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Biodiversity Management in Developing Countries– An Economic Perspective

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ABSTRACT

Forests and biodiversity conservation, especially in developing countries are threatened due to increasing pressures from growing population, rising poverty, inappropriate government policies and economic externalities resulting from various industrial and development projects. However, in recent years not only economists, but also policy makers and environmentalists are realising the implications of environmental issues and the need to incorporate them into development policies. This requires new initiatives for sustainable development and effective biodiversity management. There is a need for the governments to re-examine their economic and development policies in terms of their impact on biodiversity as well as on people. Moreover, there is an urgent need to address rural poverty and women's role in conservation planning. Lastly, it is important that all development projects, which affect biodiversity, should be used to generate financial resources for supporting conservation. India in its pursuit of high economic growth since the beginning of development planning had also unfortunately ignored environmental concerns resulting in deforestation, soil erosion and land degradation. It is only in recent decades that India started to lay emphasis on sustainable growth and address environmental concerns in its five-year plans.

Key Words: Biodiversity Management; Conservation; Developing Countries; Forest Degradation; India

INTRODUCTION

Biological diversity or biodiversity, encompasses the variety and abundance of plants, animals and microorganisms as well as ecosystems and ecological processes to which they belong (McNeely et al. 1990). Very little however, is known about species diversity in quantitative terms. Estimates of the total number of species on earth range from 2 million to 100 million, of which less than 1.5 million have been named, and only a small fraction of these have been considered for their economic value (Reid 1992). Most of the developing countries contain significant tracts of tropical forests, which possess over half of the world's floral and faunal species in just 7% of the land area. India, one of the twelve 'mega-diversity' countries of the world, is home to a large diversity of plants and animal species, many of which are endemic to India. However, about 5 to 10 % of the world's species are being lost each decade (Reid and Miller 1989).

With rapidly growing human and livestock populations, forests are under escalating anthropogenic pressures resulting in their degradation especially in Africa, Asia and South America (Erickholm 1975, Upreti 1987, Ponting 1990, Upreti 1994, Sunderlin et al. 2005 and Nagendra et al. 2006). Moreover, since a very high proportion of human population in developing countries lives below the poverty line, forested areas continue to be degraded as local people exploit a wide range of forest-based resources for their everyday needs (Guha 1994). The current threat to biodiversity however results from a complex variety of underlying social, economic, political and cultural forces and trends operating on local, national and international scales (Braatz et al. 1992, Munasinghe 1993). These influences are so complex that they may be referred as being "rooted in the contemporary human condition" (Soule 1991). Economic externalities, adverse government policies, human population growth and resource sustainability, poverty,

economic growth, rural development and urbanisation, tropical deforestation, as well as the emergence of the global economy are among the most powerful of these influences (Myres 1993, Geist and Lambin 2002, Sunderlin et al. 2005, Davidar et al. 2010, Singh et al. 2012 and Sinu et al. 2012). These factors are themselves strongly interconnected.

Over the years however, there is a growing awareness of the benefits of biodiversity which not only provides economic benefits (Mavrotas et al. 2011) but also other services to humanity along with ethical and aesthetic justifications. The most politically appealing and economically attractive argument in favour of maintaining biodiversity is that it provides enormous direct economic benefits in the form of food, medicines and industrial raw materials and has the potential for generating many more (Ehrlich and Wilson 1991; McNeely 1988). For example, many countries (Nepal as well as several African countries) earn substantial foreign exchange from natural ecosystems with tourism values. These direct economic values of biodiversity are at least conceptually easy to quantify and value, even though relevant scientific and economic data are lacking in most cases. Biodiversity also provides an array of essential services to humanity, e.g., keeping air clean, regulating hydrological cycles, recycling nutrients, etc. Although these services have yet to be evaluated and quantified, they are clearly basic to economic growth and development. And lastly, although ethical and aesthetic justifications are the least quantifiable, for many people these arguments in favour of biodiversity are the most compelling (Ledec and Goodland 1988).

Over, the years, economists have therefore, become increasingly aware of the important implications of environmental issues for the success of development efforts. Consequently, there have been some efforts to incorporate environmental concerns into development decision-making in most of the developing countries including India (Azra and Musavi 2013).

MANAGEMENT

Growing poverty in developing countries and increased demands on resources in industrialised countries are threatening biodiversity conservation as well as the future well being of mankind. Thus the conflict between the environment and current development patterns requires new initiatives for sustainable development. Sustainable development is generally thought to have three components: environment, society and economy. But the relationship between population growth and environmental degradation is complex and variable. It is to a large extend determined by social, economic and institutional factors that influence how people use natural resources as well as by the technologies employed (Braatz et al. 1992). While globalisation has resulted in far reaching impacts of any policy or action, market forces too tend to undermine biodiversity conservation by undervaluing the use of environmental resources, as biodiversity is almost totally ignored in national economic accounts because of the difficulty of placing an exact value on the services it provides (Repetto et al. 1989). Economic development has a strong impact on conservation activities in the form of linkages between threats to environmental conservation and stages of economic development (Machlis and Tichnell 1987). Effective biodiversity management in developing countries can therefore be achieved by developing a holistic approach in policy formation, as well as integrating conservation, growth and sustainable development for meeting local needs and at the same time mobilizing financial resources to support these initiatives.

Often the governments in developing countries adopt conflicting policies. At times, national policies, laws and regulations can result in providing incentives that actually discourage conservation, even as other governmental policies aim at providing incentives to conserve biodiversity. For example, the conversion of natural areas and loss of biodiversity has often been accelerated by economic policies that encourage production for export markets, promote population resettlement, or open up remote areas to road construction and logging (Myres 1993, Chopra and Gulati 1998, Geist and Lambin 2002, Nagendra et al. 2006 and Davidar et al. 2010). Proposed policies in such sectors as energy, industry and infrastructure development can induce impacts on biodiversity as well as those in natural resource sectors like forestry, agriculture, and fisheries. While appropriate policies provide the basis for national development and for meeting the economic needs of people, inappropriate policies can result in unsustainable and inefficient natural resource-use and loss of biodiversity (Braatz et al. 1992).

Therefore, better pricing policies and efficiency requirements would lead to improvements in the allocation of resources as well as substantial savings. Fertiliser and pesticide subsidies also benefit larger farmers by promoting monocultures that deplete soils.

On the other hand they discourage the use of sustainable methods such as integrated pest management, through excessive use of pesticides, which contaminate underground and surface water supplies. Promotion of Green Revolution in Indian agriculture is one such example. There are incidences where agricultural policies in developing countries, have for the sake of development, resulted in direct and indirect threats to biodiversity. Another example is the introduction of high yield varieties of seeds in small or marginal land-holdings located within protected areas. The author had, during a field study in two protected areas in the Central Indian Highlands (viz., Melghat Tiger Reserve in Maharashtra and Bori Wildlife Sanctuary in Madhya Pradesh) seen that local communities residing in the villages within these protected areas had switched to high yield variety of wheat (Musavi 1999). This not only required more irrigation than was naturally possible, as agriculture here was primarily rain-fed, but also required large doses of fertilizers as well as insecticides and pesticides as these varieties were not as resistant as the indigenous varieties. Since most of the landholders were subsistence farmers it was not possible for them to either afford the cost of lifting water from nearby streams with the help of hired pump sets or to purchase fertilizers, etc. Consequently it resulted in losses to most of the landholders having small or marginal landholdings. The even more harmful aspect of use of chemicals in these protected areas is that they enter into the local water bodies, thus polluting the entire ecosystem. Although forestry and agriculture provide the most obvious examples of how national policies can negatively affect biodiversity, examples can be cited in many other sectors as well.

Infrastructure and hydropower development, while critical to economic growth, have also had an adverse impact on the terrestrial and aquatic habitats of many Asian countries. For example, in Bori Wildlife Sanctuary in Central India, a reservoir was built on Tawa River, a tributary of Narmada River. This resulted in not only displacing households from the area but also brought several hectares of prime forest under the backwaters of the reservoir. No alternative agricultural site was however, provided to the displaced families. This has not only increased their dependence on the forest resources of the sanctuary, but also pushed them into an economic crisis as their status has been reduced to that of landless labourers, pushing them into a vicious debt-trap on one hand and on the other making them antagonistic towards the PA managers (Musavi 1999). A more familiar example is that of the Sardar Sarovar Project on river Narmada, where thousands of families have been displaced by the 300 dams of the Project. Raising the height of the dam to 138.62 meters would displace 2.5 lakh more people (Mishra 2006 and Baruah 2014). Another example from the same region is that of Indira Sagar Project on Narmada river, which on completion was expected to submerge 91,378 ha of land, of which about 45% are deciduous forests. According to the estimates (Mander 2005) more than 250 villages would have been affected resulting in the displacement of more than 30,000 families and more than 80,000 people all located within M.P. While these mega dams are expected to provide irrigation and hydropower, the loss of forests and biodiversity as well as displacement of people resulting in loss of livelihoods and compounding of difficulties both social and economic, is incomparable. Therefore, it is imperative for the governments to examine a range of economic policies to ensure that the adverse impact of such projects on people, as well as on biodiversity is minimised and that any losses in future value are fully justified. Strategies for conservation should use economics to direct government policies for promoting sustainable development (McNeely 1990). Moreover, there is a need for designing government policies, which would minimise deforestation and destruction of habitats and species, by integrating resource accounts in national accounting to represent the real cost of development in economic decision-making. This would give a more accurate picture of the effect of economic policies on ecological systems (Upreti 1994, Barbier 1987, Repetto 1992). These opinions are in contrast to traditional economic analysis which was mostly developed during the Great Depression and was therefore, more concerned with direct economic issues rather than with economic valuation of natural resource stocks.

Furthermore, women's role in the management of resources needs greater consideration in the design of environmental policy. Women control the fate of many of the world's resources as managers of fuel and water supplies, agricultural producers and guardians of household health. Unfortunately, they are rarely consulted in the design of government services or have access to extension programmes (Abramovitz and Nicholas 1992, Agarwal 2011). Also, investments in the education of women, which is closely related to the health of their children, can greatly enhance environmental efforts.

Another important aspect of biodiversity management in developing countries is the necessity of integrating the objectives of conservation with that of economic

growth so as to be able to fulfil the needs of local communities as well as, to achieve sustainable development. Over the years however, it has been realised that communities occupying lands in and adjacent to protected areas bear substantial opportunity costs as a result of lost access. For example, the benefits foregone from collection of forest-products and livestock grazing may be significant. These costs are likely to increase as human population grows and lands outside PAs are converted to other uses or depleted (Allen and Barnes 1985, Meier and Rauch 2012).

Damage by protected wildlife to local population in the form of crop depredation, livestock predation or even injury to or loss of human life is another common cost to local population (Nagendra 2008). For example, the creation of Melghat Tiger Reserve and Bori Wildlife Sanctuary in Central Indian Highlands in the first half of the 1970's have created certain problems leading to conflicts between the local people and the PA management (Sawarkar et al. 2000). The main problem that confronts the local people in these PAs is the reduced economic opportunities and benefits, which they have traditionally derived from the area, prior to the change of legal status of these tracts of land to PAs. On the other hand, protection to wildlife and ban on killing herbivores in agricultural fields has resulted in rise in wildlife populations, as well as in increased damage through crop raiding by wild herbivores and livestock depredation by wild carnivores. This has created a conflict not only between the local people and wild animals, but also with the PA officials. The PA managers have to face the problem of occasional hunting of wildlife by the local people for domestic consumption as well as retaliatory killings of the wild animals (Sawarkar et al. 2000). Similar examples can be seen not only in India and Nepal but as well as throughout tropical Asia. Most of the communities residing in and adjacent to PAs are poor, politically powerless, and lacking in government services, a large portion of the cost of conserving biological diversity is borne by those least able to pay (Ferraro 2002 and Mackenzie 2012). Moreover, when the establishment of the PA creates problems as mentioned above, along with loss of employment opportunities, the local people have no incentive to co-operate in conservation activities. Therefore, unless local people gain economic benefits from the PA or are compensated for their loss, there is little likelihood that effective long-term PA conservation can be achieved (Wells et al. 1992). The park manage-ment cannot be indifferent to the resource needs and perceptions of the local people and should be tailored to effectively address the adjacent land and local people's issues. Therefore there is a need to understand the natural resource, the local people and their problems (Sawarkar et al. 2000), which can be better achieved through joint or participatory management rather than through rigorous law enforcement. Integrated Conservation and Development Projects are one such attempt to link the conservation of biodiversity in PAs with local social and economic development. Most of these projects try to stabilise land use outside the PA boundaries and to increase local incomes, with the ultimate objective of reducing the pressure for further exploitation of natural resources within PAs. Although it is not an easy task to reconcile the needs of conservation with those of the local people, but some promising initiatives do exist, even though they are on a very small scale and have had intensive financial and technical input.

The importance of tackling rural poverty of local communities as an integral component of conservation planning is emphasised by IUCN's World Conservation Strategy (1980). Thus there is a need for co-operation, equity and understanding of ecological and social sustainability as well as influence of political factors on uneven development for achieving environmental conservation. Research has shown that education in general can help enhance a nation's ability to develop and achieve sustainability targets by improving agricultural productivity, enhance the status of women, reduce population growth rates, enhance environmental protection, and generally raise the standard of living.

There is also a need to include women in biodiversity conservation, as in the developing countries it is the women who often do most of the work of gathering firewood and non-timber forest products, getting water, and helping in subsistence agricultural activities (Agarwal 2011). For instance, introduction / development of alternative sources of energy could not alone help to reduce pressure on forests. Women, therefore, have a greater interest in sustaining the diversity of biological resources as they make economic use of a much wider range of products than men do. Educating women can help women develop a better understanding of the importance of conserving biodiversity. Moreover, it will help them to take conscious decisions for reducing their dependence on forest resources.

Lastly, there is a need for setting up areas, which will allow controlled exploitation of some resources. As in developing countries it is difficult to justify the existence of PAs vis-a-vis the economic needs of the

people. This is because the benefits from PAs are not only inconspicuous but are available only in the long run. Thus, the concept of eco-development can be applied in PAs where benefits like grasses, fruits and employment opportunities are provided to the local people.

As far as financial resources for conservation purposes are concerned, most countries have to rely on internal resource mobilisation for part of their conservation expenditures. Governments can use natural resource taxes or levies on development for generating financial support for biodiversity conservation. Development projects as well as large multinational and national companies often adversely impact natural environments. Such projects as well as the companies should be made to pledge financial resources for biodiversity protection as well as conservation. Nature tourism is another means, by which governments in developing countries can mobilise resources for the conservation of PAs. However, at present few PAs and reserves attract large number of foreign tourists needed for generating substantial foreign exchange earnings to make significant contributions to conservation.

International agencies like the Global Environmental Facility (GEF), U.S. Agency for International Development (USAID) and United Nations Development Program (UNDP) play an important role in providing funds for biodiversity conservation in developing countries. Moreover, they can also be instrumental in supporting and facilitating environmental education, technical assistance, fund-raising, and innovative public-private approaches to sustaining wildlife and biodiversity conservation.

Further, the government policies in developing countries should take into consideration their implications for the poor as well as biodiversity conservation. Often programs that are designed to reduce hardships for the very poor have little impact on poverty and have worsened existing inequalities and at the same time increased resource shortages or encouraged unsustainable methods of production. For example, Green Revolution in India helped in achieving food security however the major gains from enhanced wheat production benefitted only the large farmers in the states of Punjab and Haryana. Majority of the small and marginal farmers, including those living in and around forests could not benefit from the agricultural revolution. Moreover, they lost their landholdings due to indebtedness as well as the indigenous varieties of wheat and rice as they switched to the High Yielding Variety of seeds lured by the possible monetary gains which often eluded them. This pushed them into greater indebtedness and dependence on biodiversity resources for sustenance (Sawarkar et al. 2000). While over-use of water resources has adversely affected the water table in the wheat growing belts of the country, over-use of chemicals in agriculture has polluted the water bodies and adversely affected the wild animals (Sawarkar et al. 2000) and even birds.

INCORPORATING ENVIRONMENTAL CONCERNS IN DEVELOPMENT PROCESS IN INDIA

Over the years, India has followed policies, which were aimed at achieving rapid industrialisation, agricultural expansion and infrastructural growth with the objective of reducing poverty and inequality of wealth, through increased production and employment. Unfortunately, however, environmental sustainability was sacrificed in this pursuit for development; there are innumerable examples from Tehri to dams built on the Narmada. Moreover, soil erosion and land degradation have assumed serious proportions in India. According to the Ministry of Agriculture (GOI) 53% of total land area of the country is suffering from serious degradation. Moreover, about 6000-7000 million tonnes (Mg) of soil is lost due to soil erosion annually. Consequently, every state has set up State Land Use Boards (SLUB) to promote soil conservation schemes like afforestation, regulation of land use, etc. The National Agricultural Policy (2000) has also laid emphasis on growth based on efficient use of resources and which conserves soil, water and biodiversity. The Policy states the need for economically, technologically and environmentally sustainable growth.

One of the aspects of environmental concern neglected since Independence has been the disappearing grazing lands and the impact of rampant grazing on the environment. In the past half a century, the size of grazing lands has drastically declined. The common lands and common resources of the villages owned by the *Panchayats* have been encroached over by richer farmers. At the same time area under agriculture has increased to keep up with the increasing demand for agricultural produce. Government irrigation schemes too have contributed in converting earlier grazing lands into croplands. Moreover, to ensure their survival, livestock breeders have increased their animal population and the number of browsers resulting in greater degradation of

grazing lands and pressure on forests. Unfortunately however, despite the need to control grazing, the state governments have not yet taken any concrete action to introduce stall-feeding or pasture development in villages. Even the social forestry programs instead of providing fuel wood for the poor and fodder for their animals, have ended up supplying wood for the urban-based paper and rayon industries. Another aspect, which needs serious consideration, is the high rate of deforestation and land degradation, which has reached catastrophic levels. According to National Remote Sensing Agency estimates India's forest cover decreased by 91,710 km^2 between 1972-75 to 1980-82 at an annual rate of 13,000 km^2 with a further decline by 0.4% during 1989-1999 (Azra 2012). Moreover, the rate of forest loss in the Himalayas is not only resulting in loss of biodiversity, but also causing catastrophes like the recent floods in Garhwal and Kashmir.

According to the National Committee on Environmental Planning, only 12% of the country's land surface was under adequate tree cover. The revised Forest Policy formulated in 1988 (Planning Commission, Seventh 5-Year Plan,1985-90) for the first time laid stress on managing forests for conservation and meeting local communities' needs. It was also for the first time that the share of forestry and wildlife was raised to more than 1% of total public sector outlay (Azra 2012). The Eighth 5-Year Plan (Planning Commission 1997-2002) also stressed on bio-diversity conservation by including the programme for developing national parks and sanctuaries. The Ninth (Planning Commission 1997-2002) and the Tenth (Planning Commission 2002-2007) 5-Year Plans gave further impetus to conservation. The Ninth 5-Year Plan recognized the importance of forests for main-taining ecological balance and emphasized the need for environmental sustainability of the development process, through participation of people at all levels. The share of forestry and wildlife sector in the total outlay however fell 0.95%. The Tenth 5-Year Plan undertook the massive exercise of initiating the process of developing the National Biodiversity Strategy and Action Plan. The Approach Paper of the Tenth 5-Year Plan had also emphasized the need to extend the forest and tree cover to 33% of the country's area by 2012 (Azra 2012). Although several schemes aimed at protecting wildlife and forests were introduced in the Tenth 5-Year Plan, the percentage share of the Plan fell marginally to 0.94%.

The Eleventh 5-Year Plan (Planning Commission 2007-2012) laid emphasis on environmental sustainability. Schemes were implemented on conservation of biodiversity and habitat management during the Plan period. Programmes were also initiated with the objective of increasing forest cover by 5% of the total geographical area of the country. This was however, not matched with adequate funds as the share of forestry and wildlife further fell to 0.42% during this plan (Azra 2012). Moreover the actual expenditure (Rs 26114.4 million) during the Seventh 5-Year Plan, on activities for forest and wildlife conservation, was even less than the sanctioned outlay of Rs 29439.9 million (Twelfth 5-Year Plan: 2012-2017). The Approach Paper under the Twelfth Five Year Plan (Planning Commission 2012-2017) emphasized 'in situ conservation and sustainable use of biodiversity to enhance livelihood security..'. Accordingly the Twelfth 5-Year Plan listed 13 monitorable targets of which three are pertinent to conservation of forests, wildlife and biodiversity. While the Twelfth Plan set a target of greening of 5 million ha under Green India Mission, it also set a target of restoring 0.1 million ha of wetlands, inland lakes and water bodies by 2017. The Plan (2012-2017) has also set a target of completing the mapping and preparing biodiversity management plans for all types of ecosystems by 2017, by developing a national information grid for biodiversity, ecology and environment data for monitoring and management of natural resources (Azra 2012). Apart from the targets, the Twelfth Plan has also set a goal for implementation of Biological Diversity Act, 2002 throughout the country and has suggested the setting up of Biodiversity Management Committees at the grassroots levels (Panchayats and Palikas – the local bodies). However, it remains to be seen how far these objectives and targets would be achieved by the end of the Twelfth plan.

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