

Can Community Forestry Conserve Tigers in India?

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Abstract—Active participation of local people through community forestry has been successful in several developed countries. In the early 1980's, developing countries tried to adopt this approach for the conservation and management of forests. Nepal, for example, has gained considerable support from local people by involving them in conservation policies and actions. This paper illustrates that people living near the Sundarbans Tiger Reserve/National Park in India should not be considered mere gatherers of forest products. They can also be active managers and use forest resources sustainably, which will help in the conservation of tigers.

Conservation of tigers in Asia, especially in India, is a major concern. The Sundarbans offers a unique habitat for tigers, but the conservation strategies followed for the past 20 years have not yielded much result. One of the major reasons is that local people and their needs were ignored. Lack of concern for the poverty/forest interface, which takes a heavy toll on human lives, is another reason for failure. Tigers are the keystone species in this region, and it is necessary to preserve the whole ecosystem to maintain tigers. Humans are an integral part of the Sundarbans landscape, and as such, their needs also must be considered.

Better socio-economic conditions, through income generation from the forest, can focus conservation beyond the protected area boundary. Community forestry can help local people meet their needs while conserving the forest; this, in turn, will benefit tigers by maintaining the ecosystem in which they live.

The purpose of this paper is to recommend the application of principles of community forestry to the conservation of tigers in the Sundarbans Tiger Reserve/National Park.

In developed countries, like Canada, community forestry is recognized as power sharing between local communities and the government. Experiences from community forestry in British Columbia (Allan and Frank 1994) and four community forest pilot projects in Ontario, suggest that a greater degree of public participation in decisionmaking helps in the process of community development. For community forestry to work and establish itself, principles like employment, economic stability, and the community's interest in decisionmaking and planning are of vital importance

(Ontario Ministry for Natural Resources 1994). In most developing countries, like India, the socio-economic problems will have to be addressed first to achieve the objectives of conservation (Kuchli 1997).

Royal Bengal Tigers (*Panthera tigris tigris*) (fig. 1) are endangered and almost on the verge of extinction. Conservation of these animals in Asia poses serious problems, as their population has been reduced significantly due to hunting, poaching, and habitat shrinkage. Reserves and parks have been established to protect the animals and separate people from the forests. This, however, has caused



Figure 1—The Royal Bengal Tiger of the Sundarbans (picture courtesy of the Zoological Survey of India, Calcutta).

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resentment among the people living nearby. When parks and reserves are created by the government to protect endangered species, local inhabitants are not involved in decisionmaking or resource sharing. Almost overnight, use of the forest resources becomes the greatest threat to wildlife (Seidensticker 1997). The conflict that ensues may not solve the problem of tiger conservation because it does not consider the help of local people, nor does it try to educate the people. Instead of being part of the solution, local people become part of the problem.

In the early 1970's, the World Bank and other aid agencies realized that 40 percent of the rural population in developing countries lived below the poverty line, and that there was a need for "people's participation" in rural development. It was recognized that any development must consider the economic and social conditions of the rural people themselves as essential. This new approach drew attention to the "dependence" of rural people on forests and on forest products and their importance in the forest community (Tarnowski 1995).

Community forestry has been defined and named according to the context and country in which it is practiced. Following a World Conference on Agrarian Reform and Rural Development in 1979, programs were launched in developed countries like Canada and in underdeveloped countries like India, Nepal, and Thailand, under different names such as "social forestry," "forestry for local community development," or "community forestry." As defined by the Food and Agricultural Organization of the United Nations (FAO) in 1978, "community forestry" involves:

...local people in a forestry activity. It embraces a spectrum of situations, ranging from woodlots in areas which are short of wood and other forest products for local needs, through the growing of trees at the farm level to provide cash crops and the processing of forest products at the household, artisan or small industry level to generate income, to the activities of forest dwelling communities.

Community forestry is intended to provide rural families with certain basic needs from nearby forests on which they depend for their livelihoods. For a successful implementation of this goal, programs in community forestry must ensure participation of rural people in the conservation of forests, wildlife, and forest resources.

Community Forestry in Southeast Asia and India

The potential of community forestry was perceived by developing countries in the 1970's and 1980's as a method to rejuvenate degraded forests (Blair and Olpadwala 1988; Tarnowski 1995). Nepal is a leader in the demonstration of conservation ecology through community forestry. The Royal Chitwan Park in Nepal, a habitat for tigers and rhinoceros (*Rhinoceros unicornis*), was endangered due to overexploitation by the inhabitants for fuel and fodder. By promoting local guardianship to the people in the vicinity, providing an additional source of income through tourism, and favoring sustainable extraction of timber and fuelwood, the program has helped recover almost 15 km² of prime habitat for these species. As a result, poaching in this area has declined significantly.

Community forestry has been well known and widely accepted in India since the late 1930's when cooperative forestry management was introduced in Bastar, Madhya Pradesh. Dense population resulted in excessive cutting of trees. Uncontrolled use of firewoods and unrestricted grazing also took a heavy toll on the forests in the region. Fortunately, the local people and the administration recognized, in time, the gravity of the situation and devised a simple working solution. They decided to entrust actual management of the forests to committees either elected or appointed by the people. The project allowed the local people to take their requirements of firewood, bamboo, grass for grazing, and minor forest products from the protected forest area, but they were not given any proprietary rights over the forests. Community forestry in the Bastar region has had a far reaching consequence on the nature of forestry policies in India, particularly in recognizing the importance of the local people on issues directly connected with their daily livelihood—problems related to population pressure, overgrazing, agricultural land, and firewood collection (Anderson and Huber 1988).

The most well-known community forestry program in India was launched by the Community Forestry Wing of the Gujarat State Government in the 1970's. The program involved 3,500 village woodlot projects, each on the common land of a village panchayat (the local self-governing body at the village level). Each of the lots (about 5 ha) were given out to the villagers for fuelwood and fodder production for a period of 4 years. The Gujarat government provided management assistance, seedlings, and machinery; the panchayat provided labor and plant protection. At harvest, the government deducted the costs incurred and gave the rest of the produce to the panchayat to be redistributed to individual villagers. Although this project began as a state-sponsored project in 1979, the World Bank funded the project from outside and helped it make "tremendous strides" (Blair and Olpadwala 1988).

At an FAO workshop held in Dehra Dun, India, in 1977, participants from countries such as Afghanistan, Bangladesh, Nepal, Pakistan, and India, recognized how important it was to involve rural people in planning the development of forest lands and forest industries in less developed countries. The success of forestry development programs depends on the extent to which people adjacent to the forest areas are made participants in decisionmaking. A good example was provided by India, which, through its "Social Forestry" or "Forestry for the People" program, successfully involved local people in forestry plantations that were planned to provide support to agricultural activities such as windbelts and shelterbelts around farmlands, small timber for fencing, and small cottage industries (FAO 1977).

The Indian National Forest Policy of 1952 emphasized "the need for a sustained supply of timber and other forest produce required for defense, communication and industry" and "the need for the realization of the maximum annual revenue in perpetuity" (Kumar and Kaul 1996). This policy denied the needs of the local people whose lives directly depended on the forest for fuelwood, medicine, fodder, and small-scale industry. Although the contribution of the forest to the rural population living near the forest was talked about, it was only in the 1988 Forest Policy that issues of

public awareness and joint ventures between the agricultural and forestry section were initiated. In 1990, the Ministry of Environment and Forest emphasized the need for local participation to protect the forest in return for minor forest produce.

Population of the Royal Bengal Tiger in the Sundarbans

Evolutionary scientists believe that tigers evolved in Southern China more than a million years ago. Over time, to escape the Chinese hunters, they gradually migrated to Indochina, Indonesia, Burma, Bangladesh, and India (Ward 1997). Tigers have found a home practically throughout India, from the Himalayas to Cape Comorin, except the deserts of Rajasthan, Punjab, and Cutch. Migrating tigers from the Far East must have found a congenial home at the land's end in the Sundarbans area. Tigers from other areas of India, such as Uttar Pradesh, Madhya Pradesh, Bihar, and Orissa, might have possibly found a habitat in the dense mangrove forests of the Sundarbans, which offered them not only protection but also an abundance of food while fleeing from the colonial hunters.

To protect the tiger from extinction, the government of India passed the Wildlife Protection Act in 1972, and in conjunction with the World Wildlife Fund, launched what is called "Project Tiger." The tiger was declared the national animal of India, and a major part of the Sundarbans (approximately 2,585 km²) was recognized as both a National Park and a Tiger Reserve, and became a protected habitat for the largest number of tigers in India.

The Sundarbans Reserve is the home of the tiger species known as the Royal Bengal Tiger (*Panthera tigris tigris*). The splendor of this magnificent and regal animal is heightened by its reddish brown skin and broad black stripes on its head and back. Initially, Linnaeus classified it as *Felis tigris*, but later scientists placed it under the genus *Panthera* because of its distinctive elastic hyloid bone formation. The Sundarbans tigers are somewhat shorter in length than their counterparts in other areas, but they have bigger heads and splayed legs. The uniqueness of the Sundarbans tigers is evident in the evolution of certain adaptive behavioral patterns not known to exist elsewhere in their kind, in the plains or in the peninsula (Chakrabarti 1992). The tigers here lead an almost amphibious life—cross wide rivers, drink saline water, and feed on pigs, fish, crabs, water monitors, and lizards. Another exceptional feature of these tigers in the mangrove forests is that they do not maintain any territories because urination marks are obliterated by tidal waters (Mandal and Nandi 1989).

The Sundarbans tigers are generally branded as man-eaters. Tigers are known to be man-eaters elsewhere in India, too. Jim Corbett (1942) attributes reasons of old age, disease, and injury to the man-eating habit of tigers in the Madhya Pradesh. But in the Sundarbans, the tigers are young, strong, and healthy. Chakrabarti (1992) believes that salinity of water is probably the most important factor responsible for a good percentage (25 percent) of tigers turning man-eaters. The salt water might have affected the kidneys and liver of the animals and hence changed their physiology (Chakrabarti 1987). Human behavior is also

responsible for this propensity in the tiger. People who encroach upon the forest take little precaution against the tigers. They go into the Interior in small open dinghies (boats) and roam around together for months in search of forest products, making an easy meal for the tigers. Though these tigers have killed more than 600 people during the last 15 years, it is not true that every tiger in the Sundarbans is a man-eater. Chakrabarti asserts that man-killing in the tigers should be treated as an ecological reaction to the gross overexploitation of natural resources carried out by the humans for years together (Chakrabarti 1992).

In a census conducted in 1979, the tiger population in the Sundarbans was recorded as 205. In the next census in 1989, the population had risen to 269. Estimation of tiger population is based on pugmark (pawprints of a tiger left in the soil that help determine its size and sex) counting and analysis, and actual sighting (Chakrabarti 1992). Another census is in progress (fig. 2) and will be completed in 1999.

The Sundarbans Tiger Reserve

The Tiger Reserve in the Sundarbans (fig. 3) comprises 15 blocks of forest, covering a total area of approximately 2,585 km². The Tiger Reserve is bordered to the east by an international boundary with Bangladesh, to the west by the Matla River, to the south by the Bay of Bengal Sea, and to the north by the 24-Paraganas of West Bengal. The Reserve is divided into zones and blocks:

Zones	Blocks
Northern Zone	Pirkhali, Panchamukhani, Jhilla, Arbesi, Netidhopani, Chamta, Khatuajhuri, Harinbhanga
Central Zone	Chandkhali, Gosaba, Matla
Southern Zone	Chhotahardi, Mayadwip, Gona, Bagmara

In addition, there is a Buffer Zone comprising the remaining area of the Sundarbans in the north and west of the forest (Chakrabarti 1992; Management Plan 1982).



Figure 2—Tiger census in progress in 1988 (photograph courtesy of World Wildlife (India), Eastern Region, Calcutta).

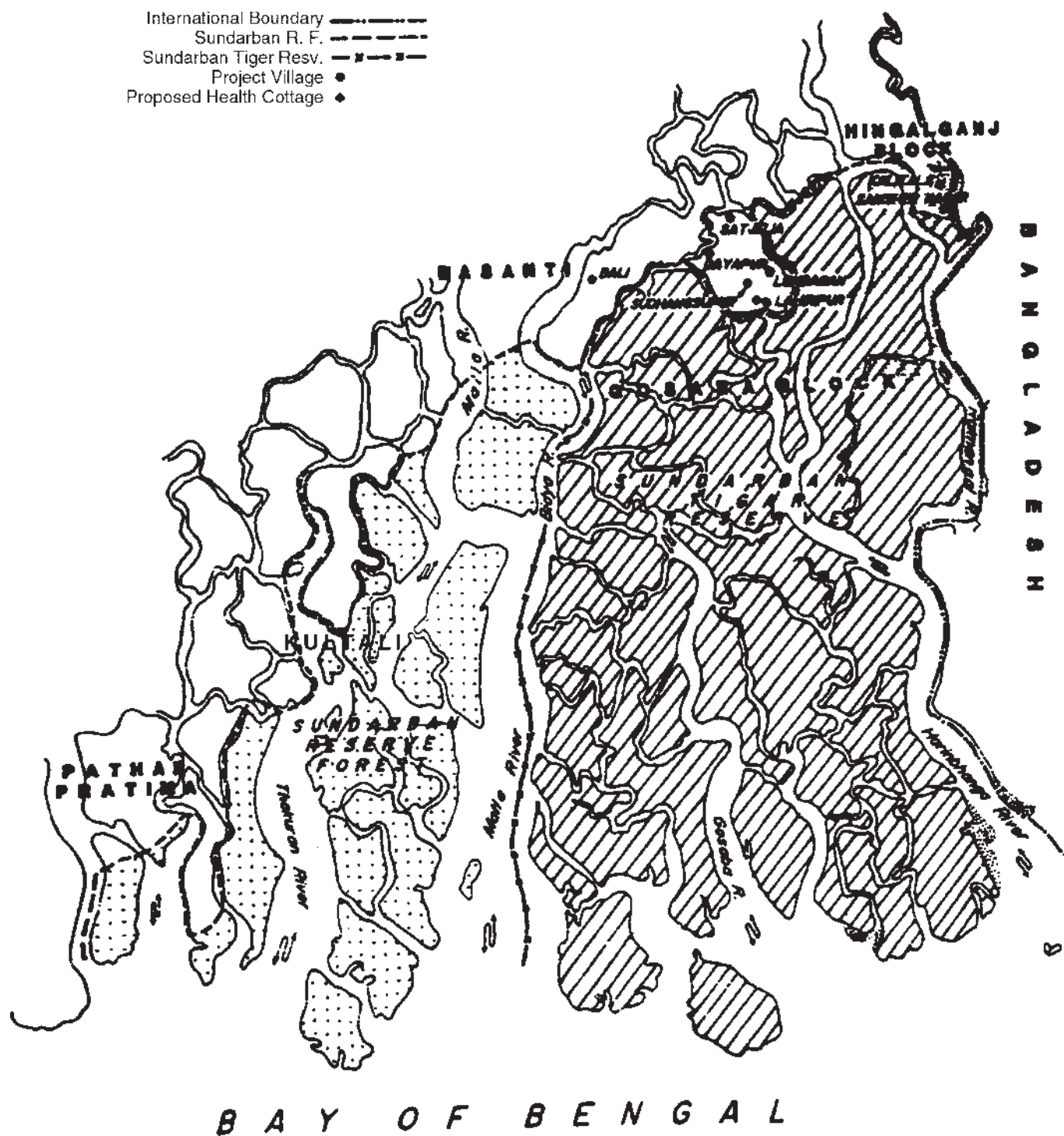


Figure 3—Sundarbans Tiger Reserve/National Park (map courtesy of the Zoological Survey of India, Calcutta).

The Ecology of the Sundarbans

The Sundarbans is an estuarine complex where three great rivers, the Ganga, the Brahmaputra, and the Meghna, meet to form an 80,000-km delta fringe—the largest tract of mangroves in the world. These are called the “Sundarbans” because of the dominance of a tree species (*Hertiera fomes*), which is called “Sunderi” (sunder means beautiful). The basin comprises a vast swampy area flanked by the massive Himalayas to the north, the Rajmahal hills to the west, and the Meghalaya Plateau and Chittagong hills to the east. The Sundarbans, part of which lies in Bangladesh, comprise an area of 9,827 km². The total area in the Indian sector, in the district of 24-Parganas, in West Bengal, is about 4,262 km², of which approximately half is under water.

The mangrove community is closely linked both to the sea and to fresh water from the land (fig. 4). A living buffer is created between the land and the sea. The mangroves are vital to the productivity of the entire intertidal ecosystem, and as Teas (1976) points out, they are valuable for shoreline protection and stabilization of soil and habitat. An abundance of organic matter transforms water into a rich nutrient, containing detritus particles that contribute toward estuarine and marine fertility (Heald and Odum 1970; Macnae 1974). The variety of the ecosystems becomes the nursery grounds for economically important fish and shellfish, and a natural abode for many groups of animals, including a large number of species that are known to feed, breed, and take shelter in the mangroves.

The Sundarbans mangroves are diverse and luxuriant. The growth and nature of vegetation in the Sundarbans are determined by factors such as (Chakrabarti 1992):

- The fineness, softness, and mobility of the clay.
- The lack of a solid base for the plants.
- The rate at which the humus is processed.
- The consequent dependence of plant life on the continual deposition of fresh silt (and its accompanying organic matter) brought down by the rivers.
- The salinity of the water.

The mangroves are adapted to the estuarine environment and animals inhabiting the region demonstrate, in turn, the same adaptability to variable salinity, muddy substratum, and periodic tidal flush. The Royal Bengal Tiger, a unique species occurring only in the Sundarbans mangrove, has also adjusted itself comfortably to this ecosystem (Mandal and Nandi 1989).

Human Interaction in the Sundarbans Forest Reserve

There is no human habitation inside the Sundarbans Forest Reserve. However, the Reserve is surrounded by many islands of villages, such as, Chamta, Chota Hadi, Kedo, Mayadeep, Raidighi, Kultali, Sajeria, Anandapur, and Lask Bagan. The people of these villages are extremely poor. They are almost fully dependent on the forest for their livelihood and survival. Subsistence is of primary concern for them no matter how great the risks are of being attacked



Figure 4—Submerged forest line during high tide (photograph courtesy of Dr. Kalyan Chakrabarti, Chief Conservator of Forests, West Bengal, Calcutta).

by tigers (Chakrabarti 1992). Driven by poverty, these people invade the forest by the thousands every day to collect thatches, timber, firewood, honey, and seeds (eggs) of tiger prawn (fig. 5).

These people are also gradually encroaching upon the fringe areas of the forest in pursuit of agriculture and shrimp (*Metacarpus indica*) culture. They construct raised mud embankments and erect barriers in the rivers (known as “bundhs”), which help to prevent seepage of salt water into the agricultural land. Unfortunately, this method often fails, and the villagers, in their desperation for livelihood, keep on shifting from one piece of land to another, often with disastrous results. The bundhs arrest the flow of water and tidal waves and interfere with the natural equilibrium of the ecosystem (Sanyal and others 1984). As an alternative to agriculture, the villagers are turning to shrimp culture, which has become a very lucrative business in recent years. It involves almost 40 percent of the



Figure 5—Prawn seed collectors on their way to the interior of the forest (photograph courtesy of Dr. Kalyan Chakrabarti, Chief Conservator of Forests, West Bengal, Calcutta).

local inhabitants, including women and children, who venture right into the core area of the Sundarbans Tiger Reserve, and cause increasing ecological pressure in the region.

Socio-economic problems in the fringe areas of the Sundarbans forest are directly responsible for the fast depletion of the tiger population. Excessive use of natural resources by humans has forced the Bengal tiger to near extinction. Reclamation of forest land to meet the ever-growing demand for human settlement and agriculture has seriously affected the tiger population in the Sundarbans forest. Excepting man, as Chakrabarti (1992) points out, there are no other disturbing elements for the tigers in the Sundarbans. The World Wildlife Fund (WWF) is also alarmed at reports that a large number of people in this area are involved in tiger poaching. In a recent report, the Tiger Cell of WWF-India (Eastern Region) has identified economic poverty along the fringe area as the main reason for a critical ecological imbalance in the Sundarbans Tiger Reserve.

Application of the Principles of Community Forestry

To obtain local support to save the Sundarbans tigers from extinction, it is essential for a project to ensure full cooperation and joint decisionmaking between the locals, nongovernmental organizations, and the government. In a country like India, a large proportion of the population, especially in the lower income levels, depends on wood for cooking, heating, and agricultural processing. With the increase of population, there is a growing pressure on wood resources, resulting in depletion of forests and degradation of the environment.

The poor people cannot afford oil-based fuels and other sources of energy. Until they are provided with alternatives like electricity and cooking gas, they will tend to depend on the adjacent forests for fuelwood. Valmik Thapar, founder of the Ranathmbore Tiger Foundation in India, serves a warning note when he says, "Despite best efforts by conservationists, the tiger population in India could be gravely threatened if the local people living near tiger reserves do not derive economic benefits from tigers in the wild" (Trivedi 1998).

Forest policies in India were directed to separate the local people by restricting entry into the forests, which in turn caused resentment and hostility among the local inhabitants. The top-down approach divided the Sundarbans Tiger Reserve into core and buffer zones. The core zone restricts human interference. The situation was created so that the new generation of animals would migrate into the surrounding forest. Local users of the forest suddenly became a threat to wildlife. Since primary subsistence is the main concern for the people in the Sundarbans, the local inhabitants, despite all restrictions, venture into the core area for collection of honey, shrimp seeds, and leaves of *Nipa fruticans*, which are used as thatches. They hunt deer for meat and skin, wild pigs for meat, snakes for their skin, and birds to be sold in the market as pets. In search of a livelihood in these forests, they often encounter tigers and are attacked by them. When someone is attacked by a tiger, the villagers unite to take revenge, arguing that if they kill the man-eater, other villagers will be saved. They inject

poison into the muscles of dead cattle to trap and kill the tiger. The socio-economic conditions of the people are responsible for such activities.

Kultali, a village adjacent to the Reserve, serves as a good example of the plight of those who live closest to the tiger reserve in the Sundarbans. This is one of the poorest villages of West Bengal. The livelihood of the villagers depends on the Sundarbans, where they gather fuelwood and building materials for their basic needs. They endanger their lives by going deep into the forest to collect tiger shrimp and honey, which they sell to middlemen to earn cash to buy other necessities of life. They live in houses built of mud and thatch roofing. There are practically no hard-surface or all-weather roads in the region. The roads are mud banks through which one person can barely walk. During the rainy season the banks give way, making it almost impossible to walk.

There are a few primary schools, but they lack both human and financial resources. Eighty percent of the pupils drop out of school; the literacy rate among girls is below 8 percent (Chaudhuri and Choudhury 1994). The locals depend on water drawn from ponds and streams—a health hazard since the water is not treated. Fewer than 10 percent of the houses have toilets of any kind. Malaria, influenza, and stomach disorders are common ailments among the villagers. There is no hospital or health clinic within 20 miles. However, there are quite a number of deaths from tiger attacks.

Conservation Strategies

Conservation of tigers in the Sundarbans requires sound strategic planning, with a goal to maintain or enhance long-term social and economic well being of the communities in the buffer and outer fringes of the forest. To this end, it is essential to:

1. Promote eco-development in the area. This could include encouraging agriculture and fish culture in the same land. Indigenous fish have a good demand in the local market, but these are often ignored by fishermen in preference to shrimp seeds and exotic carps, which have a high value in both local and international markets. Crop rotation of rice and other cash crops, such as vegetables and fruits, would help increase soil fertility and the economic condition of the people. Encouraging locals to grow timber and fruit trees in the courtyards of their homes could yield timber and fruits for domestic use. Tapping of minor forest products, such as tannin and wax, could generate income and employment for more local inhabitants.

2. Ensure sustainable agriculture, shrimp culture, and honey collection to help generate a steady income for the people. Local inhabitants discard any small fish and shrimp varieties other than *Metacarpus indica*. Encouraging and developing ways to grow other shrimp varieties, such as *Acetes* sp., *Macrobrachium iamarei*, and *Parapenaeopsis sculprilis*, would help in reducing the pressure of over exploitation in the Sundarbans estuaries and reduce the chance of the local people being attacked by tigers. Honey collection is another means of livelihood for locals. Domestication of *Apis dorsa* (honey bee) could also involve women in the area in resource generation.

3. Remove the curtain of law that separates people from their environment. There is a barrier between the local people and the government and its officials, who often harass the inhabitants for exploiting the forests. Cooperation between government officials and local inhabitants could remove this barrier. Transferring some rights, like felling of trees and sharing some of the related profits with the government, would certainly make the local people feel that the forests are owned by them rather than by the government. This would motivate the local inhabitants to safeguard the forests and its resources from being overly exploited.

4. Involve local people as a resource in the decision-making process. Indigenous people are aware of their environment, available resources, and means of exploiting them. Interacting with them in the decisionmaking process could help in educating them to exploit the resources sustainably and scientifically. Networking and establishment of rural institutions would allow communities to learn from each other.

5. Make certain that local communities receive education to understand the importance of conservation. Since most people in this area are illiterate, it is essential to teach them the importance of conservation. Education through their cultural and social beliefs could have a significant impact on their understanding of conservation problems. This would also mean redefining community forest practices in India by recognizing: (a) who is the beneficiary, (b) who decides what, and (c) how broad-ranging conservation objectives are to save the tiger.

Conclusions

Poverty, lack of awareness, and overpopulation lead to excessive exploitation of the forests and thereby cause a serious threat to conservation strategies. The lives of the people living close to the forests are closely associated with it. Their basic survival depends on the forests. This will continue to increase the pressure on the forests unless their socio-economic conditions are improved. Conservation of tigers, a keystone species in the Sundarbans ecosystem, will be next to impossible unless the local people are involved in management, the decisionmaking process, and developing techniques for sustainable yields from the forest. In India, the government and its agencies have been in charge of policy and decisionmaking. The Forest Policy of 1988 highlighted the issues of public awareness and joint ventures, a breakthrough for achieving better cooperation from the people for conservation strategies. Cooperation, collaboration, and joint ventures between the government, nongovernmental organizations, and the local people can go a long way in the conservation of the Sundarbans tigers.

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