Wildlife Conservation Strategies and Management in India: An Overview

SWARNDEEP S. HUNDAL

Punjab Agricultural University, Ludhiana, 141 004, India, email drswarndeepsingh@hotmail.com

Key Words: wildlife management, wildlife conservation, species recovery, blackbuck, Indian antelope, *Antilope cervicapra*, royal Bengal tiger, *Panthera tigris tigris*, gangetic gharial, *Gavialis gangeticus*, great Indian bustard, *Ardeotis nigriceps*, India

Introduction

Wildlife resources constitute a vital link in the survival of the human species and have been a subject of much fascination, interest, and research all over the world. Today, when wildlife habitats are under severe pressure and a large number of species of wild fauna have become endangered, the effective conservation of wild animals is of great significance. Because every one of us depends on plants and animals for all vital components of our welfare, it is more than a matter of convenience that they continue to exist; it is a matter of life and death. Being living units of the ecosystem, plants and animals contribute to human welfare by providing

- material benefit to human life;
- knowledge about genetic resources and their preservation; and
- significant contributions to the enjoyment of life (e.g., recreation).

Human society depends on genetic resources for virtually all of its food; nearly half of its medicines; much of its clothing; in some regions, all of its fuel and building materials; and part of its mental and spiritual welfare.

Considering the way we are galloping ahead, oblivious of what legacy we plan to leave for future generations, the future does not seem too bright. Statisticians have projected that by 2020, the human population will have increased by more than half, and the arable fertile land and tropical forests will be less than half of what they are today. Genetic resources are treated as inexhaustible mineral resources, but we need to care about them. It is here that the concept of management and conservation of wildlife comes into play, because anything that is not human or undomesticated is ‘wildlife’.

Presence or absence of an animal or plant in a region is determined by ecological and historical factors. Animals and plants are living indicators of the characteristics of their environment; their ranges mark the places where environmental conditions are the same or similar. To interpret the range of a species properly, it is necessary to know, in detail, the conditions required for the species to live and thrive. The science of zoogeography has both

ecological and historical aspects. On this basis, the world can be divided into six zoogeographical regions:

Nearctic	North America and Greenland
Palaearctic	Eurasia, without India
Ethiopian	Africa, south of the Sahara
Oriental	India and Indochina
Australian	Australia and New Zealand
Neotropical	South and Central America, and the Antilles

Wildlife Conservation in India

India is the seventh largest country in the world and Asia's second largest nation with an area of 3,287,263 km^2, a national border of 15,200 km, and a coastline of 7516 km. For administrative purposes, India is divided into 28 states and union territories and is home to more than 1 billion people, which is approximately 16% of the world's population. Ecologically, India can be divided into three main regions:

- the Himalayan Mountain system;
- the peninsular India subregion (woodlands and desert); and
- the tropical rain forest region.

A great wealth of biological diversity exists in these regions and in India's wetlands and marine areas. This richness is shown in absolute numbers of species and the proportion of the world's total they represent (Table 1).

Table 1. Number of species in India and the world.

Group	*Number of species in India (SI)*	*Number of species in the world (SW)*	*SI/SW (%)*
Mammals	350	4629	7.6
Birds	1224	9702	12.6
Reptiles	408	6550	6.2
Amphibians	197	4522	4.4
Fishes	2546	21,730	11.7

The people of the Indian subcontinent were once blessed with some of the most profuse natural gifts: verdant forests, water-stocked Himalayan ranges, rich coastal fish resources, productive estuaries, grassy pastures, and bountiful river systems. Abundant rain and fertile soils added to this plentitude. Years of mismanagement, however, have degraded our forests, wounded our coastline, and poisoned our aquifers with devastating results. Today, India contains 172 species (2.9% of the world's total number) of animals that are considered to be globally

threatened by the IUCN. These include 53 species of mammals, 69 species of birds, 23 species of reptiles, and 3 species of amphibians.

Extinction is somehow classified as 'biological reality' because no species has, as yet, existed for more than a few million years without evolving into something different or dying out completely. Extinction is threatening all species, but most of the time smaller animals, like bats and rodents, face this threat more than other animals. We, however, tend to focus on the charismatic flagship species, which we like to see and which fascinate us.

Success in evolution is measured in terms of survival: failure, by extinction. Most recent extinctions can be attributed, either directly or indirectly, to human demographic and technological expansion, commercialized exploitation of species, and human-caused environmental change. These factors, in turn, have affected the reproductive rate of endangered species and their adaptability to changing environmental conditions. Concern for wildlife is, in fact, a concern for ourselves.

In this paper, I would like to address the threat of extinction with respect to four species: the royal Bengal tiger and blackbuck (mammals), the great Indian bustard (bird), and the gangetic gharial (reptile).

'Project Tiger' and Conservation Practices

Tigers once inhabited a vast area from Turkey to the east coast of Russia and China, north to Siberia and south to the Indonesian island of Bali. The royal Bengal tiger, *Panthera tigris tigris*, has always been an integral part of the life and legend of India. At the beginning of the 1900s, the Indian tiger population was estimated at 40,000 animals. The first official estimate, done in 1972, recorded only about 1800 tigers. This led to the establishment of a task force under the Indian Board of Wildlife, and based on their recommendations, 'Project Tiger' was launched on 1 April 1973 with the following objectives:

- to maintain a viable population of tigers in India for scientific, economic, aesthetic, cultural, and ecological values; and
- to preserve, for all times, areas of biological importance as a national heritage for the benefit, education, and enjoyment of the people.

At the beginning of the project, 9 tiger reserves were created. Currently, there are 27 tiger reserves in over 17 states. These reserves cover a total area of 37,761 km^2.

Current Status of Royal Bengal Tigers in India

India has over half the world's tiger population. Every two to four years, a comprehensive tiger census is conducted throughout India (Table 2). The first census was conducted in 1972, and 1827 tigers were recorded. Establishment of Project Tiger in 1973 led to an increase in the tiger

population; the 1989 census recorded 4344 tigers, which led to self congratulations within Project Tiger. But the next census in 1993 recorded only 3750 tigers, a decline from four years earlier. Of these tigers, 1266 (36%) were within the boundaries of the 19 Project Tiger reserves, but to conservationists, this came as a final warning.

Table 2. Population numbers of royal Bengal tigers in India reported by states, 1972–2002.

Serial numbers of enumerated states	*State*	*1972*	*1979*	*1984*	*1989*	*1993*	*1997*	*2001/02*
1	West Bengal	33	65	97	95	97	62	60
2	Karnataka	102	156	202	257	305	350	401
3	Assam	147	300	376	376	325	458	354
4	Uttar Pradesh	262	487	698	735	465	475	284
5	Andhra Pradesh	35	148	164	235	197	171	192
6	Madhya Pradesh	457	529	786	985	912	927	710
	Total	1638	2732	3543	4026	3432	3508	3511

Royal Bengal Tigers and the Sundarbans

The Sundarbans is an area of 10,000 km^2 of mangrove forest on the southern edge of the Ganges-Brahmaputra-Meghna Delta in India and Bangladesh. It is considered to be the largest prograding delta in the world, and is an open, dynamic, heterogeneous ecological system that is resilient to disturbance from within the forest and waterways, but is sensitive to disturbance from the outside, particularly to changes in the flow of freshwater. The Sundarbans is a high quality wildlife conservation area of regional and international importance, but a series of incremental acts designed to bring more food, fiber, and material into production has damaged the Sundarbans ecosystem.

The Indian part of the Sundarbans covers 9630 km^2 and has been declared a Biosphere Reserve. Project Tiger covers 2550 km^2 of this area, of which 1692 km^2 is the core area (National Park) and has been declared a World Heritage Site. This unique mangrove forest area has the largest population of tigers in the wild. Improved management has helped restore a wide variety of flora and fauna. In this area, wildlife management occurred essentially by monitoring the investments made and evaluating its effects.

The last census in December 2001 recorded 271 tigers in the Sundarbans. The Sundarbans is one single ecosystem, however, and tigers do not know political borders; hence, there is a need for cross-border censuses to ensure more accurate estimates of tiger numbers are obtained. India and Bangladesh proposed conducting a joint tiger census in the swampy Sundarbans delta, and on 14 January 2004, the two countries jointly began the world's largest tiger census. The composition and dynamics of the tiger population are quite encouraging, and the last census

showed the presence of about 360 animals in the wild. Tranquilization and translocation of aberrant tigers has been perfected in the state of West Bengal where the Sundarbans is located. Stray tigers are captured in trap cages or tranquilized and released back into the wild after veterinary care and examination. This is one way that an aberrant tiger gets a second chance at freedom.

The people of the Sundarbans now perceive that tiger protection efforts serve their own interest. Irrespective of caste, creed, religion, or social standing, people take pride in their very own royal Bengal tiger.

India's Tiger Poaching Crisis

Evaluation of the tiger's conservation status revealed shattering news in the early 1990s with the discovery of large scale poaching and trafficking for the illegal international trade in tiger parts. The huge demand for tiger bones, destined for use in Oriental traditional medicine outside of India and as a macho supplement, is an added threat to India's tiger population. Practically every part of the tiger, from its whiskers to its tail, is used in traditional Chinese medicine. According to an estimate by the U.S.-based World Watch Institute, people in China and elsewhere in the Far East pay high prices for tiger bones and other tiger parts, with a single tiger's produce fetching up to U.S.$5 million.

Poaching is done by mafia gangs and is a part of the thriving trade, which is thought to fund, to a great extent, insurgency in north India. In 1993–94, 36 tiger skins and 667 kg (1470 lbs) of tiger bones were seized in north India. Poachers use one of three methods to kill wild tigers: poison, steel traps, or firearms. The estimated cost for the poachers for each tiger killed is $1 for poisoning, $9 for trapping, and $15 for shooting, distributed among four poachers. If charged and proven guilty, the maximum punishment is three years in jail and/or Rs.25,000 (U.S.$600) in fines. There is no minimum sentence.

The Wildlife Protection Society of India has made a concerted effort to gather accurate information and document cases of tiger poaching and unnatural deaths of tigers throughout India. Government sources state that 596 tigers are known to have been killed from 1994 to 2002; however, a nongovernment organization puts that number much higher (Table 3). Although international trade in tiger products has been banned under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), only 8 out of the 14 countries within the tiger's range comply with it.

Table 3. Number of tigers poached in India, 1994–2002.

Year	*No. of tigers poached*
1994	95
1995	121
1996	52
1997	88
1998	44
1999	81
2000	53
2001	72
2002	43
Total	649

Constraints to Tiger Conservation

New protection measures proposed by the Committee for the Prevention of Illegal Trade in Wildlife, 1994, have been prepared but not implemented, and little effective action has been taken in the field. Eighty percent of the tiger reserves do not have an armed strike force to serve as an effective infrastructure for combating poaching. The forest guards are often out-gunned by poachers. Wildlife crime is the second biggest illegal occupation in the world after narcotics, and it should be recognized as such.

Large developmental projects, such as mining and hydroelectric dams, are also taking their toll on the tiger's habitat. Habitat loss is considered to be the number one threat to the future of wild tigers in India.

The Global Tiger Forum and Achievements of Project Tiger

The International Conference on Tigers was held at New Delhi in March 1990, and was attended by countries within the tiger's range. A majority of the participant countries joined to establish a new organization—The Global Tiger Forum. The main aim of the forum is to protect the tiger from extinction at the global level.

Anywhere that tigers live today is high quality wildlife habitat. The success of Project Tiger has shown that no species, however important, can be conserved in isolation. Active involvement of the local people in the management of parks has made conservation measures more effective, and resource sharing ensures reciprocity of commitment.

Project Tiger has completed more than 30 eventful years as the largest and most successful conservation project of its kind in the world. The project's achievements are as follows:

- Better management of the reserves has improved the status of flora and fauna, and the endangered species have shown signs of recovery. There has also been an improvement in the carrying capacity of the habitat.

- Biogeographically representative areas of the tiger reserves have shown better signs of ecological security and preservation.
- The project has played a major role in providing education to, and recreation facilities for, the people.
- Enhancement programs include the management of buffer areas and tourism facilities in tiger reserves.

The landscape will continue to change, directly and indirectly, at the hands of humans, and as emphasized earlier, survival of humankind depends on maintaining the ecological balance among the living systems of the earth. New management and research initiatives have started a new era in tiger conservation.

Current Status of the Blackbuck /Indian Antelope

The blackbuck (*Antilope cervicapra*), or Indian antelope, is exclusive to the Indian subcontinent and is one of the most elegant antelope species in India. Its striking sandy color and beautiful spiraled horns make it unquestionably the most splendid specimen of the antelopes. It is also the swiftest long-distance runner among animals; at the slightest hint of danger, it can run for about 10 km at 60 km/h. A buck with five does constitutes a family. Given protection, blackbucks breed prolifically.

The blackbuck was once very abundant, but constant persecution by humans has sadly reduced its numbers, and it is now considered to be an endangered species. The blackbuck is no longer found in regions where it used to thrive. It was distributed throughout the plains of Punjab, Haryana, Uttar Pradesh, Rajasthan, Orissa, Gujarat, and Tamil Nadu, and was hunted by the princely states with the help of trained cheetahs.

The blackbuck is essentially an animal of open, flat, or slightly undulating terrain, and reaches its greatest abundance in areas covered with thorn and dry deciduous forests. With the destruction of forests, however, the animal has adapted to wastelands and agricultural fields. After the disappearance of the cheetah in the early 1960s, the blackbuck population exploded, and the species was found in large numbers in the central and southern parts of Punjab. It began to be branded as a crop raider and was hunted indiscriminately, especially during the ‘grow more food campaign’. Its flesh was relished by all.

The blackbuck was listed under Schedule I of the *Wildlife* (Protection) *Act*, 1972, and Punjab and Haryana honored it as their state animal. Now there are about 4000 blackbucks in the Abohar area of Punjab, Rajasthan, and Haryana states.

Only about 5% of Punjab’s total geographic area is forested, and much of this occurs in small strips along roads, railway lines, and canals where one cannot expect much wildlife to occur. Various forms of reserve forests have been established, but they form only 2% of the total area of

the state. Additionally, only 2% of this space has been left to the many species of animals that occur there.

There are five wildlife sanctuaries in Punjab. In the case of the blackbuck, the Abohar Wildlife Sanctuary has been established under the aegis of the Bishnoi community of the area. The Bishnoi are a predominately agricultural Hindu community which disallows felling of trees as well as killing of all wild animals, including birds. The strict policy of local cooperation and noninterference towards the local wildlife has provided protection to peafowl, partridges, hares, jungle cats, nilgai, and other wild animals. Undoubtedly, the protection afforded to blackbucks by the Bishnois is laudable, but the government should also develop a plan to save the species.

Current Status of the Great Indian Bustard

The great Indian bustard (*Ardeotis nigriceps*) is a large, handsome bird of the shortgrass plains of the Indian subcontinent. It shared its habitat with the blackbuck (*Antilope cervicapra*), chinkara (*Gazelle bennetti*), nilgai (*Boselephus tragocamelus*), wolf (*Canis lupus*), fox (*Vulpes bengalensis*), jackal (*Canis aureus*), and wild cat (*Felis chaus*), but is now confined to a few pockets in Rajasthan, Gujarat, Madhya Pradesh, Andhra Pradesh, and Karnataka states in India. The great Indian bustard is an endangered species with less than 1000 surviving individuals. Ironically, it is the state bird of Rajasthan and an indicator of the health of the grassland ecosystem of the Indian plains, but it is on the brink of extinction. The great Indian bustard forages, shelters, displays, and breeds in the grasslands, and its absence is the first warning signal that grasslands are deteriorating.

In the early 1980s, five states undertook conservation measures for the great Indian bustard, and eight protected areas were declared (Table 4). Despite these measures, the state of the bustard has deteriorated sharply during the last 10 years. In the Rajasthan, which is considered as the stronghold of the species, there were 131 birds in 2001, 97 in 2002, and 85 in 2003.

Table 4. Present numbers of great Indian bustards in sanctuaries.

Sanctuary	*No. of bustards in 1985*	*No. of bustards in 2001*
Karera Sanctuary, Madhya Pradesh	25–30	Extinct
Ghatigaon Sanctuary, Madhya Pradesh	15–18	2–3
Rannibennur Sanctuary, Karnataka	2–3	
Nannaj, Maharastra	15–24	30–40
Sorsan, Rajasthan	10–15	Extinct?
Sonkhaliya, Rajasthan	80+	30–35
Desert National Park, Rajasthan	200–400	50–100
Rollapadu, Andhra Pradesh	60+	15–20

The major problems that face the survival of the great Indian bustard include

- habitat destruction and deterioration. Too many domestic animals are causing disturbances during the breeding season, and habitat has been lost due to the conversion of grasslands and wastelands to crop fields;
- poaching. This is widespread in parts of the Thar Desert in Rajasthan;
- increased numbers of blackbuck and nilgai. Conservation measures for the great Indian bustard that were adopted by the local people have resulted in crop damage due to increased numbers of blackbuck and nilgai; hence, there is resentment among villagers towards the conservation movement, in general, and the bustard, in particular;
- corruption and total mismanagement of bustard sanctuaries; and
- lack of clear cut policy on land use and domestic grazing in India.

The Need for 'Project Bustard'

Conservation measures in India have shown that by identifying an indicator species and focusing attention on it and its habitat, a substantial part of the natural ecosystem can be protected, which benefits an array of threatened species. The following is a proposed list of objectives for initiating 'Project Bustard':

1. conserve the habitat types of the great Indian bustard and its associated species;
2. establish, with the cooperation of the state government and local people, more bustard conservation areas;
3. supervise and coordinate management of bustard conservation areas;
4. coordinate long-term studies on bustards and their habitats in different states;
5. produce educational material for publicity, and for decision makers, stakeholders, students, and others; and
6. integrate bustard habitat conservation with national grazing policy and overall land use patterns.

The Bombay Natural History Society is a pioneer in promoting the conservation of the great Indian bustard, and undertakes intensive campaigns to educate and encourage the Government of India to take appropriate measures to reverse the declining trend of the species.

Current Status of the Freshwater Gangetic Gharial

The gangetic gharial (*Gavialis gangeticus*) is a thoroughly aquatic crocodilian and a resident of deep, fast flowing rivers. It is primarily a fish-eating species and uses sandbanks for nesting. The gangetic gharial used to have wide range over all of Indochina, but today it is the most endangered of all the crocodilians. A gharial status survey conducted in Nepal indicated there were 60 individuals in the wild. In the Sind region of Pakistan, there are only one or two gharials

remaining. The species is practically extirpated in Bhutan and Myanmar. The situation in Bangladesh is much worse. No gangetic gharials are found in the wild there due to heavy impacts from fishing activities and habitat degradation.

Conservation

The gangetic gharial was brought back from the brink of extinction by restocking programs that were initiated first in India in 1975, and then in Nepal in 1978. In India, there are nine protected areas, with a total area of nearly 3000 km^2 that are designated for gharial management. Gharials are captive bred for release at six breeding centers. Eggs are also collected from wild nests for captive rearing and release. More than 3000 juveniles have been released at 12 sites, and follow-up surveys suggest there has been an overall increase of more than 1500 individuals in the wild population. In some areas, however, the restocking program has not resulted in population increases, although some gharials remain. In Nepal, 432 individuals were released to the wild between 1978 and 1994. By collaborating with its neighboring countries, Pakistan is also trying to improve the status of this unique animal. Although the gangetic gharial is virtually extirpated in Pakistan, there are plans to start a restocking effort with assistance from Indian institutions.

Threats to Gangetic Gharial Conservation

The high cost of captive breeding and the paucity of additional release sites threaten gharial conservation efforts. Increasing interactions between riverside human populations and the gharial, as well as the negative effects of agriculture and fishing restrict successful gharial populations to a few stretches along isolated and protected rivers. Gharial migration out of protected areas has been identified as a significant factor that is slowing population recovery.

Priority Projects for Gangetic Gharial Conservation

The following projects are considered to be a priority for conserving the gangetic gharial:

- use of population and habitat viability analyses (PHVA) to develop future conservation strategies
- development of a national management plan in India and implementation of the recommendations of the gharial PHVA
- population modeling
- continued restocking of gharials
- continuous monitoring of protected and restored populations
- analysis of genetic diversity and the effects of a bottleneck in the founder stock
- increased public education
- survey of gangetic gharial status and distribution in Pakistan

- establishment of a captive-rearing center in Pakistan
- development of international coordination for gharial management and conservation between India and Nepal
- expansion of the restoration program in Nepal
- gangetic gharial status survey in the river systems of Myanmar

Conclusions

Wildlife habitat and species around the world are facing a crisis. It is estimated that global warming may cause the extinction of 15–37% of species by 2050. This is another aspect which needs attention because we could lose about 1.25 million species. Unlike other environmental losses, this one cannot be reversed because nature does not give second chances to biodiversity.

If we take into consideration the conventional reasons why wildlife is disappearing in Asia, India is doing far better than other countries. India has launched an extensive protected area network of research institutions in which legislation, socio-economic factors, and wildlife research are playing a great role. The Central Zoo Authority plays a key role with zoos in programming research activities related to the conservation and propagation of wild animals. Planned research activities include studies on wildlife biology, genetic variability, species-specific nutritional requirements, animal behavior, epidemiological surveys, and disease diagnosis through postmortem examination. The future depends on interaction between captive and wild animals, preservation of biodiversity, and genetic and demographic variations of species. India still has 65% of Asia's tiger population, 85% of the Asian rhino population, 80% of the Asian elephant population, and 100% of the Asiatic lion population. These are all highly endangered and poached animals.

Suggested Further Reading

Bishnoi, S.K. 1988. The Bishnoi movement for saving the blackbuck in Abohar area. Pages 40–43 in A.S. Atwal, S.S. Bains, and M.S. Dhindsa, editors. Wildlife of Punjab. Indian Ecological Society, Ludhiana, India.

Hosette, B.B., and M. Venkateshwarlu. 2001. Trends in wildlife biology conservation and management. Vols. 1 and 2. Daya Publishing House, New Delhi, India.

Lamba, B.S. 1988. Status of wildlife in Punjab. Pages 20–24 in A.S. Atwal, S.S. Bains, and M.S. Dhindsa, editors. Wildlife of Punjab. Indian Ecological Society, Ludhiana, India.

Parshad, V.R. 1988. Mammalian fauna of Punjab. Pages 25–38 in A.S. Atwal, S.S. Bains, and M.S. Dhindsa, editors. Wildlife of Punjab. Indian Ecological Society, Ludhiana, India.

Rahmani, A.R. 2002. The deteriorating status of the Indian bustard. Oriental Bird Club Bulletin **35**:45.

Rahmani, A.R. 2003. Great Indian bustard—on the decline, or on the rise? Birdlife International, 23 August 2003. Available from http://www.birdlife.net/news/search.html.

Seidensticker, J. 1991. The Bangladesh Sundarbans as wildlife habitat: a look ahead. Proceedings of a workshop on Sundarbans. Part IV: Living off the forest—wildlife management and businesses. November 20–21, 1987. Sustainable Development International Corporation, International Center, Smithsonian Institute, Washington, D.C.

Stracey, P.D. Wildlife in India, its conservation and control. (These data were taken from various web sites on wildlife in India).