

# A Landscape Approach to Biodiversity Conservation: an Evolving Scenario and Policy Perspective

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*The Kangchenjunga landscape has been subject to progressive policy changes that have brought about a paradigm shift from people-exclusive to participatory conservation.*



## Introduction

Humans have co-existed with nature and shaped the earth's landscape for centuries (Bernbaum 1996; Colchester 1997 ; Ghimire and Pimbert 1997). The rise in consumptive use of natural resources, however, brought about an undesirable alteration in the state of nature and the earth's landscapes. However, conservation of resources also evolved at the same time and has a long history from as early as 2000 BC (Gurung 2006). In the early 19th century, the western world made a distinction between conservation and exploitative utilitarian management of natural resources. This contested the relationship between nature and human beings for the first time. Subsequently, an idealistic social construction of nature led to a movement to preserve

supposedly wild or pristine regions (Kollmair et al. 2005). The notion of preserving supposedly wild or pristine nature led to the setting up of the world's first national park in 1872, Yellowstone, in the United States of America. Following the 'Yellowstone model', which laid a foundation for protected area development, thousands of national parks and other forms of protected areas came into existence all over the world (Stevens 1997; Neumann 1998).

The Yellowstone model, perceived as a strict nature protection paradigm (Pimbert and Pretty 1997), emphasised preserving the pristine environment for reverence of nature, human recreation, and scientific investigation. Even though humans inhabited protected areas and had used their natural resources for centuries, the Yellowstone model considered consumptive use of natural resources to be incompatible with the preservation and maintenance of nature's inherent 'wilderness' and untouched state (Colchester 1997; Stevens 1997). Consequently, humans were excluded from protected areas. Natural areas were isolated from humans for conservation. Indigenous and local people were also evicted from their homelands in order to establish protected areas (Muller-Boker 1991; Colchester 1997; Stevens 1997; Straede and Helles 2000; McLean and Straede 2003). Their role in managing the natural resources in protected areas ceased, and nature conservation actually became a source of suffering for them (Alcorn 1993). As conservation began to lose its relevance for local people, establishment and management of protected areas proved to be impractical and difficult (Stevens 1997; Kollmair et al. 2005). Fragmentation of ecosystems, unprecedented biodiversity loss, unsustainable use of natural resources, and irreparable impairment in the quality of ecosystem services occurred.

The 1972 United Nations' Conference on the Human Environment declared that more prudent care for the environment was needed to avoid the consequences of environmental degradation. It also noted major undesirable disturbances in the ecological balance of the biosphere and irreparable destruction and depletion of resources caused by humans. In 1992, the United Nations' Conference on Environment and Development declared that environmental issues would be best handled with the participation of all citizens concerned. In addition, the Caracas Action Plan of 1992 drew up a global framework for expanding protected areas by involving local communities and other non-traditional interest groups. The Durban Action Plan, 2003, reinforced the importance of mainstreaming the participation of local communities and indigenous people in protected area management.

Loss of species in the isolated national parks in North America and Africa was observed. It confirmed that long-term conservation of the species in isolated, protected areas is not sustainable. The realisation grew that it was necessary to conserve species at landscape level, covering a wide range of areas extending beyond the political boundaries of countries. In the 1990s, policies emerged to maintain the integrity of environmental processes by integrating protected areas into more extensive and linked ecological networks. Since 2004, the Convention on Biological Diversity (CBD) has promoted an ecosystem approach as the best means to achieve the 2010 biodiversity target set by the Seventh Conference of the Parties (CoP 7) of the CBD. As a result, ecological networks – connecting core areas, corridors, and buffer zones – are now being set up to improve ecological coherence and conserve biodiversity at the

landscape level. Furthermore, the role of the ecosystem approach to biodiversity conservation is being promoted as an adaptive strategy to climate change (Secretariat of the CBD 2003). In recent years, biodiversity conservation in the eastern Himalayas has also begun to take on a broader perspective than heretofore by taking social, cultural, economic, and political concerns into account (Rastogi et al. 1997; Chettri and Sharma 2006). Protected areas are now being integrated into associated corridors and buffer zones in order to maintain and protect landscapes rather than protected areas only, and provide sustainable livelihoods to local inhabitants living outside the protected areas (Sherpa et al 2004; GoN/MFSC 2006; Wangchuck 2007; Chettri and Sharma 2006). In this chapter, we would like to present the evolving scenarios and policy perspectives developed over time in the Kangchenjunga landscape.

## **Kangchenjunga Landscape**

The Kangchenjunga landscape is one of the five transboundary complexes identified by ICIMOD in the Hindu Kush-Himalayas (HKH) (Chettri and Sharma 2005). The southern part (without PR China) contains fourteen protected areas and six (proposed or impemented) conservation corridors. It has strict nature reserves (6.27%), national parks (43.50%), biosphere reserves (25.24%), conservation areas (19.60%), and wildlife and rhododendron sanctuaries (5.38%). Out of the total area, about 6032 sq.km is protected, areas established to protect species listed in the World Conservation Union's (IUCN) red list and the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) appendices (WWF and ICIMOD 2001). The proposed corridors cover an additional 1,722 sq.km.

Conventionally, conservation instruments in Bhutan, India and Nepal relied on the protectionist approach. Strict rules and regulations were put in place to address the conservation challenges. The policy provisions were inadequate for resolving park-people conflicts and land tenure. Communities residing in protected areas were seen as agents of environmental degradation and biodiversity loss. Lack of local participation in decision making related to conservation and development of protected areas was apparent. Generally, the conservation effort was ineffective.

Keeping abreast of change in the conservation paradigm, these countries embarked on the process of policy reforms: the governments of these countries recognised the need for integrated approaches to conservation. When planning for protected area systems, biosphere reserves, and conservation areas, human ecology is being included (Chettri et al. 2006). New areas have been added to the existing network of protected areas (additional buffer areas to Kangchenjunga National Park to form the Khangchendzonga Biosphere Reserve and a new protected area – 'Pangolakha Wildlife Sanctuary' in Sikkim and Toorsa Strict Nature Reserve in Bhutan). To include representative ecosystems in the protected area system, Bhutan has revised its old protected area system and adopted a new system by notifying a conservation complex and corridors in addition to the protected area system (NCD 2004). India increased the area under the then Kangchenjunga National Park and re-designated it as Kangchenjunga Biosphere Reserve. Nepal designated its part of Kangchenjunga as a conservation area. Across the landscape, community-oriented and biodiversity-based economic development models began

to evolve. Community-based enterprises for recreation became one of the most promising incentives for communities living in the protected areas. People-oriented buffer zone management is emerging. Mainstreaming social and economic inclusion into conservation programmes through community participation is also growing.

The three countries have adopted policies to enable management of protected areas and corridors. The Forest Policy of Bhutan (1974) requires that 60% of the country's land area should be maintained under forest cover. The Forest and Nature Conservation Act (1995), which superceded the Forest Act of 1969, requires the establishment of a national system of protected areas. The protected areas are to be linked by corridors of natural forest and surrounded by buffer zones. This Act also makes community-based management of natural resources a legal requirement. The Act states that forest resources should be managed and used sustainably according to a scientific plan. The National Biodiversity Act (2002) provides for community-based conservation of genetic resources. The Environmental Assessment Act (2000) provides legal measures to safeguard the environment and ecosystems from the negative impacts of development programmes.

In India, people's participation in sustainable management of natural resources has been emphasised in successive policy iterations. The National Forest Policy of 1988, which constitutes a major policy reversal, legitimises sustainable management of forest resources through people-oriented approaches. It recognises collaborative management of forests. The Department of Forests, community groups, and non-government organisations have distinct roles to play. Adoption of modalities to give usufruct benefits to village communities living close to forests to ensure their active participation in afforestation programmes is recognised. The policy dictates that forest management should integrate economic use and ecosystem services of the forests. It rules that forest corridors to link protected areas should be established in order to maintain genetic contiguity between artificially separated sub-sections of migrant wildlife species. Laws have been revised to regulate the implementation of the new policy. The Wildlife Protection Act (2002) and the Biological Diversity Act (2002) were enacted and a National Biodiversity Authority established. The Wildlife Protection Act recognises management of ecosystems at landscape level as a means of ensuring legal protection for wild animals, birds, and plants. In addition, eco-development (known as integrated conservation and development elsewhere) and joint forest management (JFM) modalities have been promoted to secure people-oriented conservation of protected areas and sustainable management of forest resources. Eco-development committees (EDCs) and forest protection committees (FPCs) have been established. Many self-help groups (SHGs) have been formed by women. Community funds have been set up to finance community development programmes out of the revenue generated by sale of forest products.

In Nepal, the Constitution of Nepal of 1990 recognises the importance of sustainable management of the country's natural resources. It provides for the establishment of a Natural Resources and Environment Committee in the House of Representatives. The committee is entrusted with the responsibility of evaluating the policies and programmes on natural resources. The Local Self-Governance Act of 1998 empowers the district development committees (DDCs)

to formulate and implement soil and biodiversity conservation plans. The National Parks and Wildlife Conservation Act of 1973, provides a legal basis for the management of protected areas. The Buffer Zone Management Regulations (1996) and the Buffer Zone Management Guidelines (1999) provide legislative support to address the needs of local communities and resolve conflicts between parks and people. The Aquatic Animal Protection Act (1961) provides legislative protection to the habitats of aquatic species. The Himalayan National Park Regulations (1979) have provisions for local communities to use natural resources for their daily requirements. The Forest Act (1993) recognises the need to manage forests for their ecosystem services and economic value. It also provides for community-based management of forest resources. Initial environmental examinations or environmental impact assessments are mandatory for development proposals involving forests. The 1990 constitution has been replaced by an interim constitution (in early 2008) while a new constitution is drafted. It is not yet known whether this will have any impact the above.

## Challenges in the Kangchenjunga Landscape

Protected areas and ecosystems are now employed as a principal means of conserving nature – keeping diverse ecosystems and the well-being of different species, including humans, intact (IUCN/UNEP/WWF 1991; Chape et al 2005). The concept of managing protected areas has evolved from the protectionist paradigm to the people-oriented paradigm. The IUCN definition of protected areas and their classification, however, which is universally recognised, has not undergone revision since 1994. As a result, of the six IUCN categories, categories I and II are strictly against human consumptive use; categories III and IV also emphasise conservation, while category V envisages conservation along with recreational use. Category VI is the latest and recognises the aspirations and needs of local people and the importance of protected areas for the sustainable livelihoods of the local inhabitants and vice versa (Chape et al 2005; Scheri et al 2004). In essence, the scope for sustainable use of natural resources by local inhabitants beyond the subsistence level has not broadened (Gurung 2006). Category VI represents only about 23% of all protected areas (Chape et al 2003). The relevance of protected areas for providing ecosystem services and conserving biodiversity remains questionable unless protected areas are relevant to local development strategies and address the needs and aspirations of local inhabitants (Wilshusen et al 2002; Pimbert 2004; Scheri et al 2004).

Over the last three decades, efforts to conserve biodiversity in the Kangchenjunga landscape has gradually shifted from law enforcement and use restrictions towards participatory approaches emphasising equitable and sustainable use of natural resources (Chettri and Sharma 2006; Gurung 2006). The paradigm shift in conservation facilitated positive policy, institutional, and management initiatives in member countries. People ‘exclusionary’ to ‘community-based’ conservation evolved; however, there is still a long way to go before ‘community-based’ conservation becomes effective. For instance, at the moment, in the Kangchenjunga landscape, only about a quarter of the protected areas fall into the category in which people-oriented conservation can be practised.

The governments of the countries participating in landscape conservation have demonstrated their commitment to involve communities in the management of natural resources in protected

areas, buffer zones, and corridors. The policies of some countries, however, appear to give more importance to conservation than to the livelihood needs of local communities, whereas the policies of other countries seek to integrate conservation and livelihood needs. Equity or fairness in the management of common property resources needs the inclusion and representation in decision-making bodies of those who are poor and socially marginalised (Balasinorwala et al. 2004). Ensuring rights of access and benefits for the communities, particularly the poor and socially marginalised, is critical for governance of natural resources. Integrated conservation and development still lack demonstrable notable successes and convincing cases that show the effective reconciliation of people's development needs with protected area management (Wells et al 1999; Salafsky and Wollenberg 2000). Even policies seeking to integrate conservation and development suffer from gross inequity in resource distribution and decision making within community-based management regimes (Malla 2000; Bhattarai and Ojha 2001; Paudel and Ojha 2002).

A new scientific summary of the Intergovernmental Panel on Climate Change (IPCC) confirmed that global climate change would present practical challenges to local ecosystems (IPCC 2007). More extreme weather events, such as longer than usual droughts, higher than usual temperatures (milder winters), heat waves, and changes in local natural resources (such as biodiversity and water), will occur. Climate change will impact the natural landscape, human health, infrastructure, socioeconomic conditions of communities, and ecosystem services. Agriculture, forestry, water resources, human health, and natural ecosystems will need to adapt to a changing climate or face diminished functioning. Species inhabiting protected areas will face difficulties in changing behaviour or migrating in response to climate change (Thomas et al. 2004). While biological systems might accommodate minor (or slowly occurring) perturbations in a smooth, continuous fashion, even a minor change in climate may be disruptive for many ecosystems and individual species. Many of the landscape's species are currently under stress because of habitat fragmentation and high consumptive use of natural resources. This, coupled with a relatively rapid rate of anticipated climate change, is likely to challenge the resiliency of many species and their chances for successful adaptation. Tiding over such challenges will require improving the effectiveness of entire ecosystems and their components. Conservation corridors will need to have effective networks with diverse ecosystems. Connectivity of habitats for endangered and rare species of plants and animals is a necessity. Sustaining ecosystem services will need structural improvements in ecosystems; whereas in the Kangchenjunga landscape the connectivity concept is just evolving and the task is far from accomplished. The knowledge base also needs revision. Management interventions have to become relevant and effective. The capacities of professionals, local communities, and other stakeholders to plan, implement, monitor, and evaluate the relevance and effectiveness of protected areas and corridors need improvement. Institutions have to evolve to support community-based conservation.

The people living in the Kangchenjunga landscape are economically, physically, and socially vulnerable. Most depend on forest resources for their subsistence livelihoods as commercial resources remain beyond their reach due to difficulties in access, high prices, and limited supplies (Sharma et al 1992). Generally, the level of poverty among the populations residing in protected areas is high. Very often, the livelihood options available are not lucrative.



Economic returns from the use of natural resources are low and people have lower incomes than their compatriots outside protected areas. The most vulnerable are the ones who have no land. They resort to livelihood strategies that include temporary migration, collection of non-timber forest resources or medicinal plants, portering, wildlife hunting, and farm or forest-based and off-farm strategies. Their limited access to education, health care, and development opportunities creates an inexorable link between poverty and environmental degradation. Integrated conservation and development has yet to deliver workable solutions to the people-wildlife conflict. Wildlife poaching, overgrazing by livestock, illegal fuelwood collection and timber extraction, shortened fallow period for shifting cultivation, extensive non-timber forest product (NTFP) collection, and unregulated tourism are having a negative impact on protected areas. Haphazard land use continues to expose core areas and buffer zones to encroachment. Although rotational agroforestry (shifting cultivation) can be a valuable form of land use, distortion of the institutional mechanisms and functions that support it, and enforced shortening of the fallow period, can also result in negative impacts from this type of cultivation (Kerkhoff and Sharma 2006). Unregulated, and often excessive, use of resources brings the risk of habitat fragmentation. Unregulated collection of fuelwood, medicinal plants, and timber continues. Landslides, soil erosion, flooding, deforestation, poor agricultural practices, and forest fires aggravate habitat fragmentation.

Conservation corridors and some of the protected areas, (for instance the Toorsa Strict Nature Reserve) have yet to be placed under a knowledge-based management system. Management plans for several protected areas are in need of improvement. The infrastructure has to be improved. Conservation corridors are exposed to uncontrolled grazing, unsustainable harvesting of medicinal plants and other non-timber forest products, poaching of wildlife, slash and burn agriculture, forest fires, land degradation, indiscriminate felling of trees, and depredation of agriculture and livestock by wildlife.

Land uses in the proposed corridors include forestry, grazing, agriculture, tea gardens, and orchards. In some cases major development infrastructure, such as railways, runs through corridors. Demand on natural resources is relatively high putting pressure on forests and grazing resources. In some cases the migration routes of mega fauna of significance for conservation run through settlement areas and tourism infrastructure. The vegetative cover of some corridors requires improvement to improve environmental intactness. The review of information on corridors also reveals that alpine and subalpine pasturelands and common property resources for grazing by transhumance and settled communities are overgrazed. The warm temperate rangelands are used extensively for transhumance as well as by stall feeders, not giving enough time for rangelands to regenerate. Subtropical rangelands are grazed extensively in winter by transhumance herders as well as sedentary farming communities. At lower elevations, converting open pastures to community forests conflicts with traditional pasture management practices. In some areas, community forest user groups (CFUGs) prohibit the use of traditional migratory routes by animal herders. With the abolition of some communal land tenure and customary arrangements, ownership of the traditional community pastures inherited pasture resources has weakened leading to haphazard grazing and mismanagement.

The success of conservation at the landscape level depends on the commitment at regional level for cooperation, sharing of information, and giving access to genetic resources and access to technology transfer (Sharma et al 2007). Research has revealed the prevalence of persistent poverty among the communities which are interdependent and located along or close to the international boundaries because of limited development. The increasing economic and environmental interdependence between countries offers opportunities for cooperation (Chettri and Sharma 2006).

International boundaries also play an important role because of their multifaceted functions as filter zones for illicit activities, gateways for people and goods, and zones of socioeconomic, cultural, and environmental integration (Chettri and Sharma 2006). A host of transboundary challenges exists: illegal trading of products of protected species, poaching of animals, transboundary grazing, and use of other natural resources are prevalent. There is a lack of strategies for intervention and no formal framework within which to address transboundary challenges. Legal and policy aspects, varying across countries, affect resource use and conservation mechanisms (including community rights on the use and tenure of resources) differently in countries within the landscape. Physical and financial constraints also prevent networking and regular exchange of information and best practices among countries within the landscape.

## **The Way Forward**

Innovation and investment have to continue to (i) make the protected areas effective in delivering their goals; (ii) set up conservation corridors to make the ecosystem approach more effective; and (iii) resolve transboundary management problems. The areas of innovation and investment would include the following.

### **Remoulding policy**

The existing policies of individual countries differ. The policy of Nepal supports sustainable use of resources in protected areas designated as conservation areas. Local communities are empowered to plan and manage the protected area. In the case of India, given that the majority of protected areas fall either in national parks or sanctuaries, the policy appears to favour protection. The scope of people-oriented conservation and development is limited to biosphere reserves. Although participation of local communities is recognised, their participation seems rather restrictive as the ownership of the resources is with the state and local communities are only partially empowered. Similarly, in the case of Bhutan, the protected areas are national parks and strict nature reserves, and this appears to favour protection. The scope for people-oriented conservation seems to be restrictive as the policy to promote community participation is perhaps not well articulated in the management plans of protected areas and corridors.

Protected area management is evolving to integrate conservation and development. Both existing and new challenges will have to be overcome through remoulding policy. Essentially, policy should enable individual protected areas and corridors to become effective in delivering



conservation and development goals. Across the landscape, a uniform policy may reinforce the conservation and development efforts of individual countries. Policy has to be remoulded to recognise participatory management, stakeholder partnerships, an ecosystem approach, securing access to and ownership of natural resources, equitable sharing of benefits, sustainability, transboundary cooperation, sharing of good practices, and improvement of policies through learning. As circumstances change, and if policies lose validity, policies should be revised and made adaptable to deal with the changes. Genuine promotion of people-oriented conservation requires policies that strike a balance between conservation and development. Policy advocacy on transboundary conservation issues has to continue along with national-level advocacy. A clear policy discouraging development projects that are likely to have negative impacts on the fragile ecosystem is essential.

## **Improved Knowledge**

Research, technical, and scientific data determine the quality of biodiversity conservation programmes. Efforts have to continue to generate new information and knowledge. The relevance of biodiversity conservation programmes needs improvement in the quality of biological, physical, social, and economic information. Enrichment of the quality of research, technical, and scientific data is a continuing process to improve the quality of conservation and development interventions. Analysis of the information and knowledge gap should be spearheaded by individual countries and the quality of research enhanced. In addition good practices and indigenous or traditional technologies should be researched and recorded. Improvement in documentation should facilitate the application and use of information and knowledge; and use of information technology will improve the quality of documentation.

## **Improved Management**

Management of protected areas and corridors has to be more effective. Improvement of management planning and implementation of plans are essential in this respect. The relevance of management plans, giving due recognition to cultural and traditional practices, needs to be updated by integrating conservation and development. Frameworks for monitoring, evaluating, and reporting at national and transboundary levels need to be designed and adopted. Participation of stakeholders, community organisations, self-help groups, religious institutions, local governments, state government, non-government organisations, ministries and departments, media, and education institutions should be strengthened.

Systems linking protected areas to conservation corridors have to be operationalised. Within the corridors, rehabilitation and restoration of habitats and degraded ecosystems should be undertaken. Socioeconomic development programmes need strengthening and sustainable livelihoods need promoting. Sustainable agricultural practices, improved livestock farming, productive pastoralism, ecotourism, processing, value addition, and marketing of agricultural products have to be developed. Sustainable use and management of forests, non-timber forest products, grazing lands, and water resources should be supported, and cultural and traditional practices supporting sustainable use of natural resources should be preserved and promoted.

Governance mechanisms for protected areas and corridors need improvements based on the involvement of community-based organisations. Enforcement of laws, rules, and regulations has to become effective. Use of natural resources in both protected areas and corridors has to become sustainable: livelihood practices should be made sustainable by reducing incompatible land uses and promoting productive use of resources based on comparative advantages. Processing and value-addition of high-value non-timber and medicinal plants and promotion of community-based ecotourism should be pursued as alternative economic opportunities. At the local level, platforms for stakeholder consultation need to be created to enable participation of stakeholders. Cooperation and collaboration among stakeholders require strengthening.

## **Institutional Innovation**

Remoulding policy will call for institutional changes and the rules and regulations governing management of protected areas and corridors will need to be improved. Institutions to support people-oriented and collaborative governance of protected areas and corridors require innovation. Mechanisms to facilitate the coordination of transboundary issues as well as issues affecting individual corridors and protected areas have to be devised and applied. Common platforms to facilitate research, information exchange, and sharing of good practices among the countries in the landscape will need to be created. Guidelines and soft legal instruments, essential for addressing transboundary issues within the framework of existing laws of the countries, should be adopted.

## **Capacity Building**

Efforts to improve professional capacities in research, collecting information, and writing management plans should be carried out. Similarly, the capability of communities to develop and implement management plans has to be improved. Improving the capacities of different target groups, including women, to become engaged in conservation and development will be necessary. Increased public education, participation, and awareness about biodiversity conservation and sustainable resource use will have to be promoted.

## **Transboundary Problems**

Conservation interventions include from species' preservation to landscape conservation. Effective conservation of biodiversity involves an integrated conservation and sustainable development approach. Partnerships will need to be established between communities and government agencies within the landscape. Creation of platforms to facilitate information exchange, sharing of experiences, and fostering cooperation is envisaged.

At the landscape level, efforts to resolve transboundary conservation issues should be organised. Strengthening of policy dialogues for implementation of international conventions (e.g., CITES or the Convention on Migratory Species of Birds [CMS]) within the three countries is important. Mutual support to tackle transboundary issues will require formalisation; for instance, mechanisms and strategies have to be devised and employed to manage unauthorised cross-border resource extraction, illegal trade of species and their derivatives, spread of forest fires,

and spread of disease. Uniform strategies and approaches can be promoted for conservation of endemic species in the landscape.

Infrastructure and logistics have to be developed to facilitate management of transboundary conservation problems. Uniform strategies for and approaches to conservation of endemic species at the landscape level should be institutionalised.

Consultative meetings held in the past among the regional partners have noted a lack of cooperation and collaboration among partners in the context of sharing information and experience. Networking, creating consultative platforms, application of technology in information sharing, and exchange visits would improve this aspect.

In consulting with partners, the need to adopt a standardised long-term approach to research has been raised as an important issue. Adopting strategies and undertaking action to improve scientific and technical cooperation would enhance sustainable conservation and development. Technical cooperation to facilitate the sharing of expertise and enhance the competence of professionals and capacity building of communities would be useful.

Appropriate exchange and sharing of information can lead to development of common approaches that address common issues. Moreover, information exchange also fosters regional teamwork. As a result, standardised approaches to transboundary conservation of biodiversity can be developed and informed policy decisions can be made at the landscape level.

Joint research can be undertaken to improve capacities through sharing expertise. Creation of working groups among the partners would avoid duplication of research. It can optimise application of research results by protected area managers, policy-makers, and local stakeholders. Mechanisms for collaborative research and scientific programmes of mutual interest to the three countries can be promoted. Regularising exchange and sharing research outcomes and recommendations through annual regional seminars and workshops can make exchange of information dynamic. Cooperation for collaboration, data-sharing, intelligence gathering, and information exchange among the countries can be improved. Exchange of research, scientific, and technical data, as well as good practices and indigenous and traditional technologies relating to sustainable development and sustainable use of natural resources can be augmented.

## Conclusion

Transboundary protected area management of the Kangchenjunga landscape is an important initiative taking conservation beyond protected areas and across the political boundaries of three countries. It still has a long way to go before the landscape becomes a fully functioning landscape and ecological network. National efforts, regional collaboration, and support from donors are needed if the landscape is to achieve its objectives. More investment has to come in to operationalise the landscape as a truly functioning transboundary conservation landscape.

# Bibliography

- Alcorn, J.B. (1993) 'Indigenous Peoples and Conservation.' In *Conservation Biology*, 7(2): 424-426
- Balasinorwala, T. A.; Kothari, M.; Goyal, M. (compilers) (2004). *Participatory Conservation: Paradigm Shifts in the International Policy*. Gland and Cambridge (UK): IUCN and Pune: Kalpavriksha
- Bhattarai, B.; Ojha, H. (2001) *Distributional Impact of Community Forestry: Who is Benefiting from Nepal's Community Forests?* Forest Action Research Series. Kathmandu: Forest Action
- Bernbaum, E. (1996) 'Sacred Mountains: Implication for Protected Area Management'. In *Parks*, 6(1): 41-48
- Chape, S.; Blyth, S.; Fish, L.; Fox, P.; Spalding, M. (2003) *The 2003 United Nations List of Protected Areas* (compilers) Nairobi: UNEP, Gland: IUCN, Cambridge: World Conservation Monitoring Centre. URL: <http://www.unep-wcmc.org>
- Chape, S.; Harrison, M.; Spalding, M.; Lysenko, I. (2005) 'Measuring the Extent and Effectiveness of Protected Areas as an Indicator for Meeting Global Biodiversity Targets'. In *Philosophical Transactions of the Royal Society B: Biological Sciences*, 360: 443-455
- Chettri, N.; Sharma, E. (2005) 'Transboundary Landscapes for Protected Areas and Conservation Corridors'. Background Paper for Hindu Kush-Himalayan Biodiversity Conservation e-conference on 'Transboundary Landscape for Protected Areas and Conservation Corridors' August 29-September 4, 2005. URL: <http://www.mtnforum.org/E-Consultation05/backgroundpapers.htm>
- Chettri, N.; Shakya, B.; Sharma, E. (2006) *Biodiversity Conservation and Protected Areas in the Hindu Kush-Himalayan Region: Gap Analysis and Future Directions*. Poster presented at Association of Tropical Biology and Conservation Annual Meet, 18-21 July 2006, Kunming, China
- Chettri, N.; Sharma, E. (2006) 'Prospective for Developing a Transboundary Conservation Landscape in the Eastern Himalayas'. In McNeely, J.A.; McCarthy, T.M.; Smith, A.; Whittaker, O.L.; Wikramanayake, E.D. (eds) *Conservation Biology in Asia*, pp 21-44. Kathmandu: Resources Himalaya Foundation and Society for Conservation Biology, Asia Section
- Colchester, M. (1997) 'Salvaging Nature: Indigenous Peoples and Protected Areas.' In Gurung G.S. (2006) *Reconciling Biodiversity Conservation Priorities with Livelihood Needs in Kangchenjunga Conservation Area*, Human Geography Series. Zurich: University of Zurich
- Ghimire, K.B.; Pimbert, M.P. (1997) 'Social Change and Conservation: An Overview of Issues and Concepts'. In Ghimire, K.B.; Pimbert, M.P. (eds) *Social Change and Conservation*, pp 1-45. London: Earthscan Publications Limited
- GoN/MoFSC (2006) *Sacred Himalayan Landscape - Nepal Strategic Plan (2006-2016) Broad Strategy Document*. Kathmandu: Ministry of Forests and Soil Conservation, Government of Nepal
- Gurung G.S. (2006) *Reconciling Biodiversity Conservation Priorities with Livelihood Needs in Kangchenjunga Conservation Area*, Human Geography Series. Zurich: University of Zurich
- IPCC (2007) *IPCC Summary for Policymakers: Climate Change 2007, Climate Change Impacts, Adaptation and Vulnerability*. WGII Fourth Assessment Report. Geneva: IPCC
- IUCN; UNEP; WWF (1991) *Caring for the Earth: a Strategy for Sustainable Living*. Gland: IUCN, UNEP and WWF
- Kerkhoff, E.; Sharma, E. (2006) *Debating Shifting Cultivation in the Eastern Himalayas*. Kathmandu: ICIMOD
- Kollmair, M.; Gurung, G.S.; Hurni, K.; Maselli, D. (2005) 'Mountains: Special Places to be Protected? An Analysis of Worldwide Nature Conservation Efforts in Mountains'. In *International Journal of Biodiversity Science and Management*, 1:1-9
- Malla, Y.B. (2000) 'Impact of Community Forestry Policy on Rural Livelihoods and Food Security in Nepal'. In *Unasylva*, 51: 37-54
- McLean, J.; Straede, S. (2003) 'Conservation, Relocation, and the Paradigms of Parks and People Management – A Case Study of Padampur Villages and the Royal Chitwan National Park, Nepal.' In *Society and Natural Resources*, 16:509-526
- Muller-Boker, U. (1991) 'Wild Animals and Poor People: Conflicts between Conservation and Human Needs in Chitwan (Nepal)'. In *European Bulletin of Himalayan Research*, 2:28-31

- NCD (2004) *Bhutan Biological Conservation Complex: A Landscape Conservation Plan-Way Forward*. Thimphu: Ministry of Agriculture, Nature Conservation Division, Department of Forestry Services
- Neumann, R.P. (1998) *Imposing Wilderness. Struggles over Livelihood and Nature Preservation in Africa*. Berkely: University of California Press
- Paudel, K.; Ojha, H. (2002) *A Review of Monitoring Systems and Practices in Community Forestry at Local Level*. Kathmandu and Jakarta: Forest Action and Centre for International Forestry Research.
- Pimbert, M.L.; Pretty, J.N. (1997b) *Diversity and Sustainability in Community Based Conservation*. Paper presented at the UNESCO–IIPA Regional Workshop on Community-based Conservation, February 9-12, India
- Pimbert, M.L. (2004) *Institutionalizing Participation and People-oriented Processes in Natural Resources' Management*, Institutionalizing Participation Series. London: International Institute for Environment and Development (IIED) and Institute for Development Studies (IDS)
- Rastogi, A.; Shengi, P.; Amatya, D. (1997) *Regional Consultation on Conservation of the Kangchenjunga Mountain Ecosystem*. Kathmandu: ICIMOD
- Salafsky, N.; Wollenberg, E. (2000) 'Linking Livelihoods and Conservation: A Conceptual Framework and Scale for Assessing the Integration of Human Needs and Biodiversity'. In *World Development*, 28(8): 1421-1438
- Scheri, L.M.; Wilson, A.; Wild, R.; Blockhus, J.; Franks, P.; McNeely, J.A.; McShane, T.O. (2004) *Can Protected Areas Contribute to Poverty Reduction? Opportunities and Limitations*. Gland and Cambridge: IUCN
- Secretariat of the Convention on Biological Diversity (2003) *Interlinkages between Biological Diversity and Climate Change. Advice on the Integration of Biodiversity Considerations into the Implementation of the United Nations Framework Convention on Climate Change and its Kyoto protocol*, CBD Technical Series No. 10. Montreal: SCBD
- Sharma, E.; Chettri, N.; Gurung, J.; Shakya, B. (2007). *Landscape Approach in Biodiversity Conservation: A Regional Cooperation Framework for Implementation of the Convention on Biological Diversity in Kangchenjunga Landscape*. Kathmandu: ICIMOD
- Sharma, E.; Sundriyal, R.C.; Rai, S.C.; Bhatt, Y.K.; Rai, L.K.; Sharma, R.; Rai, Y.K. (1992) *Integrated Watershed Management: A Case Study in Sikkim Himalaya Nainital*, (India): Gyanodaya Prakashan
- Sherpa, M.N.; Wangchuk, S.; Wikramanayake, E.D. (2004) 'Creating Biological Corridors for Conservation and Development: A Case Study from Bhutan'. In *Harmone, D.; Worboys, G.L (eds) Managing Mountain Protected Areas: Challenges and Responses for the 21st Century*, pp 128-134. Italy: Andromeda Editrice
- Stevens, S. (1997) 'New Alliances for Conservation.' In *Gurung G.S. (2006) Reconciling Biodiversity Conservation Priorities with Livelihood Needs in Kangchenjunga Conservation Area. Human Geography Series*. Zurich: University of Zurich
- Straede, S.; Helles, F. (2000) 'Park-people Conflict Resolution in Royal Chitwan National Park, Nepal: Buying Time at High Cost?' In *Environment Conservation*, 27(4):368-381
- Thomas, C.D.; Cameron, A.; Green, R.E.; Bakkenes, M.; Beaumont, L.J.; Collingham, Y.C.; Erasmus, B.F.N.; de Siqueira, M.F.; Grainger, A.; Hannah, L. Hughes, L.; Huntley, B.; van Jaarsveld, A.S.; Midgley, G.F.; Miles, L.; Ortega-Huerta, M.A. Peterson, A.T.; Phillips, O.L.; Williams, S.E. (2004) 'Extinction Risk from Climate Change'. In *Nature*, 427:145-148
- Wangchuk, S. (in press) 'Maintaining Ecological Resilience in [the] Landscape by Linking Protected Areas through Biological Corridors in Bhutan'. In *Tropical Ecology*
- Wells, M.; Guggenheim, S.; Khan, A.; Wardojo, W.; Jepson, P. (1999) *Investing in Biodiversity. A Review of Indonesia's Integrated Conservation and Development Projects*. Washington DC: World Bank, East Asia Region
- Wilshusen, P.R.; Brechin, S.R.; Fortwangler, C.L.; West, P.C. (2002) 'Policy Reviews – Reinventing a Square Wheel: Critique of a Resurgent "Protection Paradigm."' In *International Biodiversity Conservation, Society and Natural Resources*, 15:17-40
- WWF; ICIMOD (2001) *Ecoregion-based Conservation in the Eastern Himalaya: Identifying Important Areas for Biodiversity Conservation*. Kathmandu: WWF Nepal