

Review article

Multi-benefits of national parks and protected areas: an integrative approach for developing countries

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ABSTRACT

National parks and protected areas can contribute significantly to the needs of poor people who live in and around them and depend heavily on forest resources for their subsistence. Especially for the rural poor who have limited economic options, use of national park resources are the main source for their survival, giving them direct benefits from food, medicine and forest products. National parks can contribute to maintaining the ecosystem and biodiversity conservation, along with the economic benefits to the local population. National parks and protected areas can play a significant role in climate change mitigation as well. Nevertheless, benefits from these areas are not well recognized in management especially in developing countries by incorporating them for climate change mitigation. Though usually more priority is given to conservation, improvement of livelihood and climate change mitigation can be achieved by integrating national parks into management and policy, and by consideration of the potential of human resources. Thus the integration can improve the poverty situation of local people and help them to adapt to climatic change mitigation strategies. Therefore, management of national parks and protected areas should ensure the participation of local communities and stakeholders.

KEY WORDS: climate change, food security, health, integrative approach, livelihoods, management, national park

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1. Introduction

National Parks (NP) play a vital role in the conservation of the world's biodiversity, in food security and in human health issues. The values of National Parks range from the protection of natural habitats and associated flora and fauna, to the maintenance of environmental stability of its surrounding regions (CBD, 2008). It provides opportunities for sustainable food security and better human health apart from environmental conservation. Nowadays National Parks and Protected areas are being a unique field that brings different subjective and objective oriented sectors melted like regional economic development, rational use of resources, generating income and creating jobs, research and monitoring, conservation education and, recreation and tourism (KOTHARI, 2008; MILLENNIUM ECOSYSTEM ASSESSMENT, 2005).

Food security and human health are linked and they reinforce each other. Food secured community definitely have a better health and vice versa. The recent statistics of Food and Agriculture Organization of The United Nations (FAO, 2009) disclosed that more than one billion people are undernourished worldwide at present. As a consequence, the "spiral effect" of undernourishment is being evident on human health particularly for poor people in developing countries at an alarming rate. Countries suffering from chronic food insecurity have a long term negative impacts on all fronts of their human development. Millennium Development Goals set by United Nations in the year 2000 endorsed by 189 nation-states put highest emphasis on poverty reduction through improving human health and better environmental management (DEATON, 2003; SHAW, 2006).

The theoretical aspects of sustainable development comprises of three basic pillars that includes social, economical and ecological aspects. Ecological or environmental role for attaining sustainable development is much recent than other two components. Hence, the components of environmental aspects sometimes are overlapping with social and economic aspects. According to different literatures on sustainable development, sustainability can be fully achieved if the overlapping issues are fully satisfied (IDRC, 1996).

From Stockholm (1972) to Rio Earth Summit (1992), the two decades were the time that elapsed to actualize the value of sustainable development, ecological conservation and translating rhetoric arguments to official text (SEYFANG, 2003). Earth Summit was the breeding house of three international agreements such as, United Nations Framework Convention on Climate Change (UNFCCC, entered into force in 2005), United Nations Convention of Biological Diversity (UNCBD, entered into force in 1993) and United Nations Convention on Combat against Desertification (UNCCD, entered into force 1996) (SEYFANG, 2003). By establishing UNCBD, the biological diversity and its official recognition are established that put a benchmark for creating and managing Protected Areas for biodiversity conservation mainly with cross cutting issues like establishment of indigenous rights, forest management, human health, ecosystem approach of development and overwhelming goals to respect the complex relations between human and nature for better livelihood. Although International Union of Conservation of Nature (IUCN) are exercising Protected Area's management since 1948 but UN recognition is a tremendous positive blow both for determining fragile ecology and IUCN activities (DUDLEY, 2008).

Recently the gradual importance of protected areas are becoming more and more significant in terms of biodiversity loss, climate change, food security, population pressure and indirectly world order of economic system that push from behind for unsustainable extraction of resources. The Johannesburg Summit in 2002 again reaffirms the global commitments towards sustainable development (SNEDDON, 2006; SEYFANG, 2003) but stipulated actions remain locked under the apartheid of "Business-as-Usual" approach (MORSE, 2008).

National Parks, by definition works for ecosystem integrity in a certain enclosed areas with equal values to recreation. Nowadays, NPs is no longer used just as recreation or tourism purpose anywhere of the world regardless of which continents it is situated. It plays vital roles from different dimensions like creating economical

forward and backward linkages (NELSON, 1987). NPs are important tools for the conservation of biological diversity and are cornerstones of sustainable development strategies. Aside from their environmental benefits, they can also generate significant economic resources in developing countries. But the roles of NP's might vary according to the local contexts and the objectives of declaring an area as national park and protected area.

Forests as a source of life's essentials particularly in developing countries provide food, shelter, fuel, medicines and income. But, such a disproportionate dependence on a single natural resource highlights the need for sustainable management of forest resources to protect and enhance people's livelihoods, today and in future (ATSE CRAWFORD FUND, 2005). Forests contribute to food security and sustainable livelihoods in numerous ways directly or indirectly through supporting agricultural systems, playing roles in rural development, in maintaining environmental integrity and the provision of opportunities for income generation and employment (FAO, 2004).

Moreover, due to the problem of deforestation and forest degradation the capacity of forests to contribute to food security, maintaining environment and other basic needs for livelihood could be impaired. For instance, 26 hectares of the Amazon rainforest are destroyed every minute, often by logging and for cattle ranching (ENVIRONMENT, 2009). The principal cause of deforestation in the park is done by commercial logging for the production of charcoal and timber (LOPEZ, 2007). Deforestation accounts for about 20% of the greenhouse gas emissions resulting from human activities. Unless and otherwise we tackle the question of forests as a mitigation method for climate change, then we will really have lost the battle to keep greenhouse gas concentrations below levels that many people would consider to be dangerous. And the consequences will have an impact on food security, health and the environment at large (KINVER, 2005).

Management of forest reserve could affect the sustainable use of the resources by different stakeholders. This includes from the national policy to the local administrative body that have power in managing and acting on the resources. The rapid declining of the forest cover worldwide indicates that forests are not managed sustainably. The management of forest resources has to favour the poor people who are entirely dependent on the forests and also the environment (ATSE CRAWFORD FUND, 2005). The other important issue is stakeholder's participation from planning until

the implementation phase of the management activities in the national parks. Recently considerable attention is being given to stakeholders' to involve in decision making in a limited ground (LOPEZ, 2007). However stakeholders who depend on the resources for subsistence base should precede other stake holders. Stakeholders who are directly affected (like people live inside the park) are usually forgotten to be consulted during decision (MURRAY, 2007).

Therefore, this paper tries to focus on the links between the national parks and protected areas, and the environment, food security and health aspects from an integrative perspective. The paper also considers whether these relevant human and environmental aspects are intermingled in harmony and in a sustainable manner through looking at the web of connections of different aspects to draw conclusions and recommendations for utilizing natural resources without compromising its natural balance and sustainability, and integrate national parks and protected areas in climate change mitigation in developing countries. The paper tries to focus on the following issues such as role of national parks in enhancing biodiversity, health and food security; role of national parks for present and future climate change adaptation possibilities and mitigation and the management/governance systems of national parks and protected areas for sustainable development.

2. National parks and protected areas

Different international conventions, treaties and organizations define national parks and protected areas in different ways. The Convention on Biodiversity which was signed at the Rio Summit (UNCED) in 1992 and which came into effect at the end of 1993 is one of the most significant and far-reaching environmental treaties ever to have been developed. A broad view of biodiversity is taken in the Global biodiversity assessment (GBA) which treats it as having four major components such as ecological, organismic, genetic and cultural diversity (HEYWOOD, n.d.). Site conservation is generally believed to be one of the most effective means of reducing global biodiversity loss and Natural Protected Areas (NPAs) have become the preferred means of implementing site conservation (GARCÍA-FRAPOLLI ET AL., 2009). As stated earlier, the importance of Protected Areas (PAs) is recognized in the Convention of Biological Diversity, as it performs many functions in protecting biodiversity and ecosystem integrity.

The most referenced definition is "A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" (IUCN). This definition covers a wide range of aspects, such as defined geographical space, management, ecosystem services and conservation. The categorization of protected areas based on IUCN guidelines are characterized by specific factors and make a distinction from one category to another (DUDLEY, 2008). According to DUDLEY (2008), there are six types of protected areas under IUCN categorization. National parks, under Category II of protected areas, are large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities. According to DUDLEY (2008), the main objectives of a National Park and a Protected Area include the following points.

- 1) To protect natural biodiversity along with its underlying ecological structure and supporting environmental processes, and to promote education and recreation.
- 2) To manage the area in order to perpetuate, in as natural a state as possible, representative examples of physiographic regions, biotic communities, genetic resources and unimpaired natural processes.
- 3) To maintain viable and ecologically functional populations and assemblages of native species at densities sufficient to conserve ecosystem integrity and resilience in the long term.
- 4) To contribute in particular to conservation of wide-ranging species, regional ecological processes and migration routes.
- 5) To manage visitor use for inspirational, educational, cultural and recreational purposes at a level which will not cause significant biological or ecological degradation to the natural resources.
- 6) To take also into account the needs of indigenous people and local communities, including subsistence resource use, in so far as these will not adversely affect the primary management objective.
- 7) To contribute to local economies through tourism and other income generating means.

2.1. Links between national parks and biodiversity

The discussion tries to uncover the links between National parks and biodiversity conservation. As in the definition, it is already mentioned that National Parks aims for ecological integrity and have distinctive characteristics such as wider geographical space, inhabits the rare and threatened species of flora and fauna and extrinsic economic value. The economic activities that are carried out and allowed inside the national park are the pioneer difference with others kind of protected areas. According to Convention of Biological Diversity (CBD), biodiversity is the complex relationship among the living organisms (CBD, 2008). Bio-diversity inside national parks, now-a-days is considerable issue since ever before because of different issues like degradation of global climate, food insecurity, endemic poverty and health problems. Biodiversity is not an abstract shape rather it's a concept that can be shaped according to the interest of discussion. The linkages between biodiversity and national park are explored using some basic components of biodiversity. The biodiversity components that are being taken into discussion are i.e. wild life, plant, conservation, indigenous group and management. The cross cutting issues that score the performance of the bio-diversity components are ecological integrity, ecosystem services, poverty, climate change and national development.

Wild lives are very much centre of the national parks but the cross cutting issues ecological integrity sometimes falls in ecological disequilibrium due to miss-management or pressing needs. The spiral effects this miss management can lead to reduced ecosystem services that a national park in theory ought to be offered. If wildlife is in crisis because of mal-governance, corruption, over-population, too many visitors and unhealthy living environment the fabric of ecological integrity must be loosen that induces less ecosystem services and vice-versa (KOTHARI, 2008). Disrupted ecological integrity and ecosystem services are vital of poverty dimension. Level of poverty among the inhabitants depends on the national parks for their livelihoods should go down if ecological integrity and ecosystem services are reduced (MANSOURIAN ET AL., 2008). Less ecosystem services bring less livelihood support to people living immediately outside the National Park or inside. At the same time, climate change impacts become worse if poverty level goes down as national parks have to face more pressure in terms of resource extraction in an

unsustainable manner which will exacerbate the potentials of ecosystem services. In sum, the overall impacts will hit the national development from different frontiers especially the issues mentioned like reduced ecological integrity, ecosystem services, more poverty, adverse impacts of climate change and national development.

Flora represents the plants species that can be considered as the heart of bio-diversity. A well-composed national park is factored by heterogeneous plant species that serves the national parks from various angels. Variety is the core of bio-diversity opposed to homogeneity. As many variety available in a certain national park the ecological integrity will be more strong and thus provide a better ecological services. Better ecological services are very much interconnected with poverty and it is obvious that good and healthy ecosystem services results reduced level of poverty. In terms of climate change, it is needless to mention the importance of varied and dense composition of plant species. Plant can play the key role of carbon sequestration and as much varied plant species in a certain national park is endowed and it will be contributing to CO₂ absorption. Besides, if a national park is well populated and well composed with plant varieties, the fierceness of natural disaster becomes lower. As a result the last cross-cutting issue- national development realizes the positive impacts of having national parks with diverse kind of flora (BRANDON ET AL., 2008; CBD, 2008, 2008a).

Conservation is the basic building block of biodiversity. Very often the term "biodiversity conservation" is pronounced together but biodiversity or the complex relationship (CBD, 2008) among living organisms that gives the planet fuel to exist need to conserved and if possible enhanced. Conservation is a management aspect from traditional points of view for protecting bio-diversity but it is also an aspect of biodiversity itself. In a healthy biodiversity, organisms try to conserve or preserve themselves and this fighting for survival enhances the quality of biodiversity (GARCÍA-FRAPOLLI ET AL., 2009; MORSE, 2008). Again from very traditional point of view, conservation is a management aspect where in-situ and ex-situ conservation is two important factors to count. Both conservation approaches are characterized by their own features eventually helps a protected areas e.g. NP to more ecological integrity; ecosystem services, reduced poverty, consequently less adverse impacts of climate change and sustainable development of the country or region.

2.2. Forest and climate change

Forests store carbon, provide habitat for biodiversity and helps to alleviate land degradation and desertification. Forests have a potential and significant role to play in climate change adaptation and mitigation planning through maintaining ecosystem services and providing livelihood options. However, forests are increasingly threatened as a result of deforestation, fragmentation, climate change and other stressors which are linked to human activities. Each year about 13 million hectares of the world's forests are lost due to deforestation. Deforestation is currently estimated to be responsible for 20% of the annual human induced CO₂ emissions worldwide (UNITED NATIONS JOINT PRESS KIT FOR, 2007).

Because of the impact of climate change on forest biodiversity and the ability of forests to provide carbon sequestration and other ecosystem services, the IPCC has concluded that the conservation and restoration of forests can considerably reduce emissions at a low cost and with potential co-benefits for adaptation and sustainable development. Recently efforts to Reduce Emissions from Deforestation and Degradation (REDD) in developing countries are gaining wide support from many countries due to its great contribution for climate change (UNITED NATIONS JOINT PRESS KIT FOR, 2007). REDD issue occupies the significant part of climate change negotiation and regarded as one of the key exit door for avoiding impacts of climate change. Actualizing the value of carbon sinking of the forest, REDD is now valued as one of the most potential adaptation means. Conferences of the Parties (COP) – 15 of United Nations Convention Framework on Climate Change (UNFCCC) underscores REDD as one the major issue of negotiation. The REDD Plus interventions under negotiation provide yet another opportunity as well as an impetus to protect, manage and increase forests for better provision of all their services. While carbon in the forestry sector is significant today, the issue of governance and community rights must also be addressed to ensure benefits to forest users (TERI, RRI, 2009).

2.3. Interlink between biodiversity and climate change

The links between biodiversity and climate change run both ways where by biodiversity is threatened by climate change, but proper management of biodiversity can reduce the impacts of climate change. Literatures mentioned some of the clear impact of climate change on

biodiversity. These include; In the Arctic, shorter period of sea ice coverage endanger the polar bears habitat and existence by giving them short time to hunt. The other one is the climate fluctuation in North America reduces plankton population which is the main source of food of North Atlantic right whale. Currently around 300 individual are only remained and the reduced availability of food due to climate change is the cause of mortality. In addition there is a threat on male turtle population in the pacific due to temperature increase. Elevated temperature reduces the number of male turtle offspring and threatens their future generation and survival (SECRETARIAT OF THE CONVENTION ON BIOLOGICAL DIVERSITY, 2007). The recently extinct golden toad and Monteverde harlequin frog have already been labeled as the first victims of climate change. Beyond this the current climate change has already made "refugees" of two communities. The Lateu settlement, located in the Pacific island chain of Vanuatu to escape rising sea levels, and the Shishmaref village located on a small island in Alaska, were recently relocated due to degrading permafrost as a result of current and future climate change impacts (ibid). The Fourth Assessment Report of the Intergovernmental Panel on Climate Change convention (IPCC) revealed that approximately 20-30% of plant and animal species assessed so far are likely to be at increased risk of extinction if increases in global average temperature exceed 1.5-2.5°C (ibid). The Millennium Ecosystem Assessment ranks climate change among the main direct drivers that affect ecosystems. Some of the consequences of climate change on the species component of biodiversity include: changes in distribution, increased extinction rates, changes in reproduction timings, and changes in length of growing seasons for plants. Some of the species are already threatened and particularly vulnerable to the impacts of climate change (ibid).

The resilience of ecosystems can be enhanced and the risk of damage to human being and the natural ecosystems reduced through the adoption of biodiversity-based adaptive and mitigation strategies undertaken. Mitigation is described as a human intervention to reduce greenhouse gas sources or enhance carbon sequestration, while adaptation to climate change refers to adjustments in natural or human systems in response to climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Activities that promote mitigation or adaptation to climate change include; maintaining and restoring native ecosystems, protecting and enhancing ecosystem services, managing habitats for endangered species,

creating refuges and buffer zones, and establishing networks of terrestrial, freshwater and marine protected areas that take into account projected changes in climate (SECRETARIAT OF THE CONVENTION ON BIOLOGICAL DIVERSITY, 2007).

2.4. National parks and food security

Forests and the benefits they provide in the form of food, income and watershed protection have an important and often critical role in enabling people around the world to secure a stable and adequate food supply. Forests are really very important to those people who are entirely dependent on the forest resource and it is the only most accessible productive resources available to them. However, activities like deforestation and forest degradation are impairing the capacity of forests to contribute to food security and other needs of the people who are dependent on the forest. Tropical rain forests are located in the areas of the world with the highest concentration food insecure people. They are the home of approximately 300 million people, who depend on shifting cultivation, hunting and gathering to survive (FAO, 2004).

Food security is defined in 1984 by FAO as “ensuring that all people at all times have both physical and economic access to the basic food that they need”. The loss of forest resources can lead to diminished income and food generating capacity for particularly forest dependent communities, higher rates of soil erosion and siltation of waterways, loss of species and genetic diversity and an increase in carbon emissions which contribute to global warming. Besides those mentioned losses deforestation and forest degradation may also generate profits for the community such as timber or other product sales, forest food products for consumption or crop and livestock production for subsistence or market level. In the assessing of the implications of forest degradation, it is actually important to consider how the value obtained compares with the costs incurred, taking into account the full implications for the global community by including non-human life forms [ibid].

Forests provide ecosystem services including food, fodder, medicine, shelter, nutrient cycling, and cultural and recreational value (SECRETARIAT OF THE CONVENTION ON BIOLOGICAL DIVERSITY, 2007). Food security is also depends on wildlife-based tourism, recreation and associated industries. Many people also get employment from this sector to secure food access. Apart from income generated directly from employment, wildlife

also contributes directly to household income through hunting, trade in bush meat and trophies, which helps to get skins and hides, as well as sale of live animals and craftwork based on wild animal products. Currently most hunters are market hunters and a high proportion of hunters would choose to sell their quarry and purchase cheaper forms of protein such as fish to feed their families, so that the money left over can be used for other basic family needs [ibid].

2.5. Links between national parks and health

Health is a multidimensional concept which by nature embedded many aspects like with food security, ecosystem, environmental degradation, economics and climate change issues. With the due course of time, health issue are becoming the most important issue. According to recent statistics of FAO, 1 billion of people around the world are either starving or suffering malnutrition (FAO, 2009).

Global food security are projected to be worsen with next few years as climate change has its direct negative correlation with food production (IPCC, 2007). This miserable situation develops a spiral effect of poverty and natural resources especially the national parks are being stressed due to food insecurity. People are unsustainably using the limited natural recourses the world has and makes the health risk more vulnerable. As national parks, already stated is one of the important stocks of world food, over stressing will bring destruction of its production? National parks are the source of food for many dependent communities, source of medicine for people living around and inside therefore losing its productive capacity will bring further health related problems. Especially the poor countries will be the first victim of health related problems created by over exploitation of national parks (MILLENNIUM ECOSYSTEM ASSESSMENT, 2005).

2.6. Local people and management

Indigenous People (IPs) or groups are embedded with biodiversity. Most of the cases, IPs considers nature as their mother and they know the best use of the resources. The healthy ecosystem can only be achieved when sustainable manner of resource extraction is used. So far, IPs are the best solution to know about the sustainable use of resources and using their inherited knowledge about nature, forest and its behaviour of biodiversity conservation and management or enhancement may get a new momentum. The roles of IPs were

ignored and they were never right holders of the resources. The scenario seems to be changing after years of movement to establish rights of indigenous communities on protected areas (SNEDDONA ET AL., 2006). As a consequence, in 2007 United Nations acknowledges the rights of indigenous communities and most of the countries already ratified the convention (MANSOURIAN ET AL., 2008). Though it is a matter of practice to incorporate them in decision making and using their knowledge for biodiversity conservation but the sooner incorporation the better result is obvious.

The issue of management is very much unresolved and somewhere conflicting (CBD, 2008). National park is a place of natural resources and livelihoods, revenue generation and luxuries tourism as well. Its' equally should be acknowledged, management should be participatory instead of imposed traditional top-down approach which allows luxurious tourism inside National Parks at the cost of poor's and marginalized community. Due to lack of participation and traditional views of park management, mounting pressure of population growth, increasing needs for food, fibre, fuel-wood and timber are worsening the bio-diversity situation of national parks even though those are protected. That in fact makes the livelihood of the people more vulnerable for those who have backward and forward linkages with the national parks for sustaining their livelihoods. Co-management is still an issue of discussion and very few practices so far entered into actions (DUDLEY, 2008). But pilot studies prove, co-management brings mutual benefits for all concerned stakeholders and retain the purity of biodiversity.

To achieve and reach the ultimate goal of sustainable and integrated management of national parks a very binding and articulated policy or strategy is important. These policies have to be formulated based on international conventions and agreements like post Kyoto agreement and the convention on biodiversity. Actually forest management is also one of the key issues for attaining sustainable national park management system. National park management includes; the intuitional structures, finance and human resource management, capacity building, stakeholder participation, and incorporation indigenous and traditional knowledge into the modern management system. Achieving sustainable and integrated management of national parks leads to improving livelihood, food security and poverty reduction. Moreover it will also play a role in biodiversity conservation, climate change impact mitigation and improvement of human and ecosystem health.

These outcomes can also influence policy issues and parks management system.

Therefore, the interaction between natural resources and human beings is too dynamic and complex. And nature responds accordingly whenever humans start going beyond the tolerable limit and capacity. Human activity can be in terms of over exploitation of the resources, improper management and utilization and so on. National parks, forest reserve and protected areas in general have been used for different purposes for human survival and due to the increase in population; industrialization and urbanization, unwise use of the recourse and mismanagement of these natural resources are found under pressure. For example, people are cutting in a rate as if there is no end for trees or timber, impairing local, regional, global environments. For instance, some 80 countries containing 40% the world population are already suffering serious water shortage (BRANCH, 1999).

Climate change and pollution are due to the unsustainable use of natural resource (MILLENNIUM ECOSYSTEM ASSESSMENT, 2005). Forest contribute as a carbon sink to reduce emission of carbon dioxide to halt the occurrence of climate change. However, high rate of deforestation could contribute high emission of carbon to the atmosphere. Climate change hamper development effort and affect environment, social, and economics. Sustainable forest management is a key issue and mandatory to maintain ecological balance, food security, health and biodiversity (TERI, 2002). Besides, protected areas like national parks act as a juncture of versatile issues ranging from biodiversity conservation to livelihood development. Livelihood; a complex composition of integrated human, social, natural and infrastructural capital entirely linked with the diversity of protected areas like forest reserves and national parks (DFID, 2002).

3. Integrative approach and developing countries

The interaction between natural resources and human beings is too dynamic and complex. And nature responds accordingly whenever humans start going beyond the tolerable limit and carrying capacity. Human activity can be in terms of over exploitation of the resources, improper management and utilization and so on. National parks, forest reserves and protected areas in general have been used for different purposes for human survival and due to the increase in population; industrialization and urbanization,

unwise use of the resources and mismanagement of these natural resources.

The integrative approach focuses how the different issues and challenges such as deforestation, environmental degradation, food security, biodiversity loss and climate change impacts, and environmental health problems can be solved from an interrelated and integrated management and development perspective. Moreover it is a high time and demanding to tackle these kind of sensitive environmental and socio economic problems in a more holistic and interdisciplinary fashion. Below examples show how there is an urgent need to pay attention on the integrated approach and how national parks contribute livelihoods, food security, biodiversity, ecosystem management and health as well.

National Parks in Indonesia have some of the richest and most varied of the world's remaining rainforests with exceptional beauty, range from coastal lowlands to highlands. The National Parks significantly contribute to preserve the integrity of their ecosystems with a wide range of soils, hydrological conditions and habitats from marine to sub-alpine volcanoes, a high diversity of flora and fauna. Although they retain their importance but they are under great threats like illegal logging, fire-setting and forest-clearances for palm oil plantations and farming, poaching, road building and lack of support from government agencies, inadequate funds for staff and equipment involved with parks management and lack of effective law enforcement against these threats (TROPICAL RAINFOREST HERITAGE OF SUMATRA, 2008).

Sundarban national park in Bangladesh is largely dominated by mangrove type and encompasses a variety of plants including trees, shrubs, grasses, epiphytes, and lianas. Almost all mangrove plant species are evergreen, dwarf, shrubby or tall trees, and grow gregariously without leaving any space on the floor (ASIATIC SOCIETY BANGLADESH, 2005). In Sundarban, the national park supports the livelihood of around 3.5 million people living immediate vicinity of the forest (ADB, 2008) and 3.5 million people directly benefiting from ecosystem services. The major ecosystem services that the Sundarban offers among others wood, honey and fish are remarkable. The dependent community includes traditional and Indigenous Munda Community and other people entirely depend on the resources for their livelihoods. The major profession of the people includes wood cutting, honey collection and fishing. Different studies (HOSSAIN ET AL., 2008).

Recent studies conducted to examine the food security impacts after severe cyclones of "Sidr" in

2007 which manages to take away 3000 lives and "AILA" in 2009 shows explicitly the close and intact livelihood interrelationship between dependent communities and the forest. The aftermath of both cyclones seriously damages all fronts of capitals which are fundamental to live such as human capital, social capital, natural capital, livelihood capital and infrastructural capital (HUQ, 2008; ROY ET AL., 2009). Brutal attack of cyclones take away people's ability to rejuvenate the forest based profession as 25% of the forest is anticipated as totally destroyed. As a consequence, food insecurity prevailed and huge forced migration occurred to urban areas for a new profession to which the migrants are not familiar with at all. All together those factors jeopardized the livelihood to the very marginal level as food was not available and mal-nutrition was appeared as endemic problem. Further devastation arrived when government banned all kinds of commercial logging, collecting forest resources and tourism inside forest the dependent communities faced second attack of aftermath due to absence of offering ecosystem services by the forest (ibid).

The Sundarban situated along with the coast line and highly vulnerable of sea level rising due to global warming is vulnerable for climate change. Increase levels of salinity are making the living harder and increased frequency of natural disaster especially cyclone is the major threat for the millions of coastal living people of Bangladesh. The Sundarban protects the lives and livelihoods as a shield using its thick and dense pattern of forest fabric where wind becomes weak and water does not penetrate very easily. The coastal cities and people living inside and around the cities, villages feel secure for any magnitude of cyclone and store surge as the Sundarban is there. At the cost of its own resources, each year Sundarban saves thousands of lives and their livelihoods. As it is projected that end of this century in worst case scenario of global warming, the Sundarban will have a strong possibility to be vanished by a significant portion (IPCC, 2007).

Van Ban National park, Vietnam, NGUYEN TIEN HIEP ET AL., 2001 recorded a total of 386 plant species. The most notable of which was *Taiwania cryptomeriodes*, a 'living-fossil' and globally vulnerable species of conifer reported for the first time from Vietnam. 320 species of higher vascular plants, nearly three quarters (236 species) of which is comprised of flowering plants are recorded. The remainder contain largely ferns (78 species) together with six species of conifer, including the globally threatened *Taiwania*. It is important to recognize that there are five species

of tree recorded from Van Ban are considered to be globally threatened (IUCN, 2003).

Medicinal plant harvest was found to be almost entirely used within the village or neighboring communes for subsistence use. It was found that 80 % of medicinal plants harvested in Na Hang were used within the Village, the other 20% is sent to other communes and with little or no plants being traded to external markets in Vietnam and China. The study found at least 150 different kinds of medicinal plants is used by the H'mong community, of which 35 species cultivated. There is a strong tradition of both harvesting wild and cultivated medicinal plants by the H'mong community. Medicinal plant knowledge, use and harvesting plays an important role in cultural tradition and health of local people, however there are some threats to maintain this knowledge and tradition in the future. Similarly in Sundarban human health is a serious issue for those who are dependent on the Sundarban and many people are regularly offered health services from forest products to keep themselves healthy. Usually the wood collectors, fisher-folks and honey collectors use medicinal plants for all kinds' health related complications they are facing. When they are staying at the forest for resource collection forest plants are the only means to get cure from usual sort of diseases. Honey, medicinal herbs, shrubs are most commonly used medicine for the resource users. Malaria, snake bite and fever are some common disease of the people living in SIZ (HOSSAIN & KABIR, 2008). Besides, around 8000 people are living based on the medicinal production from the forest resources. From other view, The Sundarban is the most attractive place for the visitors to see the wilderness and unique assemblage bio-diversity. From greater health perspective, it is another contribution from the forest.

The main argument for the establishment of national parks and protected areas is to preserve the remaining biological species for human survival (PRIMACK, 2000). Protected areas offer a lot of direct and indirect benefits to people living nearby or at the regional and even international level and the linkage is dynamic and is influenced by factors like socioeconomic and political (MCCARTHY, 2000; CASSON ET AL., 2005). But local people who are often victimized when it comes to practicing protected area management in developing worlds (WRI, 1992). There should have an agreement for maintaining livelihood of local people as comprehensive, effectively managed and ecologically representative systems of protected

areas and national parks in developing countries (NAUGHTON-TREVES ET AL., 2005).

According to the World Bank (2002), more than 1.6 billion people depend at varying degrees on forests for their subsistence and livelihoods and 500 million to 1 billion indigenous people are wholly dependent on forests (WRI, 2005). CAVENDISH (2003) suggests that forest resources have two roles in providing insurance for rural households. Firstly it provides as gap filling or economic opportunities in response to predictable events such as seasonal food shortages. And secondly, it provides safety nets in the face of more major, unpredictable events and shocks. ROZELLE ET AL., (1997) examine the extent of environmental degradation and China's success in controlling its environmental problems. They show that leadership has tried to develop a legal framework and a series of institutions to carry out environmental policy in China and the country's efforts to alleviate poverty, integrate markets, and control population appear to have helped mitigate a number of adverse environmental consequences.

To achieve and reach the ultimate goal of sustainable and integrated management of national parks a very binding and articulated policy or strategy is important. These policies have to be formulated based on international conventions and agreements like post Kyoto agreement and the convention on biodiversity. Actually forest management is also one of the key issues for attaining sustainable national park management system. National park management includes; the intuitional structures, finance and human resource management, capacity building, stakeholder participation, and incorporation indigenous and traditional knowledge into the modern management system. Achieving sustainable and integrated management of national parks leads to improving livelihoods, food security and poverty reduction. Moreover, it will also play a role in biodiversity conservation, climate change impact mitigation and improvement of human and ecosystem health. These outcomes can also influence policy issues and parks management system in developing countries. Protected areas could play a significant role in developing countries through either the strengthening of the existing protected area network or designation of new areas. Many rural poor people basically rely on forest resources. They may experience positive or negative changes to their livelihoods like food security, environment and health. The livelihood impacts of protected areas vary with protected area status, management strategies and community's involvement in governance and inequitable

distribution of livelihood costs and benefits is often yet to be adequately addressed in protected area management. Therefore, involvement of local communities in the planning and implementation through ensuring of financial or other benefits can result in a more sustainable solution to environmental problems (LAUREN ET AL., 2008).

4. Conclusions

The value of national parks in maintaining ecological integrity and the livelihood of local populations in terms of food security and health is very important. Therefore, management of national parks should follow a top-down approach for ensuring opinions from all stakeholders who depend on forest resources. This would help in conservation and prevent people from disturbing the ecosystem, in that those around national parks would feel that the natural resources are their own property. The government should also encourage and have policies for co-management and conservation, and stakeholders should adopt and practice these strategies. So maintaining forests and their biodiversity will be the ultimate solution for climate change mitigation, food security and health issues. Therefore, in order to get the maximum benefit of forest resources without compromising the use of future generation, it is really mandatory to have a sustainable forest management strategic plan or policy to face the upcoming effects of climate change in the most vulnerable countries, in which an integrated approach would improve the capacity of relevant stakeholders and lead to restructuring of government institutions and arrangements so that all partners have equal rights and responsibilities in the management of natural resources and the mitigation of calamities. At the local level, the livelihood of inhabitants must be recognized in planning activities. Getting the involvement of local communities in all processes of management and empowerment of these groups is necessary. Subsequently, this participation will increase employment opportunities and household income for local people. Finally, the knowledge of local people in development strategies for conservation and climate change mitigation should be valued and utilized in order to ensure biodiversity and environmental sustainability, especially in developing countries.

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