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Akhouri Pramod Krishna, Santosh Chhetri, and Kaushal Kumar Singh

Human Dimensions of Conservation in the Khangchendzonga Biosphere Reserve

The Need for Conflict Prevention

The Khangchendzonga Biosphere Reserve (KBR) is one of the latest additions to the protected areas network in the Indian Himalayan Region. Located in the picturesque state of Sikkim in the eastern Indian Himalayan Region with snow-clad mountain peaks, numerous glaciers, a snow- and glacier-fed stream network and high-altitude lakes, this biosphere reserve (BR) is named after the world's third highest mountain peak, Mt Khangchendzonga (8598 m), 1 of the 14 peaks in the world above 8000 m. The KBR covers an area of 2619.92 km^2, 36.92% of the land area of Sikkim (Figure 1). BRs exemplify participatory sustainable resource use and ecosystem conservation. It is therefore important to consider the human dimensions of a BR from the outset and to survey stakeholders' attitudes about conservation in order to take into account the inherent traditional dependence of people on forest-based resources. Potential future conflicts of interest need to be addressed through well–thought out strategies and integration of traditional conflict prevention mechanisms. Experience gained in the KBR may be useful in light of the widely reported conflicts in other BRs and protected areas around the world. Careful and informed planning may help reduce the likelihood of conflicts arising in newly established BRs.

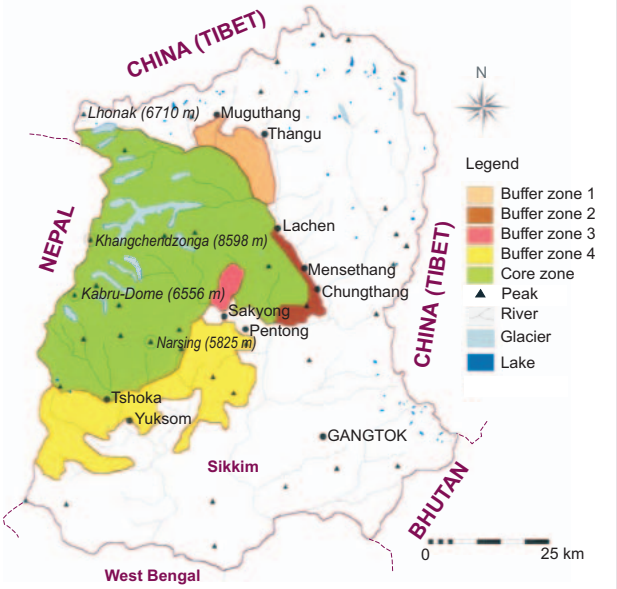


FIGURE 1 Map of the KBR in the Sikkim Himalaya, India, generated by a Geographic Information System (GIS). (Map by authors)

Expectations from biosphere reserves (BRs)

The UNESCO Man and Biosphere program recognized a number of mountain biosphere reserves (BRs) in different countries of the world. A BR represents a biogeographic province with an appropriate zoning system and a legally constituted and minimally disturbed core zone. Acting as a natural conservation pool, a BR is supposed to achieve 3 functions:

1. Conservation of genetic resources with a concern for ecosystem and landscape level integrity.
2. Promotion of research, training, and environmental education.
3. Sustainable development of local communities.

Greater protection for a "core zone" is usually achieved by establishing an outer "buffer zone" where certain controlled uses are also desirable and taken into consideration. BRs are particularly appropriate in mountain environments that have resident human populations and can be suitable sites for training and research. Research on human–environment interactions and ecosystem functioning is expected to help demonstrate that conservation is best practiced if people are involved in area management and decision-making processes so that they protect "their own environment." An understanding of the human dimensions of resource and ecosystem conservation in BRs is important for prevention and resolution of conflicts related to natural resources. Conventional protected area concepts have long neglected the human dimensions of conservation. The Khangchendzonga Biosphere Reserve (KBR) in the Sikkim Himalaya, which was declared a BR in 2000, offers an opportunity to investigate the implications and possibilities of future conflict prevention at the inception stage.

Man–BR interactions in Sikkim

Ecological management of nature reserves is an important example of a sound frame-

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TABLE 1 Forest resource use and dependency of the KBR buffer zone settlements. BZ = buffer zone, CZ = core zone, RF = reserved forest; high = >1 to <3 km, medium = >3 to <5 km, low = >5 km.

Forest resources	Settlements	Source	Availability status	Distance (km)	Dependency rate (%)
Fuelwood, fodder, timber, NTFPs including medicinal herbs, wild edibles, litter and other MFPs	Sakyong-Pentong	BZ 1 BZ 4 & RF	Medium to high	2–4	60
	Yuksam	BZ 4, CZ & RF	Medium	3–5	55
	Chungthang	BZ 2	Medium	3–4	60
	Menshithang	BZ 2	Medium	3.5	70
	Uttaray	BZ 4 & RF	Low	7	75
	Lachen	BZ 1 & CZ	Low	5.5	50
	Thangu	BZ 1	Low	5.5	50
	Tshoka (inside core area)	CZ	Medium	3.5	60

work for landscape ecology that includes both natural and cultural landscapes. An assessment of the situation virtually at the inception of the KBR, involving surveys along the fringe areas and in villages, shed light on settlement structures, the socioeconomic fabric, traditional agricultural practices and management, and patterns of resource use.

The human population living close to this BR is highly dependent on forests in the buffer zones, be it for nontimber forest products (NTFPs)—including extraction of medicinal herbs, litter, wild edible fruits, and other minor forest products (MFPs)—or for timber, fodder, fuelwood, and open grazing. It was found that the dependency in such settlements ranged from 50% to 75% with respect to forest resource use, for example, 50–90% of fodder is collected in forested areas (Table 1). Although timber cutting is strictly prohibited, it seems difficult to stop the collection of fodder and fuelwood. This is likely to have long-term effects on habitats and eradicate some flora and fauna in the KBR. Increased habitat degradation may lead to adverse effects on rare or endangered flowering species such as rhododendrons (Figure 2)—a keystone species acting as a biodiversity indicator of the region. In terms of fauna, high-altitude regions of the BR are home to rare and endangered animal species such as the snow leopard, the Himalayan red panda, the musk deer, the Tibetan sheep, the blue sheep, and many others. Strict conservation efforts may be required to protect the habitats of such species; this will be essential and unavoidable in fulfilling the objectives of this BR.

In the last 10 years the population of Sikkim has increased by approximately 33%, thus putting even more pressure on resources. In the fringe areas, livelihood options such as traditional farming, pastoralism, and tourism exist. Agriculture is at the subsistence level, with dependency on natural resources in the surrounding forest exceeding 60%. Fringe areas were characterized by socioeconomic condi-



FIGURE 2 Rhododendrons found in the high-altitude zones showing the effect of habitat degradation. (Photo by Kaushal Kumar Singh)

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FIGURE 3 Yaks grazing on the alpine pastures in the buffer zones of the KBR. (Photo by Akhouri Pramod Krishna)

tions under which annual income per household ranged from US$685 to US$1657 and literacy from 30% to 98%, with predominantly school-level education. The practice of livestock rearing to supplement agriculture and generate direct income is quite prevalent. Open grazing (eg, yaks grazing on alpine pastures, see Figure 3) is practiced for the most part, with limited stall feeding. The use of NTFPs and medicinal herbs is a common form of supplementary income.

Survey of attitudes regarding conservation

Basic human needs can clash with the concept of biosphere conservation in the case of deliberate misinterpretation or ignorance on the part of stakeholders. Therefore, a conservation attitude survey (CONAT) of approximately 10% of the households was carried out in selected important fringe area settlements (Figure 4) to determine how local communities and stakeholders express their concerns about environmental conservation. A simplified CONAT questionnaire was prepared, covering issues of great relevance to stakeholders and policymakers, which respondents could easily understand. The basic premise of this survey was that the environmental costs of enforcing BR principles related to restriction on the use of natural resources would be borne by local people and stakeholders alike.

Almost 90% of the population indicated that they were theoretically willing to accept restrictions necessary for conservation and to pay the related costs. But they were more skeptical when they perceived that socioeconomic conditions would be directly affected. They also expressed great interest and commitment in participating in research and training activities.

Hence, conflicts are likely to crop up only when the real pressure of conservation restrictions begins to affect socioeconomic conditions and the traditional practices of people living in fringe area settle-



FIGURE 4 A high-altitude permanent fringe area settlement near the KBR. (Photo by Akhouri Pramod Krishna)

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ments, in the absence of viable alternatives to their traditional dependence on BR resources.

The need for conflict prevention

The key to resolution of potential man–biosphere conflicts over resource use lies in the social, economic, and environmental concepts that are the pillars of sustainable development. Implementation policies for the newly created KBR should give careful attention to participation by stakeholders as well as to their perceptions, in the light of a recently implemented joint forest management strategy. Such an approach will ensure that stakeholders do not become antagonists, provoking conflict in BR areas. Additional surveys conducted in the same settlements in future should reveal no drastic drop in positive CONAT values when compared with present responses.

Participation, traditional knowledge, and traditional strategies

A participatory approach involving stakeholders is essential for effective management of natural resources and ecosystem conservation in this BR. Such an approach must employ traditional ecological knowledge and traditional conflict prevention strategies in the management of BR resources. For example, in certain parts of North Sikkim, close to the BR, local communities have a system known as *zumsha* concerned with social, developmental, and environmental issues of local significance. The head of this system, who has total authority, is known as the *pipon*. The *zumsha* system prescribes and regulates activities such as grazing, tree felling, and collection of medicinal plants and herbs, taking full account of traditional ecological knowledge and imposing penalties for violations. Grazing is permitted only when complete care is taken to retain the regeneration capacity of rangeland. This includes allotment of a particular piece of land for grazing, determination of the number of cattle allowed to graze, guidelines about the correct season, and suggestions concerning the times when cattle should be left in and brought out of the forests. Granting by the *zumsha* of the right to fell trees and collect medicinal plants and herbs, with the recommendation of the *pipon*, is also based on traditional ecological knowledge, with little danger of overexploitation. Such factors as consideration of the socioeconomic status of the household and systematic allotment of the area for collection, considering the capacity for ecological regeneration, are also taken into account in the granting of rights concerning quantity, species, etc. Other forms of local traditional ecological knowledge can also be integrated with BR management to make it more efficient.

Provision of alternative livelihood options and additional resources, to defray the pressure and dependence on the BR resources, is also important for efficient management and conflict prevention. This can be achieved by capacity building in local communities to enhance productivity, thereby reducing dependence on biosphere resources that are likely to be subject to restrictions. In summary, the most important initiatives to be implemented concurrently for effective conflict prevention are the following:

1. A participatory approach to ecosystem protection.
2. Credible and effective information and communication measures.
3. Management responsibility and benefit sharing, particularly with respect to traditional ecological knowledge emphasizing gender equality.
4. Community responsibility for effective monitoring, and exercise of traditional rights and forms of resource use.

Local communities must derive direct and indirect benefits in the implementation of the overall BR concept, with due concern for effective implementation mechanisms. Because this BR is in its inception stage, there is great potential, in terms of management and execution, to avoid the types of conflict generally experienced and reported in other BRs and protected areas of the world.

AUTHORS

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