

## **TOWARDS VALUATION OF ECOSYSTEM SERVICES FOR BIODIVERSITY MANAGEMENT IN THE KANGCHENJUNGA LANDSCAPE**

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### **Introduction**

Humans benefit from biodiversity rich areas in many ways: aesthetically, culturally, via the provision of services such as climate regulation; regulation of floods, drought, land degradation; soil formation and nutrient cycling; and from the direct harvest of biodiversity for food, fuel, fodder, fibres, and pharmaceuticals. These services are crucial for sustainable economic, social, cultural and environmental development. As the world experiences growth in human population, the demand for these services, and the probability of negative impact on the services are likely to grow, affecting not just humans but all other species as well (MA 2005). The global conservation efforts vary from preservation of either select or threatened species to the protection of critical habitats (Brooks et al, 2006). However, biodiversity management efforts have somewhat overlooked the linkages among the ecosystem, and the provision of services from the biodiversity rich protected landscapes. Conventional conservation thus had difficulty considering degradation of ecosystem services and evaluating them in making biodiversity management decisions.

The Kangchenjunga Landscape (KL hereafter) refers to the 14,432 sq.km of area shared by western Bhutan, Darjeeling and Sikkim of India and eastern Nepal. It is one of the important transboundary landscapes of the eastern Himalayas, which is exceptionally rich in biodiversity. It contains 14 protected areas and proposed 6 conservation corridors that could connect and provide habitat contiguity to the 9 scattered protected areas. KL provides a variety of ecosystem services, which have strong implications on people's livelihoods. The people living there as well as in the surrounding areas depend on these services for sustenance and well being. Unfortunately these ecosystem services are not recognized or valued properly. As a result, some of the valuable ecosystems are deteriorating and their capacities to generate

goods and services are decreasing (Chettri et al. 2008). There has been little effort towards quantifying the services in economic terms and advocating the benefits from ecosystem services. In view of that, ICIMOD is undertaking a study to estimate the economic value of some of the ecosystem services in the KL.

This paper outlines the process of valuation study being planned in the KL. It is an effort to integrate economics into biodiversity conservation, with the foresight that rationalising the services from protected areas and corridors in monetary terms could serve as a long term incentive providing mechanism within the umbrella of the landscape approach to biodiversity conservation and management. The *landscape approach*, as advocated by the Convention on Biological Diversity considers long term sustenance and management of ecosystems of all kinds, integrating people's well being, especially those communities who depend on the biodiversity resources for their livelihoods.

### **Valuation of ecosystem services in KL**

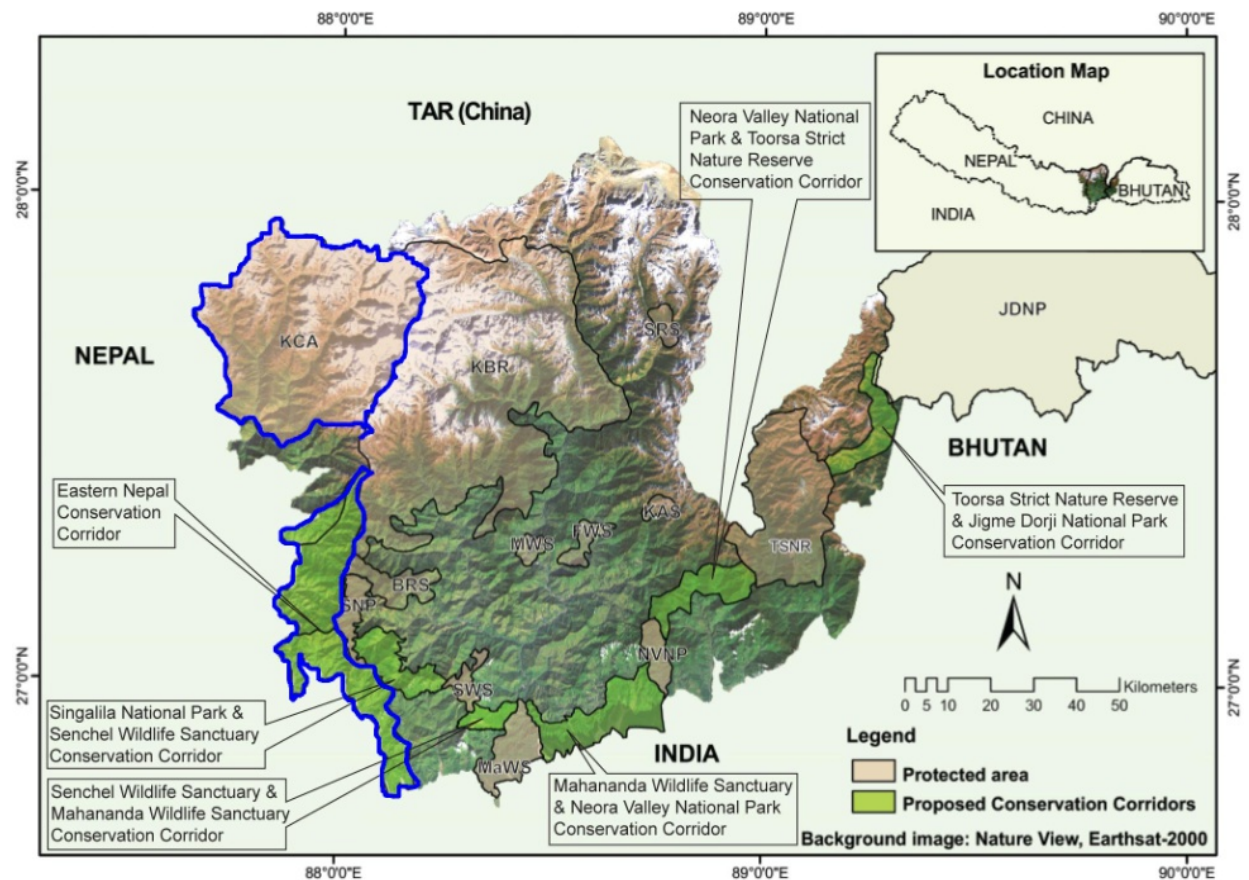
Valuation study in the KL involves various steps that include: designation of study site within the KL; identification of different types of ecosystem services based on the assessment of ecosystem processes and functions; Choosing goods and services to value under different ecosystems; prioritisation of some of the services in terms of utility and impact at various levels; development of workable methodologies to quantify the services; and test its applicability in the sites so that the ecosystem services are valued and maintained by different actors. The services are also analysed with regard to their value at the regional and global scales. The study is expected to promote conservation by endorsing tangible and non-tangible economic, environmental and social benefits to the communities. The work will also give an opportunity to customise the *Millennium Ecosystem Assessment Framework* for developing appropriate valuation methods for mountain biodiversity resources, and advocate to the community and policymaker the significance of conservation at the landscape level.

### ***Designation of pilot sites***

The Kangchenjunga Conservation Area (KCA) and the eastern Nepal conservation corridor along the border of east Nepal, and Darjeeling and Sikkim of India are pilot sites within the KL (See Map 1). The sites have unique geomorphic features and have great biodiversity, cultural and religious significance (Chettri et al. 2008). There exists a strong relationship between the people and the natural resources. They provide a habitat essential for continued existence of many rare and endangered species of mammals, birds and plants. The rich and diverse vegetation

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provide a multitude of regulating services such as climate and gas regulation, carbon fixation, hydrologic cycle regulation, water and nutrient regulation, waste treatment, disturbance regulation, soil formation and retention, pollination, and biological control etc. About 25 to 50% of the household economies come from the agricultural systems and 85% of the people depend on subsistence agriculture (Gurung 2006). The handmade carpets, dairy based products, medicinal plants and timber based products, diversity of horticultural crops are some examples of the consumptive goods.



### Identification of ecosystem services

Analysing various ecological processes and functions, including the factors affecting or supporting them, three types of broad ecosystem services have been identified. These include *Habitation Services* that provide a home for plants, animals and birds, including many protected

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or endangered species as well as genetic diversity; *Production Services* that provide fodder, timber, fuelwood, NTFPs, agroforestry products, food and horticultural crops, fresh water, and *Cultural Services*, that provide historic, aesthetic, scenic, heritage value, a place for scientific research, ecotourism and recreation, traditional practice and knowledge and hosts biodiversity of global significance.

Further works on prioritisation of services as per the community's choice and quantification of values in terms of financial costs and benefits is in progress. The process framework is in place which includes, i) defining values of the prioritised services in terms of Total Economic Value (TEV) considering both use and non use values of the services; ii) reviewing appropriate methods of valuation for different services and specifying data needs for valuation; iii) developing instruments such as structured questionnaire or focused interview for data collection; iv) data analysis and calculation of actual costs, and v) discussing result with the community and other stakeholders to explore options to acquire actual benefits.

However, there are challenges in recognising on what non marketed goods and services the economic value should be assigned or how appropriate that would in terms of benefits going to the community. The TEV framework will incorporate direct, indirect and option values as well as existence values of the services. Another challenge will be in assigning monetary cost to those intangible values from the services that have no real markets. On types of valuation methods, there are several methods that can be broadly divided into 'revealed' and 'stated' preference methods (Rasul 2009). Revealed preference methods infer values based on certain physical parameter, reference or data while stated preference method will inquire people about their willingness to pay or accept for a certain kind of service. The choice of valuation methods for our study will depend on the nature of the ecosystem goods and services people prioritise and value. People's opinion will be derived through household surveys and validated through focus group discussion and key informant interviews.

### Conclusion

The growing concern of global environmental change, along with the dilemma of conservation and resource use for livelihoods, has brought the realisation that a sustaining and healthy biodiversity environment is not possible without a healthy social economy. The importance of ecosystems as a provider of various trade-able goods, together with services from

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manifestations of ecological processes such as regulation of climate, nutrient cycling etc. are being increasingly recognised, and their linkages with the rural livelihoods are being understood. It is essential to understand what value biodiversity resources have in their products, functions and processes, and how these values can help people address conservation and development issues. The valuation exercise being piloted in the KL attempts to consolidate the knowledge of identifying various types of ecosystem services, valuing them using appropriate valuation methodologies and establishing innovative mechanisms to market the services. The intention is also to provide information that can inform and facilitate conservation policies as well as advocate the decision makers to support such economic interventions where the benefit is public, where benefit directly affects the livelihood of the local community, and where benefit leads to protection and long term sustenance of biodiversity and other natural resources.

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