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Questions and Answers to Dr. Kai Lee's Keynote Speech  
1997 Annual Science Workshop, The Hotel Captain Cook  
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EXXON VALDEZ OIL SPILL  
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**Deborah Williams:** What do you see as the role of the human population management?

**Dr. Lee:** It's different for different ecosystems. The striking fact that I think very few people outside the scientific-demographic community understand, is that the rate of human population growth has been slowing all over the world. This slowing has been quite dramatic in the poor countries, even though they have as yet to become rich. Prosperity has been the most powerful contraceptive in the human history to our knowledge. Now the problem is that there is still a lot of demographic momentum: the countries that have expanded rapidly, primarily the tropical poorer countries, still have the age structure characteristic of a rapidly expanding population, that is they have a lot of young people. As those young people mature and go through their child bearing years, they can be expected to continue to expand the absolute numbers. So that even though the rate of population growth is slowing, the estimates of the demographers are that we will be facing a doubling or a tripling of human population before stability arrives sometime in the next hundred years or so. This means that there are going to be severe problems of getting human populations accommodated to localized carrying capacities of the ecosystems they have been depending on in agrarian societies. It's quite clear already that there is not enough agricultural capacity in the world, and probably we can't make enough agricultural capacity, to feed everybody an American-scale diet. All that nice talk about Mac attacks and junk-food fish, they'll be eating sand lances before you know it at the rate in which we're going.

A much more severe problem in the kind of ecosystems that we work in, the temperate-zone ecosystems, is consumption rather than population. Consumption has been rising, as you know, throughout our life times. In fact, if you look at the economic production data that has been studied by economic historians, you can see that a long-term growth rate of about 2% has prevailed in most human populations for the last 250

years. That is about the time the industrial revolution took off. We are now beginning to experiment with modifications of global-scale ecosystems by altering the atmospheric composition by increasing its carbon dioxide content. That is something that depends on consumption, and I'm sorry to say Americans contribute disproportionately to that because we are among the richest people in the world. The worst news is that we are not going to be responsible for the lion's share of the growth, because the lion's share of the growth is going to come from East Asia where there are lots of poor people that are getting un-poor real fast. So those of you that are concerned about the environmental future of the planet, learning Chinese is not a bad thing to do.

**Question:** Is there an institutional structure that might encourage stewardship?

**Dr. Lee:** This is a softball question for which I will give a softball answer. If the *Exxon Valdez* Trustee Council could find a way to take the funds it's setting aside and create an independent foundation that is responsive and accountable to the people in some way, without necessarily being governmental and politicized, that is something that would help a great deal in this ecosystem. The cost of the information that you've already collected, the cost of archiving, maintaining the monitoring series already, if my experience is any judge, already would strain the limits of the income you could hope to get from the \$108 million reserve fund that you are going to set aside. So you already need to think very seriously about how to do that. I think that one way to have the time to think about it is to get the politicians' hands off the control of that pot of money. I don't think it can be independent of the people permanently, if only because eventually the people that become the Trustees of that legacy are going to be influenced in the way the Supreme Court judges are influenced by society that they live in. So you have some time to think about this. I think that is a very important option to take, but don't think it's more than about a five-to-fifteen-year window, and I would encourage you to think that through. More generally, I would say the answer social science has to offer is that if you want to have stewardship, you've got to have monitoring and enforcement so that you can get information about who is abusing the resource and you have a series

of steps to take to discourage people who continue to abuse the resource.

Monitoring is no easy task as all of you know. It's hard for me to say that to those in the room who have sweated and frozen over things like extracting blood from reluctant animals out there in the wild, so you can monitor these effects. So I think you are already very clearly aware of the cost and difficulty of doing a lot of monitoring.

Enforcement is another matter entirely, a governmental one in which I think, we're again, still at the beginning of figuring out what to do. My sense is that, from the Columbia basin, it would certainly be nice if Exxon and other producers from the North Slope were to create a trust fund so that monitoring against oil spills could take place. Particularly the problems of chronic and routine spillage of oil, which is as I'm sure most of you know, a much larger environmental problem around the world than the catastrophic disturbance events like the *Exxon Valdez*. So, we've got a lot of work to be done out there and the big intellectual problem, which I was in a way pleading with you to engage with is, that we don't yet have a good way of meshing social science and natural science because of all these scale mismatches that I talked about. And one thing that I would urge you all as natural scientists to do, is to be alert to how to convey the information that you collect to the people in the human communities who are operating in a social-scientific template so that they can understand what it is that you are saying and what it means for the actions that they are to take. I'm going to be here for the rest of the day. I'd be happy to talk with you but I'm always fearful, as an experienced teacher must be, of standing in the way of a student's lunch.