

Economics of Biodiversity Conservation in Nepal

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Abstract

Nepal, a developing country has low per capita income and 2.8% economic growth rate. This simply implies higher marginal utility of income and lower willingness to pay for environmental improvements and amenities. Biodiversity has multiple benefits, but some economic obstacles like lack of appropriate market pricing, intangible nature of social benefit derived by conservation of biological resources, ownership issue, and conventional method of national income accounting, make some illusion to adopt market based biodiversity conservation approaches in developing country like Nepal. This literature review paper attempts to summarize the economic benefits of biodiversity, threats of biodiversity conservation in Nepal and some financial appraisal of biodiversity conservation of Nepal (in case of Department of National Park and Wildlife Conservation & their some field offices). In Nepal, biodiversity conservation efforts have largely been centered on protection of natural resources within Protected Areas (PA) which is not justifiable but many of naturalists are in this dilemma. The issue of 'conservation for people' tries to enforce policy maker, PA manager and other stakeholders to carry economically sound biodiversity conservation mechanism which ultimately tends to the PA for human welfare. The provision of economic incentives either by the direct investment or by creating economic opportunities leads to the promotion of biodiversity conservation. The poorer the people lower the willingness to pay for environmental quality or amenities because of the income elasticity of environmental services.

Key Words: Biodiversity conservation, Economic growth, Environmental services, Economic benefits and constraints

Introduction

The biological resources are the physical manifestation of the globe's biodiversity, which simply states the variety and variability among living organism and the ecological complexes in which they occur. Generally, the diversity of life is defined in three levels: genetic, species and ecosystem but measuring biodiversity and valuation of its benefits are not easy to apply. Due to innumerable causes, biodiversity of world is being decrease day by day. If the trends of 2000 continue, an estimated 24% of mammal species and 12 % of bird species face a high risk of extinction in near future. (FAO 2001). Nepal claiming just 0.01 percent of global land surfaces having huge protected area network covering 19.70 percent of total land area.

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Altogether 80 ecosystems are represented in protected areas from high Himal to plain Terai, out of 118 ecosystems found in Nepal (Dobremez 1970, BPP 1995, Maskey 1996). The representation percentage of Nepal in Lichens, Fungi, Algae, Angiosperm, butterflies and moths, and mammals are more than 2 percentage, Bryophytes, Gymnosperms, Birds are more than 5 percent, Fishes, amphibians, and reptiles are more than 1 percentage and birds have 9.3 percentage of representation in global arena. An overview of species richness in Nepal not only provide immediate needs and long term sustenance of rural people but also gives some sprouting hopes to make the country most destined to tourist and researchers as well. The largest part of economy of Nepal is occupied by agriculture (where more than 80 percent people depend on agriculture), the agricultural biodiversity is vital to marginalized mountain communities for maintaining food security, and coping with new comer climate change impact for the sustainable livelihood. Only 21 % of land is covered by cultivatable land where as 39% land is covered by forest and shrub area. The growth rate of agricultural GDP has remained just 3.2% during the last seven years beginning from 2000 to 2008. There is no clear accountancy of Gross Domestic Product (GDP) contributed by forestry sector until recently. Beside Agriculture and tourism, the areas for widening economic growth opportunities can be fulfilled by Information Technology (IT) and Medicinal and Aromatic Plants (MAPs) inclusive of varieties of other non -timber forest products (NTFPs). The natural resource based economy in Nepal could be the exemplary way of economic growth and development, if the proper management and utilization of resources could be maintained in ecologically sound manner. Recently Nepal has 2.8% growth rate while two neighboring giants, China and India have 10.6% and 8.8% growth rate respectively (The economist, June 21, 2008). Finding the way to increase the economic growth is being the concern of government in new Nepal, Can Nepal adopt natural resource based economy for attaining double digit economic growth?

Biodiversity Conservation

Biodiversity supports the full range of living organisms, from which people have selected with desirable traits; consuming, adapting, or domesticating them to better meet their own different needs. Biodiversity has also helped to cope during drought periods by providing species crop varieties or livestock breeds that are more able than others to withstand such environmental stresses. Without such choice, humankind would simply not exist in its present form. From the economic perspective of benefits provided by biodiversity, *direct use* involves the selection and extraction of its 'tangible' elements (the goods or products) which can be consumed or traded in markets in exchange for other capital assets. The indirect or 'non-use' benefits are 'intangible' which cannot be traded (but there are being some efforts to explore the market potential for environmental services (In addition to valuable commodities such as timber. Well known forest environmental services include watershed protection, biodiversity conservation and carbon sequestration)

The Multiple Benefits of Biodiversity

Value	Description	Primary beneficiaries
Direct Use Subsistence	Biodiversity supports and provides a selection of products that can be hunted or gathered from natural, semi-natural or managed systems for subsistence use. Such products will include different foods, building and clothing materials, medicines, fodder for livestock and other materials such as dyes, gums and resins.	Rural people especially poorer groups, smallholder producers, indigenous peoples, traditional healers, and those most reliant on common property resources and least likely to own land.
Trade able	Biodiversity supports and provide a range of products that can be hunted or gathered from natural or managed systems to be traded in markets outside the area of origin. These may include timber, fish, wildlife and genetic resources.	Small and large-scale commercial enterprises and employees, for example, artisans, fishers, timber companies. All consumers of products
Indirect use Environmental services	Biodiversity is the medium through which air, water, gases and chemicals are moderated and exchanged to create environmental services. This takes place over a wide scale with watershed protection, carbon storage and on a smaller scale via nutrient cycling, pest and disease control. It ensures the continued functioning, resilience and productivity of ecosystems, which provide the 'direct use' goods.	Everyone at global level, At local levels, small-scale producers rely on environmental services, in the absence of artificial inputs
Informational and evolutionary	Biodiversity comprises genetic diversity, and associated information, used by people to create new crop or animal varieties or pharmaceutical derivatives. It also enables adaptation, through natural and artificial selection, to take place	Farmers in small and large-scale agriculture, forestry or livestock development. Plant and animal breeders. Researchers and gene scientists. International genebank systems. Agro-chemical, food and pharmaceutical companies.
Aesthetic	The unique species or special landscapes that are admired for their aesthetic qualities are, in certain contexts, important to markets, for example, through ecotourism. (These uses can have more limited impacts than direct use and are sometimes considered non-use activities, however, biodiversity is actually indirectly used and tourism itself can also trigger indirect impacts)	Tourism companies. Tourists and ecotourists.

Non-use values		
Insurance (against future risk and uncertainty)	Biodiversity may hold species or genes for future direct and indirect use, which may, for example, be needed to combat new diseases or to ensure adaptability to changed climatic conditions.	Future generations.
Existence	Biodiversity holds an intrinsic worth that can be used to justify its existence. This worth transcends its use and financial values, whether for aesthetic, cultural, philosophical or religious reasons.	Urban dwellers. People practicing religions that hold nature in reverence. Indigenous peoples, artists, conservationists.

Source: adapted from pearce and Moran (1994); Bass et al. (2001); Cromwell et al. (2001)

Biodiversity loss is a part of natural evolutionary process but the rate at which biodiversity is being altered by humankind appears to have increased over the last few centuries. For example, tropical forest loss is now estimated to be about 0.8% to 2% annually and 1% of tropical forest populations are likely to be lost with it. Most species have multiple populations, so rates of species loss will obviously be much lower but still significant. Perhaps most serious is that of current extinctions, unlike naturally induced mass extinctions are highly non-random with related species sharing the same fate (Purvis and Hector 2000)

Economic Obstacles to Biodiversity Conservation

- Lack of appropriate market pricing.
- Intangible nature of social benefit, derive by conservation of biological resources.
- Weakest ownership
- Current economic planning
- Conventional method of national income accounting.

Threats to Biodiversity in Nepal

Various attempts and successes have also been recorded over the years in the biodiversity conservation, changing climate, increasing population, poverty etc continuously threat to it. There is no doubt; Nepal's biodiversity is the mainstay of the country's economy and well being of its people. The major threats to biodiversity conservation are listed below by National Biodiversity Strategy (NBS) 2002

- Low levels of public awareness and participation.
- High population pressures and prevailing poverty
- Weak Institutional, administrative, planning and management capacities.
- Lack of integrated land and water use planning.
- Inadequate data and information management: and
- Inadequate policies and strategies for biodiversity conservation.

Efforts made by Government for Wildlife Conservation

After the enactment of National Park and Wildlife Conservation Act 1973, Nepal embarked upon modern era of wildlife conservation. Before that time period, lack of concrete roadmap and clear legal provision led to the wildlife conservation as a pleasure. An office had been set up in 1972 under the Department of Forest, later on; it was upgraded as a Department in 1980. Currently, wider network of protected areas have been established with 9 National Parks, 3 Wildlife Reserves, 1 Hunting Reserve, and 3 Conservation Areas including 11 Buffer zones around National Parks aiming to conserve the country's major representative ecosystems, unique natural and cultural heritage, and give protection to the valuable and endangered wildlife species. Buffer Zone management with provision of (30-50)% income of PAs to local community, appropriate compensation for wildlife damage, resource use right in some PAs are some important example to establish the robust system in PA management.

Some examples of Techniques used for Valuation of Biodiversity Conservation

- One assessment in case of California Deer, *Consumptive and non consumptive values of Game animal*, market price and expenditure (for spending on hunting and/or viewing trips), production function approach (for the link between forage and deer Productivity: and Contingent Valuation Method to elicit consumer willingness to Pay(WTP) for deer hunting and viewing,
- *The social costs of Rain Forest Destruction: A Critique and Economic Analysis of the 'Hamburger' Debate*, The opportunity cost approach is used to value the social costs of the government's ranching subsidy schemes.
- *The value of Non-Timber Forest Products: Estimation for Tropical Deciduous Forests in India*, The Substitute good approach-price of soft coke, and Labor inputs-cost of time spent in collection is used for fuel wood.
- *The Economics of Protected Areas in Uganda: Costs, Benefits, and Policy Issues* The Market prices and costs were used for the financial Cost Benefit Analysis (CBA), The production Function Approach is used to estimate the value of forest watershed protection services, Forest Carbon Sequestration services are valued using two techniques: Damage costs avoided and the replacement cost approach and option value is estimated to use a fixed annual figure for future pharmaceutical uses.
- *Valuing Tropical Forests: Methodology and Case Study of Madagascar*, The Market price to estimate the cash flow from the extraction of timber and NTFPs, and from shifting agriculture, (i.e. Direct use value) CVM to estimate willingness to accept compensation for loss of access to forest. Bags of rice used as a method of payment (i.e. Direct use and non-use values), Production Function Approach to estimate rice crop losses from flooding associated with deforestation (i.e. indirect use value), and TCM to estimate tourists' consumer surplus from forest recreation (i.e. direct use value)

Some Financial Facts on Biodiversity Conservation (DNPWC case)

- In 063/064, DNPWC and its site offices (Protected Areas) has generated Rs. 94557172.74 revenue, among which 50.47% of revenue regenerated by Chitwan National Park, at the same time financial contribution of Nepal government to DNPWC was Rs.133346803.6.
- The major source of revenue generation in protected areas is entry fee. In 063/064, total 245910 tourists were visit in different protected areas, where 80630 tourists were visit to CNP, Annapurna Conservation Area (ACAP) got 50129 tourists and Dhorpatan Hunting Reserve (DHR) didn't get any tourists in this year. The trend analysis shows that, the tourist numbers highly fluctuated during 057/058 and 060/061
- In 2004/05 total Rs.15597000.00 was spend in CNP and for the purpose of implementing the Buffer Zone Management Plan Implementation in CNP's BZ areas in 063/064 Rs. 20443217.86 was released as per the rate of 50% rate of investment in BZ

Conclusion

Economic inducements are likely to prove the most effective measures for converting over-exploitation to sustainable use of biological resources. The valuation of externalities from forests like biodiversity conservation is mostly related to the benefits provided by it, either the use value or option value, but the central theme is how the distance users pay for the services of public good and valuing the goods and services and incorporate the economic expectancy in decision making. In Nepalese' protected area management criteria still there are gaps to overcome for carrying valuation of biodiversity conservation, the shifting paradigm in PA management may collectively enforce the issue of conservation for people and economic perspective to value the goods and services provided by the conservation.

Biodiversity is "the variability among living organisms from all sources, including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems' (CBD, 1992)". Non-use values of forest biodiversity are large and largely uncompensated, due to free-riding; government intervention is required to capture non-use values and turn them into cash flow for conservation. Conservation costs are generally low where non-use values are high, creating an opportunity for significant welfare gains from increased conservation investment in some areas. Priorities for further research include the impact of marginal changes in forest diversity and economic values, the determinants of non-use value (especially in developing countries like Nepal), and more use of spatial cost-benefit analysis to identify optimal conservation strategies.

On the basis of study of three year progress report of DNPWC, research topics are mainly concentrated on ecology and biology of wildlife and socio-economic dimensions. There is need of robust system of research for carrying economic valuation in every aspect of PA and

wildlife management. About 3621.63 ha. land has already been handed over to Buffer Zone community (9990, Households) as community forest in CNP. Priority based activities/ programmes of DNPWC like habitat management, conservation education, species management and infrastructure development have almost hundred percent of progress, but the economic analysis in all these activities should only define the cost and benefits of biodiversity conservation initiation. In order to compete with the attention of government decision-makers, conservation policies first need to demonstrate in economic terms the value of biological diversity to the country's social and economic development.

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SOME FACTS

- All land animals drink water but desert kangaroo rat never does so.
- Mammals give birth to young ones (viviparous), duck billed platypus (*Ornithorhynchus*) and spiny ant eaters (*Echidna*) are egg laying mammals (oviparous).
- The heart of reptiles is three chambered but in crocodiles it is four chambered.
- Plant viruses contain RNA but bacteriophages, cauliflower mosaic virus and cynophages have DNA.