (WPPSS) have made payments to a dozen Washington communities near two nuclear sites totalling $20 million and Colowyo matched state funds to improve

three Colorado West Slope bridges. RBOSC and Multi-Mineral paid for Rio Blanco County's (Colorado) Piceance Road repairs, North Antelope Coal is to widen and improve nine miles of Campbell County, Wyoming, road, Anaconda and Colowyo have graveled roads near their mine sites in New Mexico and Colorado, respectively, IPA will be paying for improvements to Millard Country's Bruck-Wellman Road, Kerr-McGee has provided materials for bridge and cattle guard construction in New Mexico, and several other companies have helped in similar efforts, as well as the provision landfill, engineering services and surveys.

In order to reduce traffic congestion resulting from worker ingress and egress at a site, companies have sponsored numerous traffic control studies. Companies have proposed staggering the arrival and departure times of various segments of their workforces, as well as readjusting their entire project's shift schedules on a seasonal or year-round basis so as not to compound area recreational, industrial, other resource project, special event, or commercial traffic. Other decongestion efforts involve installing new traffic lights, special routing of access roads, designating specific local roads off-limits to workers, hiring traffic policemen, and suggesting alternate routes to workers. Resource companies have also been assisting some communities which straddle railroad tracks and are effectively cut in two during the passage of mile-long trains as was the case in Gillette where Burlington Northern, State of Wyoming, Campbell County, and City of Gillette all contributed one-quarter of the cost of an overpass.

Natural resource companies, especially those situated in remote locations, are becoming more involved with airports. IPA assisted Millard County both in applying for funds from the Airport Users Trust Fund, administered by the Federal Aviation Administration, and by contributing $42,000 itself to the County airport studies. Missouri Basin Power Project (MBPP) contributed to the cost of improving the Wheatland, Wyoming, airport through a $50,000 grant. Portland General Electric (PGE) agreed to front-end Arlington, Oregon, airport improvements in exchange for a 25-year waiver of landing fees. Western Nuclear and other companies in isolated locations sometimes put in their own airstrips or helicopter pads.

One entirely unique company involvement in worker transportation would have been Colony's proposed $10 million gondola system to carry workers 1.2 miles and 1800 feet in elevation to the oil shale work site on the Colorado West Slope.

Housing. Housing initiatives by industries during the past decade have met with success and failure. Some of the praise/blame can be attributed to company management and staff decisions and non-decisions, consultants, regulator inputs, economic exigencies, field implementation, and a combination of initiative and experience, or the lack thereof. Before committing itself to a housing initiative, a company should review the following eight decision points: 1) housing functions - is the housing to supplement, stimulate, or create area housing and is the need temporary, permanent, or transitional?; 2) housing users - are inhabitants to be single workers, workers and their families, general public or special population segment, or a mix of project and non-project families?; 3) housing type and quantity needs - need to determine number of units, types (bachelor, MH, RV, single-family, and multi-family), and ratio, transitional capability, permanency, and whether of an adequate, marginal, or showplace quality?; 4) monetary expectations - is a profit, breakeven, or a loss expected and is the involvement to be balanced against project worker, schedule, or profit benefits?; 5) role of industry - how visible and how involved in the stimulation or supply of housing and worker financing should a company be?; 6) housing unit location - is the housing to be a separate entity, an expansion or extension of a community, within or outside corporate limits, or facility adjacent?; 7) responsibilities after housing is completed - at what point will a company divest itself of any obligations to the housing or its control?; and 8) amenities and community sharing - to what extent will a company develop housing and community quality of life amenities, co-fund community facilities and infrastructure, or share its housing project amenities with a community?.

Industry housing ventures can be separated into two types of initiatives: first, direct supply of housing units and second, stimulation of housing units utilizing indirect techniques. The direct supply of housing offers the greater range of initiatives and control over timing, location, type, quality, and cost of housing, but increases the responsibility.

Recent housing supply initiatives by natural resource extraction and conversion industries can be divided into four major categories: 1) new towns and rebuilt existing towns; 2) temporary housing; 3) permanent subdivision development; and 4) housing assortments.

1) New towns and rebuilt existing towns - during the past decade five large new towns have either

been initiated or planned by resource companies: Atlantic Richfield's (ARCO) Wright, Wyoming; Plateau Resource's Ticaboo, Utah; Southern California Edison's Kaiparowits, Utah; Island Creeks' Buchanshire, Virginia; and Colony's Battlement Mesa, Colorado. A private developer is building Spring Creek near NERCO's Montana coal mine. Western Energy bought and rebuilt the town of Colstrip, Montana. The plans for these new towns and rebuilt existing towns differ from the "company towns" of the past in terms of ownership, quality, resident consideration, and style. They are all contemporary masterplanned, quality communities designed in a deliberate, highly flexible style of separate residential sections surrounded by open space (green belts and "pocket parks"). Variable housing and growth rates are taken into consideration, as well as environmental harmony (Metz, 1977).

The present generation of new town development differs from the housing efforts of the uranium industry in the 1950s and 1960s, a strategic necessity for the isolated mines. Two towns, Western Nuclear's Jeffrey City and Pathfinder Mine's Shirley Basin, and two villages situated at Federal-American Partner's (FAP) and Pathfinder's Gas Hills mines, Wyoming, and two villages at Anaconda's mine and mill near Grants, New Mexico, are unincorporated, company subsidized, and company-owned housing efforts. The two Gas Hills' villages have recently been demolished and similar plans are in the offing for Anaconda's. There are still numerous examples of company towns, built during the late 1800s and early 1900s, which are in operation today (Allen, 1966).

2) Temporary housing - Temporary housing is needed during construction both to attract and retain quality workers and lessen community impacts. Industry provisions of temporary housing is due to: the increased cost of mortgage money which means more commuting by construction workers due to an inability to buy and sell homes readily; skilled workers are more selective in choosing projects with quality housing and recreation facilities; workers, on the average, are better educated and less tolerant of disagreeable conditions; proven reduction in absenteeism and turnover; community resistance can sometimes be defused by easing the effects of worker relocation in an area. Temporary housing also reduces the number of secondary workers and accompanying families. In short, it can be extremely cost effective. Of course, an involvement in temporary housing need not be made if worker relocation is balanced among several communities, a worker transportation program is initiated, successful private housing ventures properly timed, and other local recruitment, training programs, and schedule adjustment efforts attempted (Metz, 1981).

Temporary housing can be divided into three categories: single-worker or mancamp; recreational vehicle (RV) park; and mobile home (MH) park. Often RV parks are built in conjunction with a mancamp or MH park. Variations in quality and operation can be attributed to location, terrain, weather, project management attitudes, level of labor competition, facility management, and community pressure.

Temporary single-worker housing or mancamps are generally modular in construction and appear evenly split with regard to location, at a project site or adjacent to a local community. Approximately a dozen mancamps are in operation at the present time. Mancamps vary with regard to layout, unit exterior and interior quality, housekeeping services, food selections, accommodations (number of workers per room, room site, bathroom facilities, and furnishings), recreational choices, and landscaping. It has been noted that the better the camp housing, recreation, and services, the lower the incidences of vandalism and rowdyism, worker turnover, and worker/management confrontation. APS, having had numerous worker problems at a low quality mancamp at its Cholla plant construction site, is committing around $7 million to its "man-hotel" at the new Palo Verde site. Union Oil's deluxe mancamp was built to compete with other planned Colorado West Slope oil shale mancamps. Average mancamps cost between $10,000 and $14,000 per worker, the more elaborate mancamps costing up to $18,000 a worker. Workers usually pay a small, heavily subsidized weekly room and board fee which ultimately could be dropped as competition for workers increases (Metz, 1981).

Recreational Vehicle parks have been becoming more attractive and better planned as an increasing number of families accompany workers to project sites. Vehicle pads and roads are being paved, all utilities placed underground, and parks landscaped. Recreation, shower, bathroom, and laundry facilities are included; the level of amenities is the major cost factor - $3,000 to $4,500 per pad. RV parks are often built adjacent to mancamps or temporarily placed in MH parks. The vehicle mix at RV parks is leaning more toward the large travel homes than the truck or camper trailer (Metz, 1981).

Mobile Homes are a necessary housing unit at most remote construction sites. They provide cheap, temporary housing for construction worker families. Worker or project-owned MHs are usually placed

in one of three locations: combination RV/MH parks; private MH parks; or project-developed MH parks. Each park can be planned to fulfill the short-term needs of the construction boom phase and then be dismantled or allowed to remain as a permanent MH park for long-term area housing needs or have its infrastructure used for permanent housing. The vast majority of MH parks are permanent subdivision developments.

3) Permanent subdivision development - Dozens of natural resource companies have been involved in the development or planning of permanent subdivisions. A majority of the subdivisions have been located within community corporate limits, sometimes as far away as 25 miles from the associated energy facility. These subdivisions vary in housing type and can accommodate from a dozen families to several thousand residents. They can be created to contain only employees and their families, possibly some service personnel or public employees, or a mixture of employees and nonemployees. In a few rare instances, as at ARCO's Killarney subdivision in Gillette, no company employee might choose to live in the housing. Company ownership can be maintained for long periods or phased-out quickly and the quality of life can vary. There are essentially three categories of subdivisions: 1) a MH park; 2) a MH park that is adaptable to single-family development; and 3) a single family and/or multi-family development.

MH parks are being built by resource companies such as Peabody Coal, Pacific Power and Light (PP&L), MAX, Utah International (UII), Pathfinder, Allied, AMOCO, Salt River Project, Occidental Oil Shale (Oxy), Eastern Associated Coal, Cyprus, Chevron, Kerr-McGee, and Virginia Electric Power (VEP) for three reasons: 1) the flexibility which a park offers in rapid development, expansion, and contraction; 2) because workers can finance MHs easier than single-family residences; and 3) the ability of a MH park to accommodate RVs temporarily. MHs are the first housing investment of many young miners and construction workers. They offer an easy mode of housing relocation for continually moving construction workers. In many rapid growth areas where labor and material shortages are common in the housing sector, they supply a necessary initial housing response. Park quality can vary dramatically depending upon layout, road paving, spacing, and presence of concrete pads, sidewalks, street lights, recreational areas, dust and dirt, and convenants (e.g., trailer skirts, no animals, no litter, or no external structures), and pad costs range from $7,500 to $12,000 each. One problem has been the buildup of expectations among the first residents of a park about the ultimate quality of the proposed park with eventual disappointment due to unfulfilled company promises caused by project or community changes. In a few cases, companies have overreacted too positively to resident amenity demands, but the risk of overbuilding is usually a lesser evil than that of underbuilding park amenities. Often trailer pad rental fees are subsidized, sometimes services and utilities are not charged to the renters (Metz, 1979).

Adjustable MH parks which are convertible into single-family home developments have been constructed by Colorado-Ute in Colorado and MBPP in Wyoming, one each. Both subdivisions accommodated approximately 500 mobile homes, costing $5 and $8 million, respectively, and will be converted to 250 single-family home lots. A temporary zoning variance was secured for the Colorado park and variance extension was provided by the City of Craig, at its own request, due to a continued need for the MH park. This transitional form of housing accommodation was done in recognition of the large housing need of peak construction years which was followed by a lessened demand for MH parks and a greater demand for more permanent housing.

Natural resource companies have actively sponsored close to two dozen new single-family and/or multi-family subdivisions during the past decade. Energy Development, Pathfinder PP&L, Union, Eastern, Cyprus, Oxy, Texasgulf, Western Fuels, Allied, Anaconda, Kemmerer, FMC, RME, IPA, Ideal Basics, Upland Industries, SUNDECO, ARCO, Carter, UII, Cordero, DG&T, Island Creek, Mid-Continent, and PGE have at a minimum purchased the land, planned the subdivision, performed the engineering, and had the infrastructure (i.e., water and sewer lines, electric and telephone lines, and streets) installed prior to a controlled lot sale or unit construction by the company. Western Fuels and IPA are becoming involved with "in-filling" in Rangely and Delta, Utah, companies purchase lots scattered within communities and construct single- and multi-family housing units on those lots. Resource companies have been entering into single-family and multi-family housing because of a recognized need and each has a different expectation with respect to their investment recoupment. Companies differ in their opinions of employee/non-employee purchasers/renters of this housing. The Wyoming Industrial Siting Council is now requiring more than just the construction of single-family housing as a

mitigation measure; it is also requesting a plan detailing how a respective company will assist its employees in acquiring that housing. The acquisition of housing by employees had been receiving increased company attention for the past several years as interest rates have risen and local banks have refused to enter the mortgage area to any large degree (Metz, in press).

For success in any subdivision development, companies must be careful to select a style acceptable to prospective inhabitants. Special consideration must be given to the access, landscaping, storage space, builder/owner relationship, surrounding land use, matching the purchase price to employee salary levels and fiscal attitude, and developing fiscal incentive. Most companies prefer not to become long-term landlords of rental properties because they have no corporate interest in housing, little experience unless through an existing housing subsidiary, and recognize the daily aggravation of housing management.

4) Assortment - Instead of subdivisions of just single- and multi-family manufactured or stick-built permanent housing some companies have created "assorted" subdivisions containing several of the following: RV spaces, MH pads, single-family, multi-family, and bachelor quarters. Most of the temporary housing is slowly phased into the more permanent housing, though some space is set aside for continued MH and/or RV use. Phillips, Gulf, ARCO, Basin Electric, IPA, Chevron, and FMC with their assorted housing developments face the problems of internal spacing, unit mix, separation, and flexibility of new towns, as well as the added concern of meshing the subdivision, sometimes larger than the adjacent community, into that community. Texasgulf, Allied, Union, and Oxy have taken the tack of developing separate subdivisions in their impact areas for MH and RV units and permanent single-/multi-family housing. In the large assorted subdivisions determinations have to be made regarding the independence of the subdivision and the degree of county/community facility use.

Many companies prefer to stimulate the private sector to build new housing in a project area rather than to undertake the housing expansion effort themselves directly. Stimulation efforts can include: land gifts or subsidized land sale, rental or purchase guarantees, providing collateral or the cosigning of a developer's mortgage, granting housing subsidies, providing technical assistance, helping to arrange for sewer and water lines to a developer's boundary, offering land acquisition assistance, the actual development of a subdivision's infrastructure prior to lot sale, placing money in a local bank for use as a mortgage stimulus, and devising a method by which employees can secure low interest or forgiveness down payment loans or company-sponsored mortgages or mortgage differentials. The ability to stimulate housing depends upon the capabilities of the local builders and entrepreneurs, willingness of industry to forfeit a large measure of control, and a capacity to arrange terms acceptable to corporate/project management. Western Fuels contributed $522,000 to Rangely, Colorado, so that 107 acres of BLM land would be purchased and annexed for housing and commercial development; Western Fuels bought 40 acres for its 288-unit housing development and 1.5 acres for office space. Union assisted Parachute, IPA assisted Delta, Gulf assisted Grants, and Anaconda assisted Tonopah, Nevada, in annexing their housing sites.

Examples of stimulation are numerous. For instance, Beth-Elkhorn Coal conveyed 606 acres of Kentucky land valued at approximately $160,000 to a non-profit home building corporation for $2,000, while Eastover Mining in West Virginia donated a former coal company town and land to a non-profit group for housing development. Carter has purchased and agreed to allow Gillette to annex 240 acres when it is needed for housing. PP&L has joined with several other area resource companies to cover the costs of providing sewer and water system connections to developer's boundaries. Tennessee Valley Authority (TVA) has both had its staff assist several private MH park developers design their parks and given a grant to Hartsville, Tennessee, to provide an access road and sewer/water connection to the boundaries of several developers. Westmoreland Coal provided a $100,000 interest-free loan to cover site engineering costs. Phillips, Anaconda, TVA, DG&T, Salt River Project, APS, and others have guaranteed a certain percent occupancy for a fixed number of years at area MH parks to stimulate their development. Oxy signed master leases with Rifle apartment developers to generate additional apartment construction. W.R. Grace provided collateral at a local bank for a local developer's 492-unit housing project in Craig, Colorado. RME guaranteed the purchase of 45-single family homes in Hanna, Wyoming, allowing the developer to schedule work and purchase in bulk, with company employees being given a 5% discount on their purchase. Kerr-McGee made a down payment loan of $5,000 to employees purchasing homes only in the new town of Wright, Wyoming, plus a gift of $1,500 at closing and an additional $1,000 for the first and second years, followed by proceeds with a seven year

forgiveness loan contingent upon continued employment. In order to boost housing construction during these periods of high interest rates and construction financing shortages, ARCO has purchased 14 new homes and financed 19 to be built in Wright for resale or rental to employees. Seven coal companies and the United Mine Workers formed the non-profit Coalfield Housing Corporation in 1970 to identify and obtain suitable housing development sites in West Virginia and to attract private developers/lenders to create the housing. Numerous companies have made monetary or service contributions to improve community infrastructures, particularly sewer and water systems to allow or stimulate development (Metz, 1977).

Companies have devised many methods to assist their workers in financing area housing and usually it is focused on that company's specific housing development. Energy Development sold several of its houses in Hanna under a rent/purchase option whereby once enough rent had been paid to Energy Development to equal a 5% mortgage downpayment it was transferred to a local bank with the mortgage applications. Ideal Basics carried employee, especially those with no or poor credit ratings, mortgages for two years to provide assurance to a local bank of the owner's fiscal reliability. Pathfinder absorbs a percentage of the lot and house price as an incentive to its employees to relocate to its single-family home subdivision in Wyoming. Basin Electric developed a special mortgage fund whereby the utility purchases employee mortgages as investments. Some companies are considering mortgage differential assumptions, while others shy away from any employee house financing schemes due to collection payment problems, especially after employee terminations (Metz, in press).

Education. Resource companies, when locating in rural areas, become involved in education facilities and programs essentially for six reasons: 1) a revenue lag time delays new school financing; 2) debt or bonding limit of a rural community is insufficient; 3) existence of a jurisdiction-tax revenue mismatch; 4) necessary for recruitment; 5) part of a permit requirement; and 6) shows commitment by the company to the community's well-being. In some instances, public relations can enter into the picture. There are many companies which feel that their tax payments are sufficient to compensate for the influx of school-age children and it is up to the state to remedy jurisdiction-tax revenue mismatches or allow tax pre-payment.

Assistance in mitigating school system impacts and upgrading a system has taken the form of land donation, in lieu of tax payments, prepaid taxes, gifts of buildings and equipment, monetary contributions, offers of labor and material, scholarships, employment programs, donations of educational material, and infrastructure/service assistance. While some assistance is the result of leveraging by, for instance, the Wyoming Industrial Siting Council, most is the result of a company's initiative or response to a community's recognized need.

As land is a common gift to school districts, often sites are located in planned subdivisions so as to enhance a company's subdivision and make the donation process easier. Colorado-Ute in Craig, ARCO in Wright, PP&L in Rock Springs, Colony in Battlement Mesa Western Energy in Colstrip, Phillips in Thoreau, Pathfinder in Shirley Basin, Gulf in Grants, MBPP in Wheatland, and AMAX and Carter in Gillette, for example, have donated land. A few resource companies, for instance, Texasgulf in Rock Springs and Tucson Electric in Springerville, Arizona, have actually given school buildings. Others, for instance, Colony, Amoco, Western Fuels, DG&T, IPA, and Union, gave front-end financing, some as a pre-payment of taxes. Many companies have contributed modular classrooms, unused office trailers, and additional funds to expand or refurbish existing school facilities and to supplement teacher salaries. MBPP assisted in new school construction by guaranteeing $5 million in tax-exempt bonds for a non-profit organization, which then leases the school facilities to the Platte County School District No. 1 in Wyoming.

A variety of companies have agreed to formulas which result in funding project-related school-age children. TVA has provided $1.4 million in mitigation payments based on the number of children of construction worker movers into the Hartsville area. VEPCO agreed to pay the costs of construction worker school children in two surrounding counties which do not receive project tax revenue. Puget Power and Light had agreed to make monthly payments on a per child operation and maintenance cost times a 1.5 secondary impact child factor to area schools. WPPSS agreed to a complicated formula of "pupil year" construction and operation and maintenance funding. Western Fuels has agreed to cover the costs of any school children above a negotiated baseline number.

Beyond such terms as free water to a Wyoming baseline school by Amax and the donation of school athletic fields in Hanna, Wyoming, companies provide funding for scholarships, special college degree

programs, information programs, and student employment. RME was to donate title to a coal reserve to Western Wyoming College for a mine training program. Several oil shale companies are providing funds, instructors, salvage equipment, and grantsmenship to establish or upgrade technical and engineering programs at Western Colorado schools.

Of course, there is always the negative example of the Green River School District building a school on land donated by a company in its subdivision only to find that the subdivision then was not built.

Public Utilities. A key growth inhibitor and major point of contention during a rapid growth period are inadequate community sewer and water systems, including insufficient well/treatment facility capacity, trunk line size, and distribution/collection lines. Usually assistance in upgrading and expanding these systems is a consequence of involvement in the supply/stimulation of area housing. Almost all temporary housing developments and some permanent developments, have their own independent systems. While companies can sometimes rightly claim that tax revenues should pay for system upgrading and expansion, often a lag in revenue, jurisdiction-tax revenue mismatch, or debt limits means systems cannot accommodate growth.

Resource companies have made numerous mitigation contributions to impact area communities. Western Fuels has agreed to commit $3,375,000 to improve Rangely sewer and water facilities. Colorado-Ute gave $915,000 to the City of Craig in order to receive permission for its Shadow Mountain Village. Union prepaid Parachute $600,000 in sewer and water tap fees and Colony prepaid $100,000. Part of Cyprus' $10 million mitigation effort in Challis, Idaho, involved a sewage treatment plant and new sewer/water distribution lines. DG&T prepaid one Utah water district $50,000 for future water connections and made grants of $1,340,000 to four area sewer and water districts based on a formula of project-related personnel distribution and current facility construction costs. Upland Industries enlarged the Green River water system and installed a temporary sewage treatment plant (to be replaced by municipal facilities later) at a cost of $750,000 to initiate a housing development. FMC invested $109,000 in Lyman, Wyoming's sewer and water systems, to compensate for the mismatch with regard to project taxes and employee location. IPA has given over $1 million to four communities to study and upgrade water systems, as well as $1.5 million to upgrade sewage systems in two communities. Kemmerer Coal and PP&L plus several other companies are paying half of the Town of Kemmerer's, Wyoming, share of an improved system. TVA has provided funds to Hartsville and Carthege, Tennessee, while PGE advanced money to impact communities in Oregon with no pay back obligation and prepaid some communities for future hookups. WPPSS has signed numerous construction impact agreements with State of Washington communities for over $1.5 million. MBPP guaranteed a $3 million loan for Wheatland system improvements.

Some company contributions have been earmarked for special projects. PGE contributed $5,000 to have a waterline laid to a school boundary in Boardman, Oregon. Ull gave $100,000 to Craig for a water tank, as well as a no-interest construction loan. MBPP contributed $7,000 to a Wheatland water well, while PP&L spent several hundred thousand on exploratory well development for municipal wells; reimbursement by the City of Gillette is contingent upon success. North Antelope Coal has provided Gillette with a $150,000 system design grant and NERCO has provided Douglas with a $90,000 system design grant. Phillips gave land to Thoreau for a water tower, as well as funds for its construction. Phillips also makes payments for the cost differential between pre-project small distribution pipe and present pipe size now needed due to demand from the housing development. Several companies in the Gillette area covered the costs of extending sewer and water lines to the boundaries of properties which were later sold to developers.

Company contributions have also taken the route of assistance/donations of technical expertise, equipment, or facilities. Anaconda and Gulf donated engineering expertise to Grants with regard to the sewage system. Gulf drilled a water well for San Mateo. Kaiser and U.S. Steel presently supply water to East Carbon and Sunnyside, Utah, from their nine reservoirs. Valley Kamp has loaned its pumps and pipes to the community of Scoefield.

On occasion public utility system mitigation can be in anticipation of problems. TVA paid three-quarter million dollars for new water wells and a water pipeline for Crown Point, New Mexico because of possible damage to the present system by several companies proposed area uranium mines.

Health, Public Safety, and Recreation. Public health, safety (police and fire protection), and recreation are three areas where companies contribute and employees volunteer frequently to improve area services and facilities. Improvement is essential to obtaining and maintaining an area quality of life.

While mine and plant sites are generally self-sufficient in guards, fire apparatus, trained fire and emergency crews, nursing staffs, and ambulances companies rely on area hospitals for special care and emergency treatment and community fire and police service to protect its workers and their families off-site. Mental health and recreation are achieving greater recognition today by companies.

Companies either on their own or through area industrial organizations (e.g., Southwest Wyoming Industrial Association (SWIA), Wyo-Mont Industrial Association, and Overthust Belt Association) have committed themselves to doctor and nurse recruitment (advertising, visitation costs, moving expenses, and guaranteed banknotes for use by doctors in setting up practices) and sponsorship of emergency medical training; clinic construction (e.g., PGE, FMC, Allied, U.S. Steel, Kaiser, and Montana Power), leasing ($1/year by Salt River Project), and equipping (e.g., Kaiser, Montana Power, and PGE); hospital support, expansion and upgrading, including new equipment, on a one-time (Western Fuels - $876,000 to the Rangely Hospital District; WPPSS to Prasser Hospital - $57,100; VEP to a Bact County Hospital; and IPA to the West Millard Hospital District) and annual basis; gifts of ambulances (e.g., Allied, IPA, and Arch Mineral); emergency radio communications (FAP); mental/human services/alcohol/drug programs (MBPP donated $250,000 to Wheatland and companies through the Gillette Chamber of Commerce Industrial Committee support area efforts) and a medical evacuation helicopter in Grand Junction, Colorado, supported by seven mining companies. In a few instances, companies give manpower and equipment, such as when SUNEDCO wired a hospital's emergency generator and constructed housing for it and Kerr-McGee donated nine days of heavy equipment operation to remove rocks from a hospital site.

Occasionally public health efforts by companies have expanded into peripheral areas as when Kerr-McGee gave land and Anaconda gave $30,000 for a new nursing home in Grants. Or, when United Nuclear and Gulf Minerals gave $30,000 to a Grants senior citizen's home.

Companies are usually quite willing to assist in the provision of fire protection for the remote communities in which their workers reside and workers are often volunteer firemen. FAP, United Nuclear, DG&T, Cyprus, Carter Mining, Western Energy, ARCO, WPPSS, TVA, and Salt River Project have contributed an assortment of new and used fire trucks, equipment, and fire stations. Gulf has run training programs for the San Mateo Fire Department. Western Fuels gave a lump sum of $120,000 to the Rangely Fire District. Increased fire protection lowers insurance rates for a whole community.

Company opinion is divided on providing funds and equipment to police departments. The Campbell County Sheriff's Department and City of Gillette Police Department have policies of not accepting gifts or contributions from mining and energy companies because it could compromise the departments if a strike or project management/employee friction developed. Yet, there are many instances of company assistance to police departments and the officers themselves. WPPSS, TVA, and VEP make mitigation payments to area police departments. Union and Colony approved, and RBOC was in the process of approving, impact payments to police departments. Union's payments to Parachute include $9,000 for a police car and equipment, and $43,000 annually for three years for two police officers, as well as payments for Garfield County deputy cars and officers. Cyprus bought several new police cars for the town of Challis. Kaiser gave a car to the Sunnyside Police Department. DG&T is supplying grant funds to Vernal and Uintah County, Utah, to assist in equipment and personnel expansion costs. IPA is giving financial assistance for a new public safety complex, deputies, equipment, and training in Millard as well as $50 a month to a sheriff's deputy assigned to a remote mine site MH park. IPA has also contributed to equipment and substation needs of State Highway Patrol and County Sheriff Departments.

Recreational needs of host communities and company-involved housing projects are a favorite for resource company contribution—monetary, equipment, and labor and materials. Utilities are well-known for the swimming, boating, educational, and wildlife facilities, passive and active, at power plant sites. Some mining companies are also including recreation in their reclamation plans. Mostly, resource companies are becoming known for their tens of millions of dollars in recreation centers, community centers, swimming pools, tennis courts, libraries, playgrounds, target ranges, jogging trails, bicycle paths, golf courses, baseball fields, horseshoe pits, shuffle board courts, open areas, "tot" lots, and large sodded parks which are built to accompany new towns, large subdivisions, and temporary housing facilities. Recreational facilities at temporary housing developments are often turned over to a community when the housing is no longer needed for project workers.

Resource companies have also become involved with a variety of recreation initiatives which are non-housing development related. Western Fuels is paying $820,400 to the Rangely Recreation District.

DG&T has made grants worth one-quarter million dollars to Uintah County and Vernal for the construction of additional recreation facilities and for salaries. IPA is contributing part of the three-quarter million dollar cost for new parks in Millard County and Delta City. Three utilities - TVA, PGE, and WPPSS - are supporting playgrounds and parks in their respective impact area communities. Gulf Minerals and United Nuclear have given city parks to Grants (one was eight acres). Ballfields were constructed in Gillette by Carter and in Grants by a resource company subcontractor using company earth-moving equipment. Kaiser and Kemmerer gave golf courses to Sunnyside and Kemmerer and Ull gave in-kind through use of its equipment to improve a golf course in Craig. ARCO underwrote an equestrian program in Gillette. Almost all resource companies have given in money, equipment, and employee time to little leagues, softball teams, community rodeos and scouts. Community and area libraries are also recipients of company contributions by WPPSS and Western Fuels.

Miscellaneous. Resource companies assist communities in a variety of ways beyond those mentioned in the above categories. Some of these imaginative mitigation efforts can be tried almost universally, as with assistance for planners, grantsmen, workforce training, monitoring studies, and fiscal practices while others are unique to a project impact area.

Companies have been assisting local communities in the development of masterplans, ordinances, and codes to manage growth and to secure state and federal funds to alleviate impacts. Planners have been funded by single companies (MBPP, Montana Power, ARCO, Western Fuels, and PGE) and company associations (Wyoming Mining Association) and loaned by companies (RBOSC, IPA, and TVA); planning studies have been funded by companies for communities, counties, and impact areas (Oxy - $260,000, RBOSC - $333,000, Colowyo - $70,000, RME - $75,000, IPA - $85,000, WPPSS - $58,000, and Northeast Utilities - $40,000). In order to secure maximum state and federal funding specialized grantsmen have been hired by Gillette, Moffat County, Colorado, Millard County, and Franklin County, Washington through funding by the Gillette Chamber of Commerce Industrial Group, Colowyo, IPA, and WPPSS, respectively. Monitoring growth and change is essential in rapidly growing communities, especially for those communities impacted by several projects. Companies (MBPP, North Antelope Coal, Antelope Coal, Carter and Mobil) recently proposing large resource developments in Wyoming are required to monitor socioeconomic change. Resource companies in Colorado have to monitor employee residence location in keeping with the severance tax disbursement formulas. Other companies (Pennsylvania Power and Light, Western Fuels, DG&T, IPA,Basin Electric, Salt River Project, TVA, Otter Tail, Commonwealth Edison, Kansas City Power and Light, and Duke Power) monitor change for their own knowledge or as a function of company-community agreements (VEP and WPPSS) for impact payments.

Resource companies recognize the benefit of utilizing as much local labor as possible to reduce area immigration. Some companies offer special training programs for local residents, as well as to American Indians when a project is located near or on reservations.

Resource companies and state siting commissions have become more involved in local fiscal matters as the need for maximizing local revenues has become apparent. Local banks in impact areas are now becoming the location of corporate checking accounts, certificates of deposit, and project payrolls. Companies and many contractors and subcontractors are utilizing tax transfer techniques to maximize local receipt of sales and use taxes. Equipment suppliers and maintenance firms are being pressured to open local offices. Corporate offices are being situated locally as in the case of NERCO's Spring Creek Mine in Montana. The $2 million corporate office was located in Sheridan, Wyoming, where the employees had chosen to reside to bring tax revenue to that community.

Only in a few instances have companies subsidized local administrative costs attributable to a project (IPA - Millard County, Delta City, Hinkley, Oak City, Lynndyl, and Teamington, Utah, and Western Fuels - Rio Blanco County and Rangely). Companies have helped with a variety of administrative costs: Carter is to fund a $20,000 feasibility study on converting a school for Gillette city offices; TVA has funded local planning commissions; Empire Energy gave Craig a payroll machine; and IPA and ARCO have contributed to administrative office facilities. Numerous companies have donated secretarial, photocopying, and printing assistance.

Assorted unique mitigation efforts have also been proposed and performed. Land for churches has been given by ARCO in Wright, Gulf in Grants, Phillips in Thoreau, Western Energy in Colstrip, and Colony in Battlement Mesa (10 lots). Mine water from Kaiser's Sunnyside Mine is used by the Sunny-

side to irrigate local parks. Braztah relocated, at no expense to the homeowner, 72 houses from its Castlegate, Utah, property to a new subdivision with a lot and basement provided. Fort Union Coal has offered two tons of coal free to each Gillette resident aged 62 or older. Antelope Coal is to subsidize Douglas day centers $2 per day for each employee utilizing the facilities. Cyprus gave Challis a bulldozer for their landfill. Plateau allows the Ticaboo TV antennae to be hooked up to its transformer. Big earth-moving equipment from the Rawhide and Caballo occasionally helps with snow removal when blizzards strike Gillette. Carter corrected a drainage problem near a Gillette elementary school to eliminate a hazardous water hole. Monterey has offered water from a lake on its property to Carlinville, Illinois in case the community's reservoir is depleted. There are numerous other examples which could be cited.

Company-Community Interactions. An increasing number of resource companies are putting more emphasis on company-community interaction. This is partly due to the passage of the National Environmental Policy Act of 1969 and the increasing state and Federal permits and agency reviews. But, companies have also recognized the benefits of a prepared community and mitigated impacts. Interactions are not to be considered the solution to all problems and the manner of interaction varies with each pair of participants or group of participants (Cluett, 1979).

The process of interaction is still not an established art. There are varying levels of personnel interaction (community leaders, citizens, state and local government officials and company executives, representatives, and employees), intensity (occasional meetings, newsletters, regular meetings, and a local representative), and styles (presentations, negotiations, and adversarial proceedings). Many companies are placing project representatives in planned site areas to collect local input and disseminate project information, as well as act as a liaison and conduit of concern and questions. Timing of the interactive process is important and must be initiated in the formative stages of the project. Respect for the needs and concerns of each party is also essential.

Solitary projects, for example Anaconda's Molybdenum Mine in Tonopah, Cyprus Mines' Molybdenum Mine in Challis, MBPP's Laramie River Station in Wheatland, VEP's Pumped Storage Project in Bath County, Virginia, and Intermountain Power Agency's Intermountain Power Project in Delta, have taken great strides in interaction. The result is general public support from area residents and mitigation efforts that are reasonable and considered successful to project and community participants.

Where multiple projects are impacting areas, for instance, Gillette, Evanston, Rock Springs-Green River, Grants, Bismarck, North Dakota, and the Colorado West Slope, voluntary industry organizations, some with community participants, have been formed. Five energy companies in 1977 organized the Inter-Industry Technical Assistance Team (ITAT) to monitor socioeconomic change and provide Mercer County, North Dakota, citizens and public officials with technical assistance. In Sweetwater County, Wyoming, 12 major companies involved in coal, electrical generation, and trona mining formed the Southwest Wyoming Industrial Association (SWIA) to provide employment information, limited legal, engineering and management services to area communities, and help in front-end financing. Three big oil firms organized the Overthrust Industrial Association to coordinate aid to communities impacted by energy development in the Evanston area. A Wyo-Mont Industrial Association was formed in Sheridan to collect, assemble, and disseminate information on energy developments in Sheridan County, Wyoming, and Big Horn County, Montana. There is always the concern among these area company organizations over a potential perception of company collaboration to the detriment of the public or a government anti-trust initiative. But, company organizations can be a valuable asset to an impact area and provide mitigation efforts beyond that which is normally initiated.

Conclusions

Natural resource companies are committing large amounts of capital to a wide range of new extraction and conversion projects. The fiscal consequences to a company of any schedule delays or workforce problems are mounting, and companies are recognizing that it is in their best interests to invest time and capital in enhancing beneficial and mitigating adverse socioeconomic impacts. Mitigating the adverse impacts receives the most attention by companies, communities, consultants, experts, and state and federal governments. Mitigation is the focus of conflicting opinions regarding

responsibility, strategy, and effort. There are no hard, fast, or tried and true rules for company involvement in mitigation efforts. Each mitigation effort must be tailored and negotiated to match the unique characteristics of individual projects and circumstances of specific locales.

Companies must assume financial responsibility for the temporary impacts and area needs created by their projects. They must also offer financial and technical assistance to impact areas, not just the host political jurisdiction, when local, state, federal, and special fund sources of revenue or technical assistance are not available or insufficient. But, local, state, and federal governments must also recognize their responsibilities and make adjustments in tax jurisdiction boundaries and disbursement formulas so that impacted areas are properly defined and receive an adequate share of lease, royalty, severance tax, permit fee, special use and service charges, and sales tax payments. Laws need to allow innovative uses of tax pre-payments, housing mortgage bonds, changeable debt and bounding limits, industrial loans with delayed prepayment, and revised revenue assistance formulas. Enabling legislation is required in most states to allow impact areas to negotiate the mitigation efforts.

Each impact area's characteristics, capacities, attitudes, legal framework, and needs have to be inventoried and evaluated with respect to one or more project's potential impacts before assumptions of responsibility can be determined. Where legal adjustments are necessary by local, state, and federal governments to assist in mitigation, these should be done promptly. Mitigation negotiations should be carried out between companies and impact area communities in good faith, with adequate consideration given to each party's limitations, desires, and financial capabilities, and as a compromise. Mitigation efforts need to be flexible and dynamic to reflect actual change as revealed in monitoring studies. In some instances, little or no mitigation is necessary by a company.

Because of recent "bust" times in many resource development communities, mitigation strategy and effort will undergo some modifications. Local, state, and company responsibilities, fiduciary and fiscal, are being reviewed and new "boom" area mitigation efforts will reflect today's concerns. Company involvement in impact area mitigation will surely increase as a result, as well as an involvement in an impact area safety netting in case of "bust."

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Common Socioeconomic Program Elements in Four Large Construction Projects: Implications for Alaskan Community Strategies

Sheila F. Helgath

Introduction

The socioeconomic impact programs of four construction projects were examined for applicability to the development of a socioeconomic program for the Alaska Natural Gas Transportation System. The projects were the Trident Submarine Base construction in Washington, the Washington Public Power Supply System, the Northern Tier Oil Pipeline and the Western Fuels Deserado Mine in Colorado. It was found that these projects contain common elements, described below, that contribute to successful mitigation strategies. It should be stressed that comparison of these projects to Alaskan projects may not provide a completely accurate picture of the development process of a mitigation program. The socioeconomic efforts in these projects are most valuable as conceptual frameworks for developing local Alaskan community strategies. Though the impacts may be quite similar in a coal fired electrical utility, a military base, and/or a pipeline the legal mandates under which projects are developed, the funding sources (i.e., private vs. public), and the duration of the impacts may dictate different responses. Other factors which influence the projected need for an impact mitigation program and its cost include the initial size of the existing community, the population growth rate, the public management abilities of the community, the type of development, and attitudes toward growth (Sanderson, 1977). All of these factors have to be considered in the local communities strategy for controlling negative impacts and enhancing positive impacts.

The four projects selected were of a size equivalent to Alaskan resource development projects. The Northern Tier Oil pipeline was selected as an example of a contemporary, privately funded pipeline similar to ANGTS. The Washington Public Power Supply Nuclear Plants No. 3 and No. 5 were selected for examination because they demonstrated the effect of the Washington Energy Facility Siting requirements approach to solving local community socioeconomic problems. The Trident Submarine base construction in Bangor, Washington, is an example of a Federally funded project and the resulting direct Federal involvement in socioeconomic mitigation. The Western Fuels Agreement in Colorado is being recognized as a prototype of future energy resource developments in the western United States. Rio Blanco County and the State of Colorado have effective facility siting and permitting processes. The characteristics of the four projects, communities, and laws under which the socioeconomic programs were developed are described in Table 1, A Comparison of Large Energy and Construction Project Cost, Social and Economic Costs, and Substantive Areas Covered by Contractors and/or Federal Government. Information was obtained through interviews and materials provided by those involved, by examining files, and by reviewing published materials.

Five Common Elements

Five elements were found in these socioeconomic programs which can guide the development of a basic structure and strategy for a local community. These elements are: (1) a professional advocacy team; (2) a local or community generated needs assessment; (3) a mechanism to match resources; (4) a special impact fund; and (5) a public participation program.

Table 1
A Comparison of Large Energy and Construction Project Costs, Social and Economic Costs, and Substantive Areas Covered by Contractors and/or Federal Government

Case I Project	Project Cost	Social and Economic Payments[1]		Work Force	Description of Existing Infrastructure
Washington Public Power Supply System (2 Nuclear Power Plants)	$7 Billion	$13 Million		6500 Construction	The counties of Thurston, Grays Harbor, and Mason already had adequate infrastructure in terms of roads, communications, and housing. The additional workers produced incremental as opposed to threshold affects. Within 50 miles of the area are Seattle and Tacoma with a combined population of over 1.5 Million.
		Transportation	---*		
		Housing & School	---*	200 Operating	
		Social Services	---		
		Law Enforcement	---*		
		Sewer/Water	---*		
		Fire	---*		
		Recreation	---		
		Library	---*		
		Information	---		
		Other Services	---*Courts, Monitoring		

Legal Authority

a. Requires Supply System to monitor Primary/Secondary Social and Economic Impacts.

b. The Washington Facility Siting Act requires payment of substantiated claims by State and all political subdivision claims net finance burdens above revenues of claimant.

Source: Jim Connely, Washington Energy Siting Commission and Dr. Ralph Murphy, Turston Regional Planning Council

Case II Project	Project Cost	Social and Economic Payments[1]	This list is not complete as costs and other issues will continue to be negotiated	Work Force	Description of Existing Infrastructure
Northern Tier Pipeline Company	$500 Million Washington State	Transportation	---*	1000 Peak Construction	Semi-rural community with National Park, National Forest, and fishing as the mainstay of the community. Port Angeles is a community of 18,000.
		Housing	---*		
		School	---	100-200 Operation	
		Social Services	---		
		Law Enforcement	---		
	$1.8 Billion for Five States	Sewer/Water	---*		
		Fire	---*		
		Recreation	---*		
		Library			
		Information Services or Impact Coordinator	--- ---*		
		Other Services	--- $16 Million for Harbor facilities relocation in Port Angeles.		

Reimbursement Philosophy and Legal Authority

The company maintained a philosophy of cooperative planning with local entities. The local communities negotiated for any costs to local governments beyond taxes and for up front preparation costs. The Company agreed to construction of the Seamans Center, to provide a small boat harbor, and other facilities to gain use of area where the existing recreational harbor is located. The Washington Facility Siting Law was in operation.

Source: Gary Smith, Northern Tier Pipeline Company

Table 1 Continued

Case III Project	Project Cost	Social and Economic Payments[1]		Work Force	Description of Existing Infrastructure
Rio Blanco Sybfuel/oil Shale Mining	$160 Million	$9 Million		(Data not available)	Rio Blanco is a rural ranching county of 2000 people on 2.2 Million acres of land. Expect $3 billion in projects in next 5 years and companies to pay for $100 Million in government services.
		Transportation	---Reimbursement for roads being negotiated.		
		Housing/Planning	---*Required of Company to provide		Legal Authority
		School	---		State law requires an impact analysis/mitigation if activity increases population 1.25%.
		Social Services	---		
		Law Enforcement	---*		
		Sewer/Water	---		
		Fire			
		Recreation			
		Library			
		Information Services or Impact			
		Coordination	---*		
		Other Services	---Mental Health		

Source: Duane Rehubrg, Rio Blanco County Planner

Case IV Project	Project Cost	Social and Economic Payments[1]		Work Force	Description of Existing Infrastructure
Trident Missile Submarine Base	$1 Billion	$75 Million		2000 Peak Construction	The existing county area work force was approximately 30,000 people. The infrastructure was in place before the construction began.
		Transportation	---$40 Million		
		Housing	---*		Legal Authority
		School	---$20 Million		Military Construction and Authorization Act Section 008 of PL 93-552: the Federal Government paid for the cost of the project, including primary social and economic costs.
		Social Services	---$15 Million		
		Law Enforcement	---*		
		Sewer/Water	---*		
		Fire	---*		
		Recreation	---*		
		Library	---		
		Information	---		
		Other Services	---Courts, Planning		

Source: John Horsely, Kitsap County Commissioner

"*" Indicates the category the local government received impact funds for, from the Company and Federal Government in the case of Trident.

Professional Advocacy Team

Resource development occurs often in communities which do not have immediate organizational structure and skills to solve the problems associated with growth. Communities have responded by developing professional advocacy teams. Professional advocacy teams are organized to help local communities identify problems, find solutions, and provide expertise in public involvement and negotiation with private industry. Professionals on these teams have a variety of skills which usually include planning, community administration, sociology, demography, legal experience, and financial expertise. These teams have been set up in a variety of ways. For example, Colorado State Law formally sets up a State agency which sends teams out to live and work in energy impacted communities. Companies have hired consultants to work with communities. The Foundation of Urban and Neighborhood Development (FUND) is an example of a consulting group which has worked under the sponsorship of large oil firms to help local communities identify needs, priorities, and goals. Northern Tier funded a community liaison officer. Usually these consultants act as facilitators, information conduits, and public involvement specialists. Another approach has been to form teams composed of State, Federal, and local members on loan to the project office. The Mountain Plains Federal Regional Council set up such a program. External professional planners provide the emphasis, organizational focus, and expertise to develop a socioeconomic program. How a team is set up depends on local and State organizations. However it occurs, this team needs to be in place during the facility-siting and design phase of a large project.

Needs Assessment

The needs assessment documents existing conditions; for example, the capacity of the local hospital or housing rental market. A needs assessment examines trends within the community's population, economic expansion, service activities level, level of unmet needs, etc. The demand(s) placed upon the community by the project should be identified during this process. The needs assessment is the systematic documentation of local, state, and Federal services. Assessments require information from social service providers and the resource development company be compiled and correlated. Technical assessments usually are prepared by professionals with assistance from key informants. Needs assessments take considerable time; for example, an assessment of Fairbanks would probably require eight months of staff time and cost $85,000 to $100,000. This estimate is the result of work jointly developed by Elstun Lausen, the Alaska State Pipeline Coordinator's Socioeconomic Officer, and myself. The estimate was based upon the costs of other similar projects completed by the North Star Borough Community Research Center.

Needs assessments are most effective when the service providers, usually the local communities, participate in the process. Outside specialists can do an adequate job of assessment, but without local participation, action to satisfy identified needs is unlikely to occur. Needs assessments, however, are difficult to accomplish because of timing, financial demands, and the availability of professional expertise. Advocacy teams have been able to facilitate the preparation of assessments by encouraging and focusing the process for local communities, by obtaining grants for planning, and by providing professional assistance. Most Alaskan communities, particularly the smaller ones, would have the above problems in developing an assessment of the potential changes occurring from resource development.

Impact Fund and Resource Matching

Special funds have been set up and resource matching has occurred in effective socioeconomic mitigation programs. These funds have been instituted through State and Federal legislation or through agreements negotiated with private industry. Rocky Mountain Western States, such as Montana, Wyoming, and Colorado, recently affected by energy development use special funds in their respective programs. Funds are in the form of single legislative grants or are earmarked receipts from a revenue source. Most of the time a board allocates these resources based upon joint consideration of population, need, merit of proposals, and willingness of applicants to match funds with their own effort and financial resources. The Alaska Constitution prohibits the establishment of dedicated funds, therefore, an appropriation by the Alaska State Legislature or the development of a Grants Program are a more likely mechanism by which the State can assist in resource matching. Local community leaders should be aware of the probable need for additional funding and should encourage strategies which will enhance resource matching by private industry, State government, and Federal agencies.

Public Participation

Resource development agencies, such as the U.S. Forest Service, have used public participation to reduce conflicts, set goals and priorities, and reduce stress by communicating with the local communities. Public participation and review has been commonly approached through citizens or public officials, boards, and commissions. To be effective the groups must have adequate financial support which enables staff assistance and, in Alaska, travel expenses. Travel expenses were a major item for the interim Alaska State Socioeconomic Advisory Committee on ANGTS whose membership was spread along the pipeline corridor between Barrow and Tok. Effective boards have resulted when good communication between political authorities such as Mayors, Governors, or Siting Councils and the citizens groups is achieved. Equally important has been the involvement of industry on these boards. Care must be taken to ensure that these boards and commissions are asked to review and provide advice on issues on which they are knowledgeable. Citizen boards should not be asked to draw up technical documents such as socioeconomic terms and conditions for a project but should be involved in setting priorities, goals, and objectives for such documents. Clearly articulating the responsibilities, authority, and effort required for these commissions is imperative. Boards and citizens' advisory groups are not the only approaches available; other forms of public participation such as surveys, polls, and hearings are valuable tools which can be effectively used by local governments. Two manuals, *Managing Growth in the Small Community* (EPA-908/4-78-005a) and the Alaska State Department of Transportation and Public Facilities, *Public Participation Manual* are useful references for local communities initiating a public participation program.

Developing A Socioeconomic Program

The above elements can be incorporated into a logical sequence of actions which will help a community developing a socioeconomic mitigation program. These steps are illustrated in Table 2, Five Steps to Develop a Socioeconomic Program. Table 2 also shows the interrelationship between the specific actions taken in developing a program and the elements described in the first section of this paper.

Step 1 — Needs Assessment

The purpose of a needs assessment was discussed in the previous section. The needs assessment provides community members with the information necessary to negotiate with Federal, State, and Company officials. Timeliness is essential if the assessment is going to be useful; therefore, assessments should be accomplished as soon as possible. If company information is unavailable, communities should not wait but should base the assessment on a range of time sequences and population growth. The needs assessment effort should produce a critical path for the community to solve growth related problems.

Step 2 — Identification of Goals and Priorities

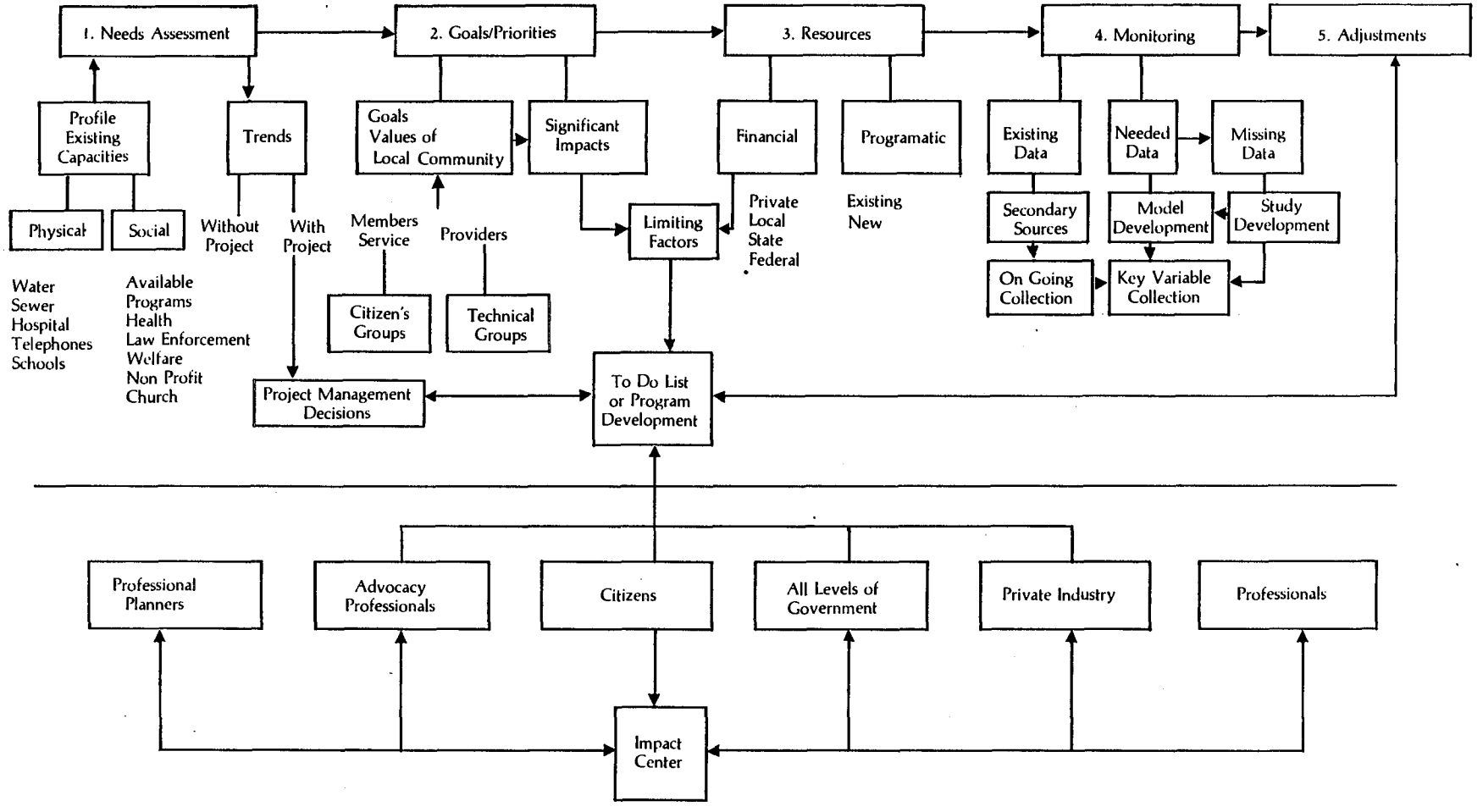
A community by definition has an identifiable economic base, shared values and goals. The identification of these factors helps the professional developing a socioeconomic program to prioritize the actions to be taken. For example, schools, health care, and law enforcement may be affected by a construction boom. One community may emphasize maintaining schools at a preconstruction level while another community may choose to emphasize law enforcement. During this step, it is important to combine information provided by local citizens, community leaders, and service providers to produce a priorities list. The objectives of this step are to prioritize goals, to identify significant activities affecting those goals, and to identify the factors which can reduce the magnitude of the negative changes and enhance the benefits of growth.

Step 3 — Matching Resources

Resources are the available organizational, human, and financial capabilities of a community to address an impact problem. These resources include existing capabilities, undeveloped potential within the community and additional capabilities that can be attracted from other levels of government and private industry. For example, an existing utility maintenance crew may have the potential for installing new systems. Schools may be reorganized for more effective use of space. Federal programs may be identified and matched with special funds for impact mitigation efforts provided by the State or the

Table 2

Five Steps to Develop Socioeconomic Program



Source: Office of the Federal Inspection, 1982.

resource development company. Innovative financing mechanisms such as leasing programs may be developed at this stage to resolve revenue shortfalls. Steps 1-3 should occur at least one budget cycle and one building season before construction begins. In Alaska, that would be 18-24 months prior to the time preconstruction activities take place. The Environmental Protection Agency has developed a time chart for major infrastructure development in the contiguous States which stress lead times of a year or more (U.S. Environmental Protection Agency, 1978). Alaska would have similar restrictions plus the additional time required for the transportation of materials to the community and the limitation of a shorter construction season.

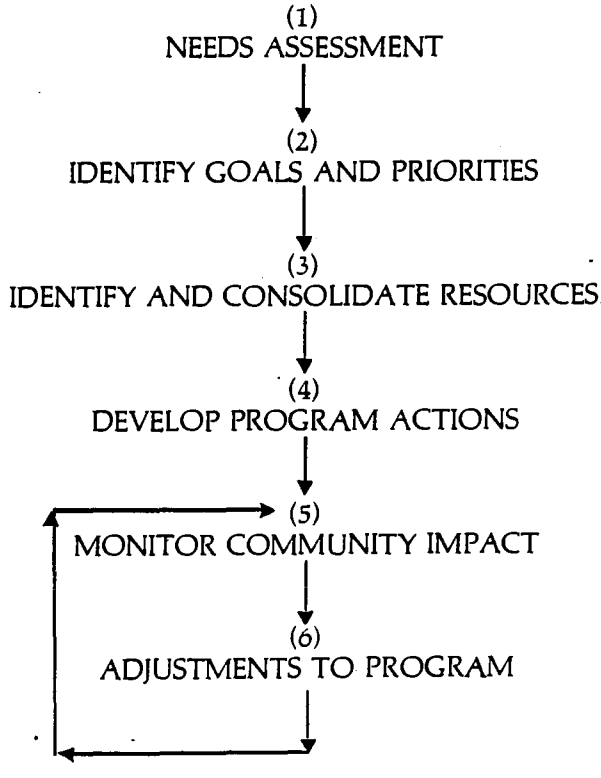
Step 4 — Monitoring

Step 4 continues the documentation of the existing situation begun in step 1. Monitoring provides a mechanism to evaluate project-induced change and the effectiveness of the impact mitigation program. Monitoring has been used to apportion level of responsibility as well. For example, population change and therefore the reimbursement for government services by the company in the Western Fuels Deserado Mine agreement, was tied to monitoring results. Monitoring systems require an analysis of key indicator variables. Ideally, this analysis is accomplished during step 1, since variables in a monitoring system should be standardized with a preconstruction information base. The purpose of this step is to provide a mechanism to evaluate project-induced change and the effectiveness of socioeconomic program actions. Monitoring provides policy makers with a method to evaluate policy decisions.

Step 5 — Adjustments

Any socioeconomic program needs to be developed to accommodate changes in the project and the local community. For example, construction schedules and labor force requirements change dramatically from the time a project is initiated to construction completion. Adjustment of an ongoing program, such as increasing staff at a local school if more students than were anticipated arrive, is an example of how a program might be changed to remain effective.

Again, the steps to develop a program are:



The roles of industry and government in this process are a policy decision, but it is generally agreed upon by those within the profession that the assessment should be done by those in local government

providing the services, with financial and technical assistance being provided by private industry, State, and Federal governments. Information, priorities, and action steps are given credibility if developed by those who are most affected.

Mechanism to Initiate a Program

State of Alaska

Mechanisms local communities use to ensure orderly resource development in Alaska may vary. The State of Alaska does not yet have a comprehensive facility siting law which would force the consideration of socioeconomic concerns, although it does have water quality and other permitting authority. Local Colorado communities, by working closely with those agencies with environmental concerns, were able to ensure that social concerns were addressed in the Rio Blanco County area. Similarly, the Washington Energy Facility Siting Council notes whether local communities have objections before approving permits. The Department of Natural Resources is required by laws (such as AS 38.35.100) to determine if the proposed uses severely conflict with existing uses and to protect subsistence resources in certain types of resource development such as rights-of-ways. Also, the law requires the Commissioner to insert reasonable provisions and conditions that protect the public interest. Broadly interpreted, these laws can apply to socioeconomic concerns. Although the above are not an exhaustive list of laws which pertain to socioeconomics, they are intended as an example of how existing legislation can help. Working with State officials, including the legislature, during the planning and siting stages for timely and coordinated assistance is the most effective way a local community can utilize State resources. Once ground is broken and the construction force is present, effective socioeconomic mitigation programs are unlikely.

Federal

During resource development, Federal agencies are required by various laws, examples of which are the National Environmental Policy Act (NEPA) and the Federal Land Management Practices Act (FLMPA), to address socioeconomic issues. NEPA requires that impacts on human communities be considered, assessed, and monitored. Local communities should insist that any resource development occurring on Federal lands which require an environmental impact statement have an adequate social impact assessment component and monitoring effort. Most Federal resource management agencies have recognized this need and have social science staffs available to do the assessments.

Federal socioeconomic involvement has varied dramatically depending on the characteristics of the project. There is more likely to be Federal involvement if the project falls under the Military Authorization Act and is a national security or defense project, and is Federally funded; or if the project is controversial. For example, if it involves nuclear power and/or wastes, and if the interest and the influence of the Congressional delegation is focused on the project, such as the Alaska Delegation's recent encouragement to the Federal Energy Regulatory Commission to hold hearings in Alaska on socioeconomic impacts of the proposed Alaska Natural Gas Transportation System. Local communities should recognize that the Federal government programs, until recently, have focused on passing receipts from resource development to local communities for roads and schools. Recent Federal legislation has broadened that scope (see Table 3, Chronology of Federal Legislation Addressing Resource Development and Socioeconomic Mitigation). Local communities' interests are not necessarily the interest of the national clientele and legislation which the Federal agencies must respond to, so strategies developed locally should also recognize that Federal assistance may be limited.

Local Communities

Each community has the option to zone land, set standards of acceptable conduct, and tax resource development. Alaskan communities should not overlook these methods as tools for implementing socioeconomic programs. Local action in producing a preliminary needs assessment and a statement of goals and priorities, consistency in responses, and willingness to work with other government agencies and industry will often produce the cooperation from these entities needed for small communities to implement a socioeconomic program.

Table 3
Chronology of Federal Legislation Addressing Resource Development and Socioeconomic Mitigation

Date	Federal Law	Socioeconomic Mitigation
1920	Mineral Leasing Act (41 Stat 449)	Allowed 37.5% of receipts be returned to local governments for schools and roads; required protection of subsistence habitats.
	Coastal Energy Impact Program	Places Federal government in a secondary role behind State and local governments.
1969	National Environmental Policy Act	Required human community conditions to be assessed and monitored.
1975	Federal Coal Leasing Amendments Act	Increased percent of revenues for socio-economic mitigation.
1976	Federal Land Policy Management Act	Required revenues received by States to go to impacted areas.
1976	Mineral Leasing Act Amendments	Increased the amount of receipts to 50% and broadened categories of receipts that could be spent on courts, sewers, infrastructure, etc.
1978	Power Plant and Industrial Fuel Use Act	Federal government can pay for planning and land acquisition for housing and community facilities in coal/uranium development.
1981	Military Construction and Authorization Act	Allows up to $1 million of Federal funds per county for impacts.
1981	Inland Energy Impact Assistance Act	Most comprehensive socioeconomic act to date. Provides mechanism and funding for an active Federal role in mitigating impacts through Departments of Energy and Agriculture. Did not pass Congress by one vote.

Conclusion

Local communities have the most to gain or lose in the development of a socioeconomic program when resource development affects their communities. Elements and a conceptual framework for developing a program have been discussed in this paper. Principles which community leaders should keep in mind while developing a program are:

Timeliness

Concern about socioeconomic impact should occur in the planning and facility siting stage—not after the construction work force arrives.

Application of Legal Mechanisms

Be aware of requirements in Federal and State laws involving socioeconomic issues. Make sure agency officials are aware that you are monitoring their performances.

Clearly Articulate Goals and Objectives

Clearly stated goals and objectives provide the emphasis and focus for community action and the ability to negotiate for assistance from other government agencies and industry.

Local Initiative and Cooperation

Demonstrating local initiative and willingness to work with resource developers to help everyone achieve their objective encourages joint development of a socioeconomic program.

Promote Communication

Keep parties informed at all levels, private, local, State and national, of problems and success in solving them. Formalize systematic communication channels as soon as possible.

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**Dates of Interviews are not available—Ed.*

Is A Legal Basis for Impact Mitigation Necessary?

Nancy J. Owens

Resource development has environmental and socioeconomic consequences, some beneficial and some adverse. The goal of mitigation is to enhance the beneficial effects and reduce the negative effects.

In the past, mitigation efforts focused primarily on such factors as reclamation, air and water quality, and pollution control. Today, environmental analyses generally suggest mitigation measures for the full array of social, economic, cultural, biological, aquatic, and atmospheric impacts. Mitigation measures for social, economic, and cultural impacts have been given particular emphasis recently because large-scale energy developments have been proposed for rural, sparsely populated areas that don't have the infrastructure to accommodate the influx of workers and their families caused by the development.

The question under consideration is: Is a Legal Basis for Mitigation Necessary? I'd like to examine the needs of both local and state governments in managing the growth that comes with large-scale development. I will then review Montana laws that respond to resource development mitigation needs, and conclude with a summary of the best features of those laws which might be generalized for use by another state. Finally, I will answer the question that has been posed.

Local Government Mitigation Needs

Local governments bear substantial financial and planning responsibilities in dealing with large-scale developments. The three biggest problems for local governments in Montana are:

1. Up-front costs, including money to plan for the population influx, obtain technical assistance, and finance capital facilities and services. To do successful planning, local governments and the local citizenry need to participate in the environmental impact statement studies, which are usually undertaken by state or federal agencies. Meaningful participation can occur only if a clear structure is provided for local input and if funding is made available for local government participation.
2. Jurisdictional mismatch of costs and revenues, resulting in problems in financing infrastructure improvements when the facility is located in one taxing jurisdiction but the impacts occur in another taxing jurisdiction that does not receive tax benefits.
3. Back-out costs, when the "bust" comes, or even when intermediate economic and production slumps occur, and the community loses jobs, purchasing power of workers, and its tax revenue base. Often there is dependence on the one large industry and the local economy does not have the diversity to sustain itself after the "bust."

State Government Mitigation Needs

In Montana it is a constitutionallly declared policy to maintain a clean and healthful environment for present and future generations, to protect the environmental life-support system from degradation, to prevent unreasonable depletion and degradation of natural resources, and to provide administration and enforcement to attain these objectives.

It is natural, then, that Montana's regulatory laws would be statewide in scope and that permitting would be controlled at the state level. From a state perspective, effective mitigation measures include giving the people of the state a voice in major natural resource decisions by providing them with information and allowing them to express their concerns in public hearings. Siting and related laws should give the state some options in controlling the pace and location of development; ensuring that revenues

are adequate to meet the costs of development; ensuring that revenues will reach the jurisdiction that are incurring the costs; ensuring that the location, construction, and operation of major facilities will produce minimal adverse effects on the environment and on the citizens of the state; ensuring the protection of the existing economic base; promoting use of renewable resources; and providing for long-term economic prosperity and a clean environment for future generations.

In sum, the state's needs for socioeconomic mitigation are to smooth out the boom-bust cycles, ensure citizen involvement, ensure that the benefits of environmental regulation are available uniformly to communities across the state, establish mechanisms to resolve jurisdictional mismatches between revenues and costs; and to ensure that the state receives some tangible, long-term benefits from the extraction and conversion of nonrenewable resources.

Other Mitigation Needs

Some of the socioeconomic impacts can best be mitigated by the private sector. For example, local governments cannot deal with housing problems such as shortages of housing, inflated housing costs, or the availability of local financing for housing construction. Private sector initiatives are needed in the housing arena.

Local communities face the problem of providing human services, and of recruiting health and human service professionals: doctors, nurses, dentists, mental health workers, teachers, and counselors. In some cases the salaried professionals (for example, teachers and social workers) cannot command the pay that energy workers do, and cannot compete for high-cost housing.

Local communities also face the task of community-building in an environment where there are many newcomers, often with transient lifestyles different than the original community. For example, in eastern Montana where the coal fields are, the economic base is agriculture. Both the ranching communities and the Native American communities in the area are long-term communities with relatively stable social organizations and well established social relationships and networks. The political and economic power bases of these communities reflect these social relationships.

The lifestyle of newcomers connected with coal development may be markedly different. Their social organization, patterns of social interaction, values, and expectations may differ from those of the existing populations. In addition, coal development represents a major economic shift. In any major economic shift, some people lose power and some gain it. The highly capital intensive nature of coal development, and the sheer amount of capital involved in comparison with agriculture, suggest that energy interests will replace agricultural interests in both the political and economic power base of coal regions. It is possible that with the scale of energy development being proposed for eastern Montana, an entire transformation of the social structure will occur. Corporate and union interests are likely to become dominant locally, in state government, and in the state legislature. The existing agricultural communities could become a minority in their own territory.

These are substantial social, cultural, and economic impacts. As a result, opposition groups have developed among eastern Montana ranchers and among the Native American groups, which have worked to slow down the pace and scale of coal development, to protect agricultural interests and the existing social communities.

No real mitigation is possible for the kinds of social impacts such groups are concerned about. Their preferred action is therefore avoidance of this kind of impact.

The Montana Power Company has responded to these kinds of social concerns in selecting a site for its new proposed coal-fired facility. They decided to put the plant near Great Falls, which is the second largest city in Montana with a population of about 60,000, rather than site it as a mine-mouth plant in the sparsely populated agricultural areas of eastern Montana. This decision is an excellent example of mitigation by avoidance. Great Falls has adequate infrastructure capacity and social and economic diversity to handle the population influx associated with the project.

Montana Laws Which Respond to the Goals of Socioeconomic Impact Mitigation

Most of Montana's energy-related laws have been passed since 1971, in response to the growing interest in developing the West's energy resources and in the potential adverse impacts of extracting and converting nonrenewable energy sources.

The regulatory laws relating to energy are administered primarily by the Department of Natural Resources and Conservation (DNRC), the Department of State Lands (DSL), and the Public Service Commission. A common theme is the recognition that environmental, social, economic and human

health-related factors may be adversely affected by energy extraction, conversion and distribution activities. Minimization and mitigation of impacts, equitable distribution of energy production costs, reclamation of natural resources, and energy conservation are primary points of emphasis (see Figure 1).

The Montana Environmental Policy Act (MEPA) is the cornerstone of Montana's environmental laws. It is virtually a carbon copy of NEPA, the National Environmental Policy Act, and requires that an environmental impact statement be prepared for any major state action, such as issuance of a lease, permit, or certificate. Actions covered by Montana's other regulatory laws, such as the Major Facility Siting Act, the Mine Siting Act, the Strip Mine and Reclamation Act, and the Hardrock Mining Act, all trigger an EIS (environmental impact statement) done under MEPA. MEPA provides an opportunity for public input into the decision-making process, and allows the state to make an independent evaluation of the environmental and social effects of a proposed undertaking.

All State Agencies

Montana Environmental Policy Act (MEPA)

Department of Natural Resources and Conservation (DNRC)

Major Facility Siting Act
Renewable Energy Grant and Loan Program (funded by Coal Severance Tax)
Oil and gas pipelines and water development projects covered under MEPA (environmental analysis done by DNRC)

Department of Health and Environmental Sciences (DHES)

Major Facility Siting Act (health-related provisions such as air and water quality)

Department of State Lands (DSL)

Underground and Surface Mine Reclamation Act
Underground and Surface Mine Siting Act
Hardrock Mining Act

Department of Commerce

Coal Impact Board
Hardrock Impact Board
(Commerce Department also provides a broad range of technical assistance to local governments)

Department of Revenue

Coal Severance Tax
Oil and Gas Severance Tax
(Collection and administration of a variety of other resource taxes)

Public Service Commission (PSC)

Public utility rate regulation

Figure 1. Montana Laws Relevant to Socioeconomic Impact Mitigation and State Agencies Administering Them

Major Facility Siting Act

The Montana Major Facility Siting Act (MFSA), enacted in 1973, provides for comprehensive review of proposals to construct and operate certain kinds of facilities for generating, converting or transmitting energy in Montana. The Act covers: 1) facilities that can generate 50 megawatts or more of electricity; 2) facilities that can produce 25 million cubic feet or more of gas per day; 3) facilities that can produce 25,000 barrels of liquid hydrocarbon products per day; 4) uranium enrichment facilities; 5) facilities that can use, refine or convert 500,000 tons of coal or more per year; 6) electric transmission lines greater than 69 kilovolts capacity, with certain exceptions for lines covering short distances;

7) facilities for developing and using geothermal resources capable of producing 25 million Btu per hour or more; 8) facilities for *in situ* coal gasification; and 9) pipelines leading from or to a facility as defined above. Facilities under exclusive federal jurisdiction are exempt as are oil and natural gas facilities. Thus the Northern Tier oil pipeline from Port Angeles, Washington to Minnesota, and the Northern Border natural gas pipeline (which eventually will connect with the Alaska pipeline) are covered only by MEPA and not by MFSA. Mining is covered by other laws, which I will describe later.

The Major Facility Siting Act has four provisions which are important for impact mitigation. First, the Act requires all parties planning to construct a facility (as defined by the Act) within the ensuing 10 years to file a long-range plan with DNRC. All proposed facilities must be adequately described in a long-range plan at least two years before DNRC may accept an application. The plans are submitted on April 1st of each year and any new plans are generally covered by the press. The plans thus serve to notify the public of any proposed facilities substantially in advance of when they will actually be constructed.

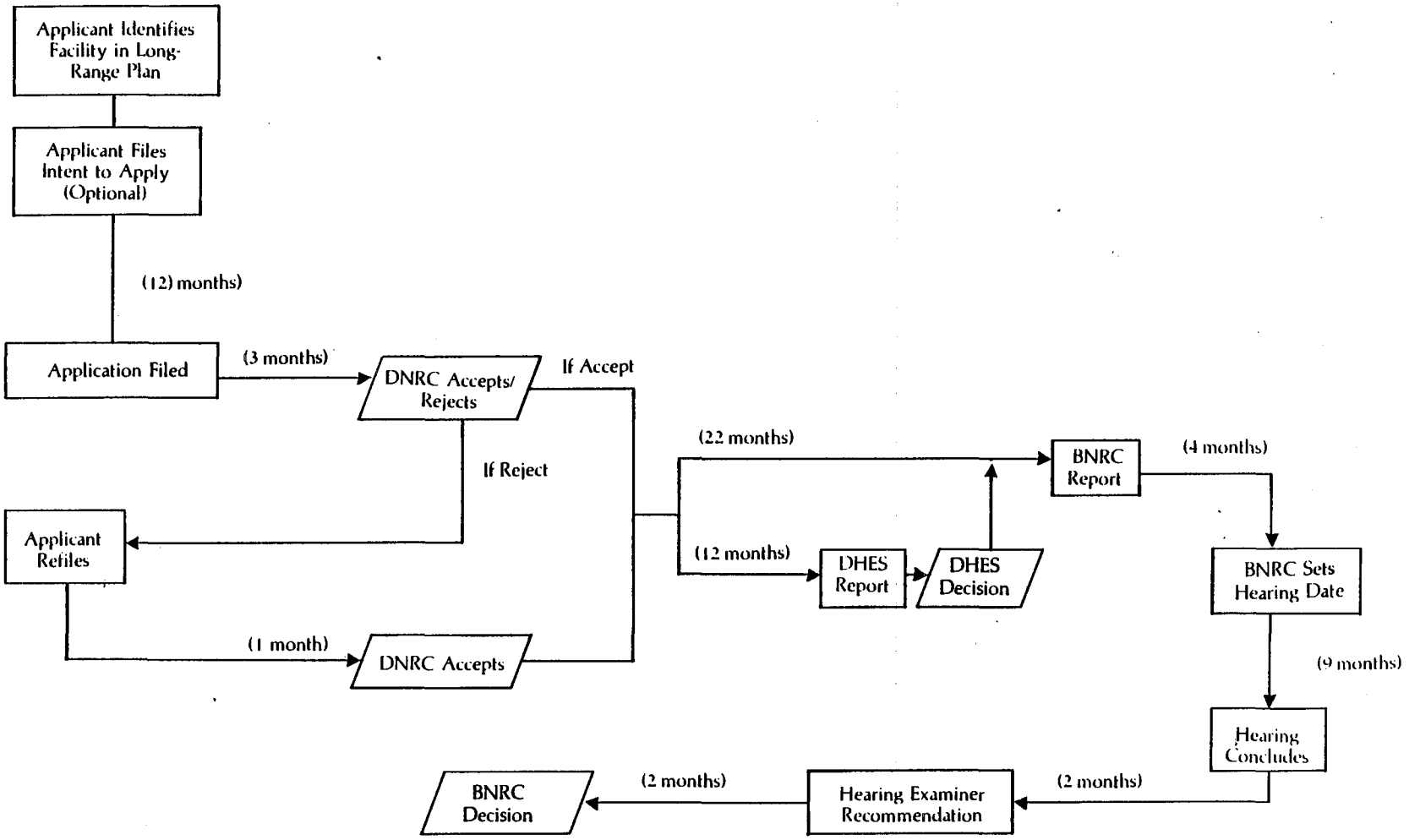
Second, the Act requires that an application for a facility must be filed with the DNRC. The application must include a description of the proposed facility, with discussion of alternative sites, an explanation of need for a utility facility, discussion of efforts to promote conservation and reasonable alternative energy sources, and a filing fee, based on the estimated construction cost of the facility, to finance the state's evaluation. The flow chart (Figure 2) illustrates this application and certification process and I will briefly describe it to you. The DNRC has 90 days to determine whether an application is complete; that is, whether it contains the information required by the law and associated rules. When the DNRC accepts the application as complete, it then has 22 months (in the case of generating plants) or 12 months (in the case of small transmission lines) to do an independent analysis, including preparation of an EIS under MEPA, holding public hearings, and preparing a final report to the Board of Natural Resources and Conservation (BNRC).

In the meantime, the Department of Health and Environmental Sciences and the Board of Health have a year, plus an additional 6 months if applicable, to determine whether the project will comply with air and water quality standards, and other laws administered by the Department of Health and Board of Health.

Note that this period of state evaluation provides the opportunity for working with the affected local communities to analyze impacts and suggest mitigation strategies. It also provides for a mandatory public hearing where the public can comment on DNRC's and the Department or Board of Health findings.

The third provision of the Siting Act that provides opportunities for mitigation is the Board of Natural Resources and Conservation decision as to whether to issue a certificate for project construction. The Board is a 7-member citizen board, appointed by the Governor. A certificate may not be granted unless the Board finds and determines: 1) the nature of the probable environmental impact; 2) that the facility represents the minimum adverse environmental impact, considering the state of available technology and the economics of various alternatives; 3) that the facility is consistent with regional plans for expanding utility grids and will serve system economy and reliability; 4) that the facility's proposed location conforms to state and local laws and regulations; 5) that the Board of Health has certified that the facility will not violate air and water quality standards and implementation plans; and 6) for a utility application, that the facility serves the public interest, convenience and necessity. Need, environmental impact, benefits to the applicant and the state, effects of resulting economic activity, and effects on public health, safety and welfare must be considered in making these determinations.

After receiving the DNRC's final report on the proposed project, the Board has 11 months to make its decision. As part of its decision-making process, it must hold public hearings under the Montana Administrative Procedures Act. These are contested case hearings involving attorneys, witnesses, and cross-examination. The affected local governments must be a party to the proceedings or state why it will not be and the applicant, of course, participates in the process. Citizen groups and industry groups usually also participate. The Board must consider all the evidence and prepare Findings of Fact and Conclusions of Law. It has three options regarding the Certificate: 1) deny a Certificate; 2) issue a Certificate for the project as proposed by the applicant; or 3) issue a Certificate for the project, but with conditions attached. It is this power to apply conditions to the Certificate that enables the Board to specify mitigation which the applicant must follow. Certificates may be revoked for failure to meet safety standards or failure to comply with any other conditions imposed by the Board. Unlike Montana's mining laws,



DNRC = Department of Natural Resources and Conservation
BNRC = Board of Natural Resources and Conservation
DHES = Department of Health and Environmental Sciences

Figure 2. MFSA Application and Review Process

the Board is not restricted in the kinds of mitigation it can specify and consequently, socioeconomic and cultural mitigation measures can be required.

Examples from the Certificate which was issued in 1976 for the Colstrip coal-fired generating plants include two provisions affecting the Northern Cheyenne Tribe. The Northern Cheyenne Indian Reservation is about 20 miles south of Colstrip, and the Tribe opposed the plants for three reasons: 1) because of the potential effects of air pollution; 2) because of the impacts to their culture from a large influx of construction workers; and 3) because they had gotten only a handful of construction jobs with other Colstrip plants. Thus, they felt they received no economic benefits, yet had to suffer the adverse environmental and cultural effects of the plants. The Board's conditions to the Certificate required Montana Power Company to work with the Tribe in setting up, at MPC's expense, an air quality monitoring program. They also required that MPC work with the Tribe to establish training programs to develop skilled labor so that Tribal members could be employed during construction and operation of the coal plants. The result has been that, while only 12 Northern Cheyennes obtained employment on Colstrip Units One and Two, over 100 have been consistently employed on Units Three and Four.

The fourth important provision of the Siting Act from a mitigation point of view is the requirement that DNRC must monitor the construction and operation of the facility to ensure that the Board's conditions are being met and the application must pay for the monitoring program. If the Board finds that a condition is not being complied with, it can revoke the Certificate. This enforcement power has the following two benefits: 1) it ensures that mitigation efforts are carried out and 2) it provides information on whether the mitigation measures are successful in solving the problems, whether the anticipated problems turned out to be real ones, or whether unanticipated problems develop. This information is invaluable for future impact assessments.

Mining Laws

Montana has three mining laws relevant to energy and mineral development impacts. These include the Strip and Underground Mine Reclamation Act, the Strip and Underground Mine Siting Act (which applies to coal and uranium), and the Hardrock Mining Act. The reclamation act served as a model for the federal strip mine and reclamation act. The mining laws are administered by the Department of State Lands (DSL). However, none of the mining laws contain provisions that allow DSL to condition a mining permit for socioeconomic mitigation. The reclamation act is quite stringent about requiring successful reclamation of land as it affects vegetative cover, wildlife, and air and water quality. The act is thus economically important to ranchers and other residents of mining areas because it protects the ecology of the area. However, there are no provisions for mitigating the impacts of a population influx.

Large-scale mining activities can have substantial socioeconomic impacts. In recognition of the need for communities to have up-front money to provide infrastructure for a population influx, Montana has enacted several laws that provide money for up-front costs to local governments. The most important is the coal impact legislation which channels part of the coal severance tax revenues (see coal severance tax section below) into the coal impact areas of the state. The purpose of the impact program is "to assist local government units which have been required to expand the provision of public services as a consequence of large-scale development of coal mines and coal using energy complexes" (90-6-201, MCA). The program is funded by 8.75 percent of the coal severance tax revenue, and the impact fund is administered by the Coal Board.

The Coal Board, composed of seven gubernatorial appointees and assigned to the Department of Commerce, was established to evaluate grant applications from local governmental units (or state agencies assisting such units) for funds which could be used for local coal development impacts. The Board awards grants from a designated portion of coal severance tax revenues which are deposited in the local impact and education trust fund account. The Board is directed to give attention "to the need for community planning before the full impact is realized." The Department of Commerce is responsible for designating counties, towns, school districts and other governmental units which have had or expect to have an estimated 10 percent population increase during any three-year period since 1972 as a result of the impact of coal development. These units are to receive at least 50 percent of the funds available to the Board. The unexpended balance in the local impact and education trust funds account is invested and the resulting income is used to support public schools, colleges, and universities. Coal Board grants are awarded on the basis of need, degree of severity of impact, availability of funds and degree of local effort in meeting the need. (In determining the degree of local effort, the Board shall consider millage

rates and bonded indebtedness as they apply to each applicant.)

From 1975 to 1980 over $30 million was granted to local impact areas for such projects as school planning, school construction, water and sewer systems, fire trucks, police cars and related city equipment, libraries, and so on.

Recently the Coal Board made a grant to the city and county planning agencies in Great Falls to allow them to participate in the evaluation of Montana Power Company's application for a new coal-fired power plant located in Great Falls. The Major Facility Siting Act is designed to give state government the evaluation and permitting authority. There are no provisions in the Act to provide funding for local government participation. Thus the Coal Board planning grant has filled an important gap in the impact evaluation process which, of course, is the first step in mitigation.

Depending on the needs identified by the local government, the Coal Board will again be able to provide funding in a timely fashion for whatever infrastructure is necessary for local government to deal with the impacts.

Coal impact funds are presently limited to coal impact areas. For example, areas experiencing growth from hydroelectric development or hardrock mining are not eligible for coal impact funds. In the latter case, the Legislature enacted a law establishing a Hardrock Mining Board, requiring companies opening a hardrock mine to submit an economic impact plan to the local community and the Board, and providing for pre-payment of taxes to cover the costs of the impact/mitigation plan. This law is very specific about impact mitigation, particularly economic mitigation of up-front costs. Unlike the Coal Severance Tax Legislation (see below) there are no provisions for back-out costs when the bust comes. Thus, when the Anaconda copper mining and smelting operations pulled out of the cities of Butte and Anaconda recently, there were no funds available from state coffers to help these communities develop a new economic base.

Oil and Gas

Oil and gas development is relatively unregulated in Montana as it is not covered by any siting or reclamation acts. However, there is a severance tax on oil and gas production amounting to 2.65 percent of the gross value of production. There is a mitigation provision that returns a portion of the tax collections to the county affected by oil and gas development in those years when production has increased. Thus, during growth periods, the county receives that portion of the severance tax which results from increased production. The drawbacks of this provision are that the county is unable to plan its budget to cope with growth problems because it cannot know in advance how much the revenues will be; in addition, there are no provisions for the county to share the revenues with affected municipalities which may be experiencing the bulk of the population growth and related infrastructure problems. Further, there are no back-out provisions. Thus, in the recent economic decline, when nearly all the rigs pulled out of eastern Montana, the results were a decline in both production and taxes. There are no state funds or programs to handle this situation. However, the local communities had committed themselves to long-term infrastructure expansion projects to handle the boom that was taking place.

Other Mitigation Laws

Montana has a general tax pre-payment law for manufacturing and mining facilities that allows the County Commissioners to request pre-payment of taxes in an amount up to three times the expected tax revenues due the year the facility is completed (15-16-201, MCA). The amount prepaid is credited against future tax payments so there is no net benefit to the county. Pre-payment does, however, make funds available for up-front costs. A county government affected by a hydroelectric project might use this provision because there are no separate impact funds that cover hydroelectric development.

Montana also has a law that allows a county superintendent of schools to require that a person intending to construct a mine or major facility prepare an educational impact statement (20-1-208, MCA). The statement must include the number of workers, family members, and school-age children expected, their anticipated residential distribution, and the time periods they are expected.

A school district may also require the owners of a proposed facility to enter into an agreement to pay, in addition to their property taxes, a certain percentage of the principal and interest on school construction bonds that exceeds the school district's legal limit on bonded indebtedness (20-9-407, MCA). This ensures that schools needed to accommodate a population influx can be constructed.

The Coal Severance Tax Trust Fund

The current coal severance tax was enacted in 1975.

The purposes of the tax are: 1) to maintain severance taxes on coal production at a constant percentage of the price; 2) to stabilize the flow of tax revenue from coal production to local governments; 3) to simplify the structure of tax revenue from coal production and improve reliability of revenue from coal production and improve reliability of revenue projections; and 4) to establish tax categories that recognize the unique character of coal. This act repealed the coal mine license tax and deleted coal from the provisions taxing the net proceeds of mines.

The coal severance tax act established a variable tax rate depending on the heating (Btu) value of the coal mined and whether it was mined and its Btu value is high enough to be taxed at a rate of 30 percent of the contract sales price at the mine.

In 1976, Montana voters approved an amendment to the constitution to create a permanent trust fund with part of the coal severance tax revenue. Since January 1, 1980, this revenue has been allocated to ten accounts as follows:

1. Fifty percent to a permanent coal tax trust fund. The interest from this constitutional trust fund may be appropriated by the Legislature each session, but its principal is inviolate unless three-quarters of the members of each house vote for its appropriation;

2. Nineteen percent to the state general fund where it can be used to fund a variety of the state's programs;

3. Ten percent to the education trust fund to support the state's public education system. Of the interest earned on this trust, 66.5% is paid into the state public school equalization program, 22.5% goes to the Board of Regents for the university system, and 10% is reinvested in the trust;

4. Eight and three-quarters percent to the local impact account. The state Coal Board awards grants from these funds to local governments to assist them in providing facilities and services needed as a direct result of coal development;

5. Five percent to the state public school equalization aid program which provides assistance to schools throughout the state, based on financial need and student enrollment;

6. Two and one-half percent to the alternative energy research development and demonstration account. DNRC awards grants from this account to citizens, businesses, and government units for research, development, and demonstration of alternative energy sources;

7. Two and one-half percent to a parks acquisition and cultural projects trust fund. One-third of the interest from this trust may be appropriated by the Legislature to protect works of art in the state capitol and for other cultural projects. The other two-thirds may be appropriated for the acquisition, operation, and maintenance of state parks, recreation areas, monuments, and historic sites;

8. One and one-quarter percent to the renewable resource development account for loans and grants to government units for project that will develop Montana's renewable resources;

9. One-half percent to the State Library Commission to provide basic library services to all counties and to pay participation costs in information networks. The Commission is currently passing these funds on to the state's six library federations to fund resource sharing, particularly interlibrary loan services.

10. One-half percent to counties for land planning projects. Montana's 56 counties have used these funds for a variety of projects including sanitation planning, mapping, subdivision review, and housing studies.

The permanent coal trust fund is a legacy for the time when coal reserves will be depleted. By the end of this year the trust fund will have accumulated about $100 million. While this is far short of the billions of dollars in Alaska's permanent trust fund, it still provides the opportunity for meeting future economic needs.

States like Alaska, Montana, and Wyoming have economies based on the primary production of raw materials. We are thus dependent upon world commodity markets and experience regular boom-bust cycles. Montana's history with copper makes us appreciate the significance of our coal tax trust fund. The city of Butte is built at the foot of a mountain once described as the "richest hill on earth." Today it is a gaping pit undermining the foundations of the downtown area. Copper mining has all but ceased and unemployment skyrocketed. The nearby town of Anaconda used to boast the "world's largest smelter" but the Anaconda copper company has now pulled out and sends its copper to be smelted in Japan. Montanans look to the coal tax trust fund to ensure that the current coal boom in eastern Mon-

tana will not leave them in the same state as Butte and Anaconda.

There is debate in Montana that parallels the debate here about the extent to which our natural resource trust fund should provide capital for in-state investment and diversification of our economy. The other option is to invest it simply to maximize return, whether in-state or out of state. Those who advocate in-state investment of coal tax monies still have not yet determined how to use such funds to diversify and stabilize our economy. Research and exploratory efforts are underway by a variety of groups. In terms of socioeconomic mitigation, the trust fund is a long-term mitigation measure for dealing with the inherent boom-bust of a natural resource based extractive economy. Perhaps Montana and Alaska will have the opportunity to share ideas and experiences on how these permanent trust fund monies can most profitably be used for the long-term benefit of the state's economy.

Summary

The goals of impact mitigation are to enhance positive effects of resource development and reduce negative ones. Mitigation responsibilities belong to state government, local government, local communities, and the private sector. A summary of these responsibilities is produced in Figure 3.

State Government

-Information to local governments & general citizenry

-Provision for public input

-Revenue collection and revenue sharing adequate to cover costs of development, including back-out costs

-Mechanisms for revenues to reach the jurisdiction incurring the costs, and in time to meet the cost requirements (e.g. impact fund)

-Ensuring that the location, construction, and operation of facilities will produce minimal adverse effects on the environment and on the citizens of the state

-Protect existing economic base

-Maintain clean and healthful environment for future generations

Local Government

-Planning, including participation in environmental studies of project

-Finance capital facilities and services

Private Sector

-Timely information about project

-Technical assistance to local government and local community

-Housing

Local Community

-Assume planning functions if no local government is organized

-Recruit health and human service workers (may be shared with local government)

-Community-building, incorporation of newcomers, accommodating significant lifestyle changes

Figure 3. Mitigation Responsibilities
(Based on Montana Governmental Structure)

Now, to answer the question, is a legal basis for impact mitigation necessary? It is my opinion that each identified unit should have the ability to control and act upon the areas that are most directly its responsibility. Thus, local government, which has fiscal responsibility for water, sewer, education, and so on, should have the financial means to participate in the analysis of impacts, conduct the planning functions necessary to determine appropriate mitigation measures, obtain technical assistance when needed, and be in a position to finance the needed capital and service improvements. This means, in my opinion, that local governments should not be dependent on private sector control of funds, nor be in the position of having to negotiate with the private sector for the funds it needs to carry out its responsibilities. It needs a legal mandate for carrying out its responsibilities, as well as a funding source.

State government has the responsibility to ensure the long-term economic and environmental viability of the state. It must provide mechanisms for citizen participation in natural resource decision-making. It must ensure that developments are paying their way and that tax revenues are adequate and equitably distributed to those bearing the costs of development. Again, a legal mandate and a funding structure are necessary to discharge these responsibilities.

The efforts of industry to mitigate socioeconomic impacts are in many cases outstanding. The private sector should be a partner in providing technical assistance. Further, there are some impacts such as housing shortages that are outside the province of government control and are best handled by industry. In spite of the leadership role that some companies have taken, ultimately community development will be best served if there are legal mechanisms in place that enable local people to plan and finance the mitigation efforts that they determine are needed.

Montana's laws are a patchwork of mitigation measures. There are some outstanding features, however, that apply generally to resource development impacts, and may be worth borrowing or modifying for Alaska.

1. Local and state governments must have a legal mandate for carrying out their responsibilities.
2. There must be a legal framework or structure for cooperation among the different entities involved (state agencies, county and municipal governments, affected local communities, the public at large, and the project sponsor). Montana generally handles cooperation with the federal government through memoranda of understanding.
3. There should be a cornerstone law, such as the Montana Environmental Policy Act, which covers all major undertakings.
4. There should be a unified community impact program that provides:

    a. grant/loan assistance to communities for resource development impacts - including planning, capital facilities and services, tax credit to companies against a state severance tax for helping communities put together an impact plan, and assistance for communities which aren't in the taxing jurisdiction and do not qualify for tax pre-payment;
    b. technical assistance for local communities;
    c. grant/loan assistance for any other economic development (as a lower priority)

A unified impact program could be funded from one resource tax or royalty base or be funded by a portion of a variety of resource taxes. In Montana the coal impact fund covers only coal impacts. The hardrock impact board duplicates the functions of the coal board. Other developments, like oil and gas or hydroelectric, have no impact funds to draw on for up-front costs. A single, unified program would be preferable.

5. Siting laws that are developed should include adequate time frames for independent analysis, explicitly cover the full spectrum of impacts that might be encountered (such as section 503 of MFSA), including social and cultural impacts as well as economic and environmental ones. There must be provisions for meaningful public involvement, and local and state government cooperation. The decision-making board must have broad powers to condition the certificate. Monitoring of facility construction and operation must be required to ensure compliance with certificate conditions.
6. A permanent trust fund from nonrenewable resource development revenues should be set up to help diversify and stabilize the state economy and provide assistance for resource "busts."

A sound legal and financial basis for impact mitigation can establish control where it belongs and ensure that the standard of minimum adverse impact is achieved.

Human Impacts of Large Scale Development Projects
The Process and Legal Basis for Mitigation

Janice Rae Cole, Allison Fargnoli and Betty Ramage

Large-scale development projects bring benefits such as employment opportunities and other economic advantages to areas in which they locate. However, adverse social, cultural and economic impacts can also occur, especially in rural areas. The goal of impact mitigation is to *prevent, or mitigate adverse impacts, and to assure local residents share in the benefits of development.* This can be accomplished through actions by industry, and federal, state and local governments to mitigate impacts.

Mitigation is generally focused on three types of impact issues:

- responding to the strain on the provisions of goods and services;
- assuring residents share in the benefits of development; and
- preventing or mitigating social disruption and cultural change.

The majority of successful mitigation strategies have dealt with the need to respond to the strain on the provision of goods and services, particularly local infrastructure. In some cases nationally, agreements have been negotiated to assure that residents benefit from employment and business opportunities. Less emphasis has generally been placed on minimizing the negative aspects of social and cultural change. It is essential to address the full range of impact issues when evaluating the planning and legal basis for mitigation.

Components of the Mitigation Process

The central need in any large-scale development situation is the capability to anticipate, plan for, and respond to sudden social, cultural and economic change. This includes the need for legal authority to assure the concerns of local residents are considered. This may be a monumental task, particularly in a rural area. The necessary efforts are quite extensive and include major components listed below.

1) Identify and involve all affected parties (public groups, industry, local, state and federal governments):
   - provide a mechanism for public participation in the planning process;
   - provide a forum for joint planning between industry and government authorities;
   - provide a mechanism for negotiations between all parties and a method of resolving conflicts between competing interests; and
   - analyze the consistency between industry proposals and local goals and policies.

2) Assess impacts and determine needs:
   - assess short- and long-term impacts;
   - analyze the demographic, economic and social change expected;

This paper summarizes selected material from a policy analysis paper prepared for the Governor's Office, Division of Policy Development and Planning.

- determine the services and facilities necessary to respond to the increased need (amount, cost, etc.);
- evaluate the costs and benefits to various population groups, the industry, the local community and the State; and
- identify mitigation activities necessary.

3) Develop a formal agreement or binding plan between industry and government authorities:
   - identify and apply the legal mechanisms necessary to assure the communities concerns are addressed (e.g., zoning, permitting, taxing);
   - develop and negotiate an agreement between the community/state and the developer; and
   - determine any requirements that must be placed on the participants.

4) Provide financing for necessary facilities and services:
   - determine who is responsible for providing and funding the facilities and services necessary;
   - plan for and assign responsiblity for providing the needed public services; and
   - determine how front-end financing requirements in the community will be met.

5) Implement mitigation activities:
   - proactive mitigation - prevent impacts through efforts to reduce the magnitude and speed of change (e.g., influencing the size of the workforce or other project plans); and
   - reactive mitigation - provide for the services necessary to respond to change.

6) Monitor the project:
   - monitor the demographic, economic, and social indicators;
   - monitor the project workforce information; and
   - monitor project activities for consistency with agreed upon standards.

Major Impediments to Mitigation

Adequate planning for and responses to development impacts are frequently prevented or impeded by the following: 1) lack of communication between the various responsible parties (e.g., community, developer, public, state); 2) lack of local expertise in impact planning; 3) inadequate lead time and/or uncertainty about when and if a project will actually proceed; 4) lack of accurate and timely information for planning and monitoring; 5) lack of timely financing of public services and community infrastructure; 6) confusion about the assignment of responsibility for impact mitigation; and 7) lack of local or state legal authority to implement planning recommendations. Each of these factors is discussed below.

1) **Communication Between Affected Parties** - In many cases, the lack of communication and cooperation between local/state government and industry has contributed to the impacts resulting from a project, because no appropriate mitigation is planned and implemented. National boomtown literature, as well as literature from major industries, agrees that the most promising new strategy for addressing human impacts is in industry/community cooperative planning. This interaction involves a combination of public involvement in planning and industry sponsored efforts, such as local planning grants, local project coordinators, loans of technical expertise and demographic monitoring programs. It is important that local officials work with the project developer to identify potential impacts and to propose solutions. Although technical expertise must be applied in this process, many social impact issues involve value judgments which should be resolved by the affected residents.

2) **Local Expertise** - Local communities, particularly in rural areas, may lack the technical capability to assess and plan for impacts of a major development project, the legal expertise to negotiate with industry, and the administrative capability to expand services. A number of states have initiated programs for impact aid and assistance to communities to alleviate this problem.

3) **Lead Time** - It is important that adequate lead time exist to assess potential impacts of a development project, to plan mitigating measures and to provide financing of community needs. These activities must be accomplished before major decisions regarding design and management of the project are finalized, before legal agreements and permits are finalized, and with enough lead time before project start-up to allow for construction of any needed facilities. Uncertainty about project start-up caused by fluctuations in resource markets, changes in public development policy, and confidentiality of industry data (particularly with those firms facing strong competition), contribute to the problem of assuring adequate lead time.

4) **Information Needs** - The provision of accurate and timely information is vital to predicting and planning for the needs of a large population increase. Without demographic projections and project specific information, planning is almost impossible or at best, a matter of guesswork. This problem occurs when there is poor communication among the affected parties. Developers may withhold information in the interest of confidentiality, or in some cases, predictive information provided to government agencies becomes invalid as project plans change.

5) **Financing Problems** - A major development project can create serious public and private financing problems. Local governments generally face the most difficult financing problems because of the need to expand services and facilities to accommodate a large population increase. "Up-front" financing is usually needed as locally generated funds seldom are sufficient to cover the cost of needed expansion. The timing of state government costs versus revenue is a less serious problem, but the State must assure that the expected revenue will offset increased government costs due to expanded services. Local private developers may have difficulty in obtaining capital in order to expand in housing and local businesses.

   The types of financing problems experienced by communities include those discussed below.

   - Jurisdictional mismatches and lack of taxing powers - If a project site is located in one taxing jurisdiction and in-migrants locate in another, project derived revenues will not go to the jurisdiction providing and paying for the increased services. A constraint on local financing peculiar to communities lying within Alaska's unorganized borough, is the absence of a local taxing authority.
   - Cash flow/tax lead time problems - Even if the tax revenues expected from a project cover the increased government service costs, there generally is a cash flow problem. Major increases in government costs occur prior to the start of a project while increased revenue may be realized years later, when the project begins operation. This cash flow problem can create major difficulties particularly for small communities and as a result front-end financing arrangements are necessary in most cases.
   - High financial risk/difficulty in borrowing - Because of the uncertainty associated with large development projects, builders, developers and lenders are reluctant to risk major investments based on projects that might not transpire. This reluctance extends to private borrowers (e.g., local housing developers).
   - Institutional problems - Many small communities have legal debt limits and bonding caps which can prevent borrowing and issuance of bonds.

In addition to government fiscal needs, there may also be a shortage of private capital for construction of homes, stores and offices in impacted regions. Options for alleviating this shortage of private working capital include:

- State mortgage purchase or "loans to lenders" programs;
- federal housing and development loan programs; and
- financial aid programs (e.g., standard housing loan programs, small business loans, non-residential development loans).

6) **Confusion about responsibility** - One of the fundamental problems noted in impacted areas is confusion as to what entity actually has the authority to make various decisions regarding development as well as uncertainty as to who has the responsibility for certain services, costs and activities. Negotiation between all parties involved in and affected by development is necessary to clarify these uncertainties. Uncertainty can further be reduced if the State has straightforward and consistent policies regarding development (e.g., the process for involving all parties in decision-making, methods for monitoring impacts, programs for impact assistance, guidelines for assigning responsibility for fiscal costs, and statutory authority regarding the evaluation of projects).

7) **Legal Authority** - Community, state or federal legal authority is necessary in order to negotiate formal binding agreements which specify the responsibility of various parties; to assure equitable financing of impact-related costs; and to assure that those affected by a project are involved in the decision-making process. Alaskan communities as well as the State government have limited legal authority regarding large scale development compared to other energy producing states. Many communities in Alaska lack zoning authority or taxing powers, and the State does not have general statutory authority for facility siting.

8) **Alaska Conditions** - Many of the impediments discussed above are relevant to existing conditions in Alaska. A recent report by the House Research Agency dealt with Alaska impact planning mechanisms. House Research findings along with those of this study are presented below as a brief outline of concerns regarding the Alaska situation.

- State agency responsibility (including the review process) for socio-economic impacts is unclear;
- a number of permits deal with various environmental controls and/or types of projects, but few permits encompass social impacts;
- there is no process for monitoring the social impact of major projects on a consistent basis;
- few mechanisms exist to encourage industry to provide for human impact planning and mitigation;
- the standards for how social and economic impact costs should be assessed and allocated are unclear;
- funding for local planning efforts and technical assistance to communities is limited;
- there is no consistent mechanism for providing impact funds to local communities (other than Coastal Energy Impact Program funds);
- few local government entities in the unorganized borough have planning powers; and
- there is no established forum for communication among all parties who receive benefits or bear costs of a development project.

State Initiatives in Human Impact Planning

Recognizing impediments to impact mitigation, many of the energy producing states have developed a special office to address human impacts of development and to assist communities in impact mitigation. A state impact office could perform the following functions:

- Act as a central coordinating office responsible for addressing development impacts.
- Develop guidelines for evaluating major development projects. (Impact assessment techniques, cost analysis and impact monitoring.)
- Provide a forum for negotiations and joint planning between communities, industry and the state.
- Assist in negotiations with industry representatives for state/industry or local/industry agreements and work with industry in mitigation planning.
- Provide technical and legal assistance to potentially impacted communities in the following areas: impact assessment, fiscal analysis and community planning assistance; citizen participation methods; monitoring techniques; legal advice regarding use and implementation of local government powers (e.g., zoning); and aid in the development of front-end financing.

- Administer community impact grant and aid programs for local impact assessment and planning as well as providing impact-related facilities and services.
- Participate in facility siting evaluation (where applicable).
- Monitor development impacts and the effectiveness of mitigation methods applied to large projects.
- Provide a library of human impact related material for use by communities, state agencies and industry representatives.

Developer Initiatives

Several authors have noted that companies developing large-scale projects in remote areas have themselves recognized adverse socioeconomic impacts and are investing time and capital in mitigation efforts.[1]

Industry is more likely to be willing to share the responsibility and cost of impact assistance.[2]

- If the project will operate in the area for a long period of time;
- If the project is a necessary part of the company's overall plan;
- If construction delays will cause project costs to escalate especially due to community opposition, through legal challenges;
- If community opposition to the project is present but may be minimized through impact planning and assistance;
- If worker productivity will improve and turnover rates decline due to impact assistance;
- If the company does not feel that the project is being expected to remedy long-standing deficiencies in public services;
- If the community is well-organized for planning and implementing impact assistance programs;
- If extremely adverse impacts are likely to result from the project;
- If the public image of the company would be hurt by the publicity involved in not helping to mitigate impacts;
- If the company can recoup its costs (e.g., pre-payment of taxes, tax credits for mitigation costs); and
- If impact assistance facilitates acquisition of required government permits or licenses.

Industry mitigation efforts typically include one or more of the following: 1) pre-payments of property taxes so that communities have revenue for service and infrastructure needs before the development occurs; 2) payments to potentially impacted communities which may not receive tax revenue because of jurisdiction inequities in taxing districts; 3) dedication of industry expertise to assist communities in planning for development impact; 4) provision of area planning grants; and, 5) implementation of company impact monitoring programs.

Industry as well as impacted communities have begun to recognize the need for cooperative community-developer planning. Cooperative efforts have utilized company technical expertise combined with public involvement in the planning process.

Legal Authority for Implementing Mitigation

Formal binding agreements between industry and government entities are usually necessary to assure equitable financing of impact-related costs, and to assure that those affected by a project are involved in the decision making process. Legal authorities which can be used toward this end include local zoning, state and federal permitting, state and federal leasing procedures, and facility siting legislation. These

[1] *William C. Metz, "The Mitigation of Socioeconomic Impacts by Electric Utilities," Public Utilities Fortnigtly (1980): 41-42. (Volume Number Unavailable - Ed.)*
Sheila Helgath, "Common Socioeconomic Program Elements in Four Large Construction Projects: Implications for Alaskan Community Strategies." In this symposium Volume, Section IV, 1983.
Land Use Planning Report, Companies Ease Pressures Created by 'Boomtown Syndrome' in the West, 1981.
[2] *Lawrence Susskind and Michael O'Hare, Managing the Social and Economic Impacts of Energy Development (Cambridge: Massachusetts Institute of Technology, 1977).*

means can be used to influence or control the location, type, magnitude, and timing of development and to assure agreements between communities and developers. This legal authority can be used to protect against adverse social, political, cultural and economic impacts as well as maximize economic and employment benefits. Local financing needs can also be assured through these agreements.

Tax policies and financial agreements can be geared to recouping the increased costs of public goods and services. In some cases, tax policies can also be used to encourage or mediate the pace, scale and location of development.

Local Authority

The human impacts of a development project generally occur at the local community level, and local entities must respond to project-related problems. Local governments should play a central role in assessing potential project-related impacts, planning mitigation, and responding to the increased need for public services. It is therefore crucial that local communities be empowered with the authority to implement mitigation strategies and to negotiate agreements with developers assuring the project is consistent with goals of the community.

Local Zoning Powers

An effective tool that can be instrumental in mitigating adverse socioeconomic impacts is a local government's zoning power. Well designed zoning codes mean that local jurisdictions have the authority to control the type and location of development.

Zoning has not been widely used as a means of regulating development decisions. Yet it is potentially the most powerful regulating and bargaining tool a community possesses. A good illustration of community use of its zoning power as a bargaining tool is Skagit County in the State of Washington. Skagit County is a rural district largely dependent on agriculture for its livelihood. A Washington based utility company, Puget Sound Power and Light Company of Bellevue, petitioned the Skagit County commissioners to reclassify approximately 260 acres of a forestry-recreation site to permit construction and operation of a proposed 2,600 megawatt nuclear electric generating facility. Since the economy of Skagit County is so heavily dominated by agriculture, the majority of residents wanted Skagit to remain rural in character.[3] Due to this attitude zoning ordinances regulating land use were already in effect. But popular opinion was not anti-development; rather it favored a selective program of attracting industry compatible with agriculturally-based interests. Faced with the decision to accept or oppose construction of the nuclear project, the majority of the residents favored acceptance, with the stipulation that Puget Power would share the responsibility of mitigating adverse impacts through impact payments. Puget Power was faced with the decision to either accept the county's proposal or not obtain the zoning permit necessary for construction. The company agreed to provide impact payments to schools and law enforcement agencies in the county as a condition for obtaining the rezone permit. The type of zoning change agreement entered into by Puget Power and the County is an effective use of zoning to mitigate adverse socioeconomic impacts.

The efforts of municipalities in Alaska in the use of zoning have been sporadic. Chapter 29 of the statutes contains the provision giving municipalities planning, platting and zoning powers. Only incorporated municipalities have planning, platting and zoning powers, and the power to undertake capital improvements. The Department of Natural Resources has a general grant of power to zone within the unorganized borough; however, this has not yet been exercised.

Probably the most successful use of zoning powers to mitigate socioeconomic impacts in Alaska was undertaken by the community of Yakutat. Through their zoning powers, city officials refused to grant the oil companies rights to construct docks and bring in large ships on the tidelands owned by the city in front of the land owned by the oil consortium. Yak-Tat Kwaan, the native village corporation, offered to purchase the site in return for leasing the firms another piece of property on the far side of the bay. Left with few alternatives, the oil companies accepted the offer. The oil companies also agreed to prohibitions against owning property, constructing shore-based facilities, and housing employees locally, and agreed to hire local residents whenever possible.

This type of approach can be used successfully in other incorporated communities in Alaska. It is an

[3]*Davis, Mayhra, "One Nuke Gets a Warm Welcome," Planning (1975): p. 4. (Volume Number Unavailable-ed.)*

exceptionally effective tool because it requires industries to deal directly with impacted communities. It gives the parties most directly affected a powerful tool to guarantee these problems and needs are addressed.

Local Taxing Powers

The most common way for local governments to raise revenue to help mitigate impacts of development is through their taxing powers. Article X, Section 2 of the Alaska Constitution limits this power to organized municipalities. There are two general taxes available to Alaska municipalities—property taxes and sales taxes. Use taxes are also available, but rarely used.

There are limitations on the amount of taxes that can be levied by a municipality. Alaska Statutes, Title 29 (Municipal Government) and Title 43 (Oil and Gas Property Taxes) impose such limitations. For example, AS 29.53.050(a) states that no municipality may levy and tax for any purpose in excess of three percent of the assessed valuation of property within the municipality in any one year. AS 29.53.050(b) limits the amount of taxes that can be levied to $1500 a year per person residing within municipal boundaries or upon values which, when combined with the value of property otherwise taxable by the municipality, exceed the product of 225% of the average per capita assessed full and true value of property otherwise taxable by the municipality. AS 43.56.010 puts a similar limitation on taxation of oil and gas property.

However, these limitations do not apply to taxes levied or pledged to pay or secure the payment of principal and interest on bonds (See AS 29.53.055). Bonds are limited to paying for capital projects. The State Supreme Court in *North Slope Borough v. Sohio*[4] has interpreted this to mean that a municipality is limited as to the amount it can tax for operating costs, but is not limited in the amount it can tax to pay off bonded indebtedness of capital projects. Since much of the mitigation efforts of a municipality would be directed towards building capital projects (sewer systems, water systems, schools) the bonding exception to the taxing limitations becomes crucial.

There are two issues relating to local taxing powers that should be examined further. They are the special circumstance of the unorganized borough, and prepayment of taxes.

1) The Unorganized Borough - Seventy-five percent of Alaska's land area lies within the unorganized borough. Neither the unorganized borough nor unincorporated communities within it have the power to levy and collect taxes. Although much of the unorganized borough does not have an adequate tax base to compensate for services now received from the State and federal governments, in some cases, especially in areas where oil and gas related properties are located, there is a great potential for tax revenues. These areas currently include the existing oil pipeline and pump stations between Prudhoe Bay and Valdez and along the proposed natural gasline route between Prudhoe Bay and the village of Northway. According to the report, *Problems and Possibilities for Service Delivery and Government in the Alaska Unorganized Borough*, the January 1, 1979 assessed value of Alyeska Pipeline Service Company's property within the unorganized borough was roughly $4.325 billion. The report further states:

> To date only one borough has formed to take advantage of the tax revenues from oil and gas development. This is the North Slope Borough, incorporated in 1972. Starting with a revenue budget of $500,000 in 1972, by 1977 the Borough collected $30 million in petroleum revenues and was in the third year of a projected $150 million capital improvements program. Nearly two-thirds of the Borough's revenue comes from the taxation of oil properties at Prudhoe Bay.
>
> One other region along the pipeline route is considering incorporation. During the 1973 legislative session, the Department of Community and Regional Affairs received a special appropriation to fund a borough feasibility study for the Yukon Flats Region. The study found the estimated Trans-Alaska pipeline assessed value for this area to be $900 million, which would be converted into property tax revenue of around $6 million in fiscal year 1981, or approximately $13,750 per capita. If the natural gas pipeline assessed valuation was added in fiscal year 1982, the total assessed value could increase by $155 million for a total of $1 billion assessed value.

[4]*North Slope Borough vs. Sohio, 585 P. 2d534 (1978).*

In contrast, without oil and gas properties, the net taxable, locally assessed property for the proposed Yukon Flats Borough for fiscal year 1981 would be $8.5 million.

Organization of the unorganized borough has not been an easy task thus far. Most of the opposition comes from residents of the unorganized borough. Many of them feel that there are insufficient numbers of people with basic skills and training necessary for efficient administration of programs and organizations at the local level. In some areas, such as school construction, there are financial disincentives to incorporation. An excellent analysis of problems of incorporating is found in the study cited above.

2) Prepayment of taxes - Public cash flow problems at the local level are a documented fact of life in the boom process. The majority of local capital expenditure increases for schools, sewer treatment facilities, etc. must be initiated two years prior to the arrival of the expanded population. Operating expenditures need to be increased at the time of arrival of the population. Meanwhile, increased receipts from local property taxes are usually realized one or two years after the arrival of the increased population.

   One way to reduce the impact of this time lag is through tax prepayments. Tax prepayments are, in effect short-term, stop gap loans by industry to local (or state) governments otherwise unable to finance development of public facilities and services in anticipation of large-scale development. Such payments can be either mandatory or voluntary. In either case the developer prepays property taxes which would usually have been due when the facility was complete and in operation. Actual terms of a prepayment plan vary according to each community's needs. The size of the prepayment would depend on the needs of the community and the projected future tax liability of the developer. Terms also include a plan for crediting the developer for the prepayment.

   There are currently two bills in Congress, S. 1919 (the Energy Community Self-Help Act of 1981) and S. 1731 (Energy Impact Mitigation Tax Incentive Act of 1981) which would provide current year deductibility of prepaid state and local taxes from federal income taxes, as opposed to "when assessed" payment as under current law. The bills are a part of recommendations advanced by the Western Regional Council as a new approach for addressing community socioeconomic problems associated with energy and natural resource development.

   Thus far, prepayment of local property taxes has not been attempted in Alaska. Although there is nothing in the statutes prohibiting prepayment, a statutory provision that included each party's interest and responsiblities might prove helpful to communities wishing to institute such an arrangement.

Local Development Plan - Even when communities have limited legal authority to control development, the community/region can prepare development guidelines. These guidelines are a formal record of community or regional development plans and provide a standard against which all projects can be evaluated. Violations of such guidelines could be met with moral and political sanctions from government and/or interest groups.[5] The Coastal Zone Management process of regional development plans follows this process although the CZM program does have the force of law as federal and state actions must be consistent with local approved coastal district plans. An Alaskan initiative toward regional planning is the NANA Regional Strategies which involves public participation in the development of regional goals and objectives regarding development.

State Authority

The broadest and most powerful statutory authority and taxing powers, the most expertise in planning, and the strongest leverage in negotiating with developers generally belongs to state governments. The authority and role of a state is therefore crucial to planning future development and to successful mitigation.

[5]*Dr. Howard R. Balanoff, Implementation of Land Use Codes and Ordinances in Small Towns and Rural Counties, 1979. (Place and name of Publisher Unavailable - Ed.)*

Current Alaska Statutory Authority

Alaskan laws which deal with development projects disperse decision authority among various departments. Evaluation of State policy and State authority is thus difficult. The following pages summarize selected examples of the State statutory authority which might apply to social, cultural and economic issues. Some of these powers are quite general, however, and may not have been applied to socioeconomic issues.

This summary is not comprehensive and additional analysis of the applicable statutes, regulations and procedures will be necessary for a thorough understanding of the strengths, weaknesses, and potentials of existing systems.

Department of Natural Resources - There are several statutes administered by the Department of Natural Resources that could be used by the State to ensure that mitigation strategies to alleviate socioeconomic impacts are a part of an industrial development plan. Most of the statutes do not specifically address socioeconomic concerns, but contain language broad enough to justify including the concerns when evaluations are performed. The following is a summary of these laws.

- Water Permits (AS 46.15.080) - Natural Resources is the agency that issues permits for water rights. Although socioeconomic impacts are not mentioned in the statute as specific criteria that must be considered before issuing the permit, the law is broad enough so that such criteria could be considered.

  The statute could be interpreted to require the applicant to provide detailed socioeconomic information on construction and operation of the proposed facility, and stipulations designed to address concerns raised on the application could be required as a condition of issuing the permit. Thus far the department has not used its power to issue permits in this way.

- Powers and Duties of the Director (AS 38.05.035) - The Director of Land and Water Management has broad powers in drafting contracts and other agreements for State resources. As with the water permit laws, the statute gives very broad powers to the director in approving State contracts. Again, stipulations that address socioeconomic mitigation measures could be included in such contracts.

- Planning and classification in the Unorganized Borough and on State Lands (AS 38.05.037) - gives the Department of Natural Resources the power to zone lands located in areas outside organized boroughs where there is no municipality with zoning power. Chapter 04 of Title 38 gives the Commissioner of Natural Resources the authority to develop, maintain and revise land use plans for state-owned lands. In classifying lands the commissioner must provide for meaningful participation in the planning process by affected local governments, state and federal agencies, adjacent landowners and the general public. The physical, economic and social factors affecting the region must be considered in the classification process. Thus far the State has not exercised its zoning power in the unorganized borough. Most of the land classifications have been in the areas of the land disposal program and habitat classification.

- Right-of-Way Leasing Act - Chapter 35 of Title 38 regulates the leasing of right-of-way on the State lands for pipeline purposes. Because of the requirements of the statute, socioeconomic impacts must be considered in the analysis of a project. However, these impacts do not appear to have been the major consideration of such analysis. Although the majority of laws that could be used to mitigate human impacts are located within the province of the Department of Natural Resources, the department's primary mandate involves resource issues rather than human impacts.

Alaska Coastal Management Program - Under the federal Coastal Zone Management Act, the U.S. government provides funding and technical assistance for voluntary State planning and management of the coastal zone. The basic responsibility for such planning and management is left to the states with the federal government retaining the authority to approve state coastal management plans. The Act requires that federal actions within a state's coastal zone be consistent with the state's approved program. These consistency provisions apply to federally sponsored energy exploration and development

activities on the Outer Continental Shelf (OCS) and activities of state and local government that are supported by federal funding and affect the coastal zone.

A local community or district receives two benefits related to the mandatory planning activity required by the Coastal Management Act:

1) funds to develop and implement a coastal plan;
2) the assurance that both state and federal actions will be consistent with the provisions of the local program. (State program guidelines and standards apply to coastal management decisions in cases where a local program has not been developed.)

The formulation and utilization of local coastal management programs can be an effective tool in achieving local goals and objectives, and assuring substantial local control over the types and amount of development that occurs. The program standards include provisions addressing wildlife habitat, energy facility siting, geophysical hazards, pollution control, forestry practices, transportation and utilities, recreation, subsistence, and mining. The act itself addresses socioeconomic issues (AS 46.40.020(2)) but specific standards have not been developed as yet.

Atomic Energy Facility Siting Permit - In 1981, an atomic energy facility siting act was passed in Alaska (AS 18.45.025). It covers nuclear fuel production facilities, utilization facilities, reprocessing facilities, and nuclear waste disposal facilities. None of these facilities can be built except on land designated by the Legislature. Once land has been designated, a facility can be built only after a permit has been obtained from the Department of Environmental Conservation. The statute is not a comprehensive facility siting law. There is no mention of socioeconmic impacts, but AS 18.45.025(c)(2) states that D.E.C. may not issue a permit until the municipality with jurisdiction over the proposed site has approved the permit. The statute is therefore significant because it gives power to the muncipality to accept or reject the proposal. The department has not received any applications for a permit thus far.

Alaska Environmental Procedures Coordination Act - Enacted in 1977, AS 43.35 provides for a "master application" process coordinated by the Department of Environmental Conservation for review and decision on state permits required for a development project. The law also provides for the establishment of Permit Information Centers which on request provide detailed information to developers regarding local, state, and federal permits and agency contacts. The centers also coordinate pre-review meetings with all governmental levels with jurisdiction on a given project. This coordinated permit process has been infrequently used. The program is voluntary, and an applicant may feel more comfortable dealing directly with the state, local, or federal agency issuing a particular permit than using the coordinated review.

Although the emphasis of the Environmental Procedures Coordination Act is (as one would expect from the title) environmental, there may be potential for expanding the purview of such a process. Of the many permits which fall under this statute at least one type, water permits (which are discussed above) requires a fairly broad finding of public interest.

However, according to Ernst Mueller, Commissioner of Environmental Conservation in a recent speech to a Conference on Alaska Energy Development:

> The master application process is not, however, designed to be a generic, holistic review of a project. It is based on an aggregate of the permit requirements and not designed to include factors which are outside any single agency's jurisdiction, and as a result some public interest issues may not be examined. Therefore, the governor often must establish special institutions to handle large project proposals on a generic basis.

Alaska Royalty Oil and Gas Development Advisory Board - The purpose of the Alaska Royalty Oil and Gas Development Advisory Board as expressed in AS 44.83 is to facilitate the wise development of Alaska's royalty oil and gas interests by providing means and procedures for sales, exchanges, or other disposition of those interests in ways calculated to promote private economic growth consistent with applicable environmental standards and public fiscal stability. In exercising its powers, the board must consider certain socioeconomic impacts.

The Royalty Oil and Gas Board's enabling statute contains some of the most specific language on socioeconomic impacts that exists in Alaska's statutes. Thus far, the Board in its analysis of proposals for

the use of the State's royalty oil and gas, has not addressed socioeconomic questions in the detail that might be expected given the statute. Although the matter is discussed informally whenever a development proposal is considered, the Board often assumes that the subject of socioeconomic concerns will be analyzed more thoroughly when the proposed development goes through other federal and State permitting processes.

Alaska Power Authority - The Alaska Power Authority has authority to evaluate, design, finance, construct and operate energy projects for the people of Alaska (AS 44.83). Its purpose is to offer the lowest energy costs possible to a community without undue adverse socioeconomic and environmental impacts. Although enabling legislation for the Authority puts limited emphasis on socioeconomic impacts, the regulations are more specific (SAAC 94.055 - 94.060). For instance, the A.P.A. is empowered to conduct reconnaissance studies and feasibility studies on a specific project. The purpose of a reconnaissance study is to identify and assess the present and future power needs of a community or region, whereas, a feasibility study is used to assess the technical, economic and environmental aspects of a project identified in a reconnaissance study. Local community input is solicited while both studies are being conducted. The plans for a project resulting from these studies are evaluated using the following indicators relating to socioeconomic impacts: 1) environmental; 2) community; 3) impact on community infrastructure; and 4) land-use input and ownership status. According to the A.P.A., socioeconomic impacts have not been a major factor in decisions thus far. The emphasis is on providing the lowest energy costs possible. However, impact analyses are expected to become more important in the future.

Facility Siting

In contrast to the dispersed legal authority described above, some states have taken a more comprehensive approach to control of socioeconomic impacts through facility siting legislation. Facility siting laws may delineate a process for public review of development proposals, describing what information is required, in what time sequence, by whom it will be considered in what forums, what the considerations should be, and what kinds of decisions may result. The general outline of sequential steps in a state certification process is given below.

1) Applicant files an application for certification to appropriate commission or agency accompanied by filing fee.
2) Agency or applicant distributes application to interested parties.
3) The application for certification provides the major basis for evaluating the proposed facility sites. Included in the application may be alternative plans and their effects on various physical, biological, environmental, land use and social and economic elements of the area, and ways to mitigate adverse impacts. It also may include financial information on the project, a statement explaining the need for the proposed facility, a statement of compatibility of the facility with State or local land use plans, and long-range development forecasts.
4) The agency or commission performs its own staff evaluation of the application or hires an independent consultant to perform the evaluation. A series of public hearings near the proposed site are held to obtain public input on the proposed development. Social and economic considerations can be raised here.
5) Additional studies may or may not be required depending on the adequacy of information provided in the application.
6) The agency integrates the comments and criticisms obtained from public, state and local agencies to formulate its decision regarding approval or disapproval of the application. Among the alternatives may be approval of the application with conditions imposed.
7) If the applicant or parties to the proceeding are not satisfied with the decision of the agency, appeal procedures are provided.

The main advantage to this approach is that a single agency or council is responsible for approving a site, resulting in streamlined development approval and improved efficiency. A second advantage is that facility siting laws provide an excellent forum for interested parties to express their concerns at an early stage of development when it is still possible for conflicts between parties to be resolved. Agreements reached between parties to mitigate impacts can be incorporated into the permit itself.

At least 32 states have enacted some form of facility siting legislation, many of them modeled after the State Utility Environmental Protection Act developed by the National Association of Regulatory Utility Commissioners in 1970.* But the states vary in approaches to the legislation in several main areas:

- **Type of facility** covered by legislation. Since facility siting was originally designed to balance the demand for more energy facilities with the necessity to reduce pollution and improve the environment, most states cover only energy facilities. Some states do cover a broader spectrum of development. Maine covers any state, municipal, educational, charitable, commercial or industrial development which occupies land or water more than 20 acres, or which have a single structure with ground area of more than 60,000 square feet, or any mining activity or hazardous activity (including oil development). Wyoming's statute covers general industrial facilities with estimated construction costs of more than $50 million, in addition to energy generating and conversion plants.

- **Administrative structure** issuing a permit. There are two main approaches states have taken in this area. Some states have created an independent commission or council charged with implementing legislatively mandated siting procedures. The makeup of such commissions or councils varies from state to state, but a typical membership consists of relevant state department heads, members of local governing bodies, and public members. The membership from local governing bodies is selected according to the location of proposed facility under review. The commission or council is usually authorized to give final approval to facility site requests. Staff support is usually given by an existing state agency. The second approach taken by some states is to place responsibility for implementing facility siting legislation on an existing state agency, typically a state environmental or natural resources agency. Again, the agency is usually authorized to give final approval to facility site requests.

- **Role of local governments.** The role of local government is another area where states have taken different approaches. At one end of the spectrum are those states requiring that notice and an opportunity to be heard be given to local governments, but in which the facility siting statute preempts all local ordinances and regulations, including zoning (e.g., Washington and Arkansas). At the other end of the spectrum are the states where local laws and regulations are binding on the siting authority (e.g., Wyoming and Nevada). A middle position is taken by Arizona and Montana who condition their permits on an applicant's compliance with local regulations unless such regulations are found to be unreasonable.

- **Funding options.** A typical siting statute provides a mechanism by which the state collects a filing fee from a person or business who applies for a siting permit. The fee is then used to cover any evaluation reports, administrative costs or compliance costs incurred by the state in processing an application.

- **Criteria** for approval of a particular site. Criteria for approval of an application also vary from state to state. Some states give discretion to the siting authority to formulate criteria, while other states have implemented statutes that go into great detail about the criteria that must be considered before issuing a permit. These criteria often include socioeconomic impacts.

In addition to the basic provisions and alternatives offered above, some states have individual provisions that deal with specific items, as identified below.

- Conflict of interest provision. Some states have conflict of interest provisions in their siting statutes that prohibit a member of the siting council or employee of a siting agency from having any pecuniary interest in a facility covered by the statute during his tenure or for two years following. Oregon further states that employment of such a person by a facility is grounds for revocation of any license issued by the state and held by the owner of the energy facility that employs such a person.
- Notice of intent to file. In Montana, a potential applicant may file a notice of intent to file an

*Council on State Governments. 1972. Suggested State Legislation. Model State Utility Environmental Protection Act, 277 et. seq. (1971).

application for a certificate at least 12 months prior to actual filing. An applicant who does this is entitled to a 5% reduction in the filing fee. This provision provides both state and local governments lead time for a major facility development.

- Accounting and Refund. Montana also provides that an applicant is entitled to an accounting of monies expended by the siting agency, and a refund with interest of 6% a year for the portion of the filing fee not expended by the department in carrying out its responsibilities under the law.
- Hearing process. Several states require that a certification hearing be conducted as close as practicable to the proposed site, thus affording impacted residents a chance to be heard. Montana allows the applicant, each local entity, state agencies, nonprofit organizations, and any other interested person who establishes an interest in the proceeding to be parties to the certification proceeding. This provision allows potential conflicts to be aired and resolved early in the proceedings.
- Burden of proof. Montana also provides that the applicant has the burden of showing by clear and convincing evidence that the application should be granted and that the required criteria are met.
- Local governments. Some states provide that representatives of the local governments sit on the siting council as voting members during the time that a proposed facility in their area is being considered.
- Conditions imposed. Wyoming provides that a permit may be issued conditioned upon the applicant furnishing a bond to the siting office in an amount determined by the director. The bond would be used in the event the applicant did not complete the facility proposed. It would allow local governments to recover funds they had spent in preparation for impacts caused by a facility in anticipation of increased revenues from such a facility.

A report by the Western Interstate Nuclear Board[7], points out that existing state siting statutes also contain certain shortcomings or inadequate treatment of specific problems. Consideration should be given to the conditions listed below which contribute to the success of such a process.

- The power or responsibility to monitor and enforce stipulated permit conditions, to institute reporting procedures and maintenance of records, and to impose penalties should be clearly defined.
- Actions open to the parties at interest at each possible decision point (e.g., amend, resubmit, or appeal) should be clear.
- There should be provisions for the early identification of the issues to be addressed in subsequent proceedings by the parties at interest. Additionally, the system should require the consideration of all reasonable alternatives plus allowing the discarding, as the process proceeds, of items that are determined in the proceedings to be nonsubstantive.
- Statutes should require explicit consideration of regional factors, for example, need for power, economic factors, environmental considerations, socioeconomic impacts, and mitigation of impacted areas.
- The exact authority of the siting law and agency with respect to interagency actions, other state agencies, laws and local ordinances and regulations, including zoning, should be explicitly detailed.
- Local municipalities should be involved from the beginning of the siting and planning process to obtain early problem identification, and thus avoid resistance and emergency catch-up actions later.
- Methods should involve appropriate federal agencies and all other parties at interest.
- Consistent with administrative due process the approval or denial of applications and other decision points should have specified double ended time scales. A minimum time period is needed to allow the public and other parties at interest an opportunity to present information and their views while a maximum time limit protects the applicant from delays or inaction.

[7]*Western Interstate Nuclear Board, Regional Factors in Planning and Siting Electrical Energy Facilities in the Western States, (1977), pp. 16-18. (Place of Publication Unavailable - Ed.)*

As discussed earlier, Alaska does not have a comprehensive facility siting law, but it does have a statute, AS 18.45, that covers nuclear facilities. An attempt was made during the State Legislature in 1977 to pass a facility siting bill that covered the construction of shore-based support facilities for offshore oil and gas exploration development and production. The bill required that a permit be obtained from the Department of Community and Regional Affairs to construct such a facility.

The main thrust of the proposed legislation (HB 219) was to provide a mechanism to ensure that the construction of the support facilities would produce minimal adverse impacts on the affected local governments. This was to be accomplished in three ways. First, a permit fee was to be paid by the applicant. The proceeds from the fee were to be appropriated by the Legislature from the general fund for use by municipalities affected by the construction. Second, a permit could not be issued by the Department without a resolution of approval of the governing municipal body where the facility was to be located or any municipality within 10 miles of the proposed facility. Third, it was to be required that a person contemplating construction of a shore facility submit a long-range plan to the Department. The plan was then to be distributed to affected municipalities. The bill did not pass the Legislature, and similar legislation has not been introduced since then.

State Taxing Powers

Some states have helped mitigate costs of socioeconomic development by passing laws whereby a certain percentage of mineral tax revenues received by the State is earmarked for local impact assistance. For instance, in 1980 North Dakota's citizens added a new section to their Constitution that earmarked 15% of the state's coal severance tax to a permanent trust fund for loans to impacted areas. The North Dakota statutes further lay out the scheme for distribution of the remainder of the tax. All money received from the tax is deposited in the Coal Development Fund. Thirty-five percent of the money is distributed by the energy development impact office to coal impacted cities, counties, school districts and other taxing districts.

As mentioned above, fifteen percent is deposited in the permanent trust fund. Twenty percent is allocated to coal producing counties and is distributed in proportion to the amount of coal extracted from the county. The remaining thirty percent of the tax is deposited in the state's general fund.

Another example of state earmarking of funds is Wyoming which has a special severance tax on coal of two percent of the value of the gross product extracted. The funds generated by the tax are dedicated for use in areas which are directly or indirectly impacted by the production of coal. The Farm Loan Board is authorized to disburse the funds. Fifty percent of the funds must be used on highways, roads, water and sewer projects.

Alaska is precluded from earmarking its resource revenue for impact aid by its Constitution. Article IX, Section 7 of the constitution states:

> **Dedicated Funds.** The proceeds of any state tax or license shall not be dedicated to any special purpose, except as provided in Section 15 of this article or when required by the federal government for state participation in federal programs. This provision shall not prohibit the continuance of any dedication for special purposes existing upon the date of ratification of this section by the people of Alaska.

This section has been interpreted to prohibit the dedication of funds for a special purpose, such as community impact aid. A special fund could be established, but it would be dependent on yearly appropriations from the legislature. In other words, it would be in competition with all other state-funded projects. An argument has been made that since a local government has legislative powers, it is not a "special purpose" within the meaning of the constitution provision, and therefore the state may earmark a share of its revenues to local subdivisions without violating the constitutional prohibition. Even assuming the validity of this argument, there might still be a problem because impact mitigation itself is a special purpose. Whether the state could share its revenues only with impacted communities or whether a community would have to use the money for socioeconomic impacts are questions beyond the scope of this project. Suffice to say that it would be, at the very least, extremely difficult to draft a constitutional law for Alaska that earmarks state revenues for local impact aid.

Conclusion

This paper summarizes selected material from a policy analysis paper prepared by the Division of Policy Development and Planning, Office of the Governor. The report identified a number of serious impediments to mitigating the negative impacts and enhancing benefits of large-scale development projects. The following recommendations are presented as options for overcoming these impediments.

State policy regarding human impact planning and mitigation is not well established. The following improvements are suggested:

- the State develop more specific policy guidelines regarding human impacts of major development projects including policy on review or permitting of major projects, assistance to impacted communities, State impact analysis, industry incentives and the role and responsibility of the State, local communities, the federal government, and industry; and
- the State consider establishing an office responsible for impact issues.

Communities may lack sufficient legal authority (or the expertise in utilizing their legal authority) to assure community concerns are addressed. Therefore, it is recommended that:

- the State continue to encourage communities to maximize their use of zoning and other powers to assure development consistent with community goals;
- the State provide legal aid to communities regarding their zoning and other development related powers. This could extend to assisting communities in initiating agreements and negotiating with developers;
- the State continue to encourage communities to develop their own development plans and a process for determining if proposed projects are consistent with these plans; and
- the State consider use of its zoning powers, where appropriate.

Timely financing for impact-related needs is often unavailable, creating major infrastructure and service delivery problems for communities. Therefore, it is recommended that:

- the State establish a means to provide financial impact aid to communities anticipating major development projects where such aid is needed. Such aid could be provided through a grant program, loan program or by revising the formula for the revenue sharing and/or municipal assistance program;
- the State encourage that front-end financing of community impact costs through industry agreements, pre-payments of taxes, federal funds or State funds; and
- the State work through its Congressional delegation to ensure that federal assistance is available for those Alaskan development projects meeting national needs.

Local expertise in impact assessment and planning is generally quite limited. Therefore, it is recommended that:

- the State expand its technical assistance to potentially impacted communities, including techniques for impact assessment, fiscal analysis, community planning, citizen participation and impact monitoring; and
- the State maintain reference material on human impacts of development for use by communities, State agencies and industry.

State review authority over major projects needs to be clarified, and the quality of such review should be improved. Therefore, it is recommended that:

- a review and evaluation process be applied on a consistent basis (i.e., across all projects meeting certain criteria), including guidelines for human impact assessment, methods for evaluating cost, and methods for monitoring impacts;
- facility siting legislation be considered by the state;

- the timing of major State-sponsored capital projects be evaluated in relation to other related development to assure maximum employment benefits for Alaskans; and
- formal monitoring and follow-up research on the impact of major development projects be assured. State data systems should be evaluated to assure development impact data is available wherever feasible within the system.

Industry initiatives are an important resource to addressing impacts. Therefore, it is recommended that:

- there be a forum for negotiations and joint planning between the communities, industry and the State; and
- the State develop mechanisms to encourage or reward industry for impact planning and mitigation (e.g., State tax credits for pre-payments to communities to cover front-end financing).

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