



## **Biodiversity Protection through Community Initiatives**



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## **Biodiversity Protection through Community Initiative**

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## Summary

*Biodiversity including natural forests have been subject to intense biotic pressure in many tropical countries including Bangladesh. The remainder floral and faunal biodiversity is being protected in the country's 5 pilot protected areas (PAs) that are being co-managed under an USAID supported biodiversity conservation project. Biodiversity protection efforts being attempted by local communities under the project are presented in this paper by analyzing empirical information. It is concluded that the protection of biodiversity against illicit removals, poaching, forest fire, forest grazing and forest land encroachment can only be achieved by actively associating local stakeholders through gainful partnerships.*

# 1. Introduction

Biodiversity in dense tropical countries have been subject to intense biotic pressure, the extent of which can be illustrated by taking an example of Bangladesh. It is the world's biggest delta landscape (situated between the foothills of the Himalayan massif and the Bay of Bengal), developed by huge amount of sediments deposited in their estuaries by three transnational rivers – the Ganges, Brahmaputra and Meghna. The country is flat and riverine in nature, crisscrossed by a very high density of river systems that have great impacts on forest ecosystem and social system. The density of rivers is the highest in world whereas the density of natural forests is one of the lowest. Of the total area of forest land of 2.53 million (m) hectare (ha), Bangladesh Forest Department (FD) manages 1.53 m ha of forest land, mainly under the legal categories of reserved forest (RF) and protected forest (PF). Protected Areas (PAs), presently under the management of FD, have been declared on RFs and PFs mainly from 80s under the Wildlife (Preservation) (Amendment) Act, 1974. An important criterion followed for designating existing RFs and PFs under PAs related to conserving biological diversity in representative areas of the country's four bio-geographical zones (tropical evergreen and semi-evergreen forests, dry deciduous forests, mangrove forests, and reed forests/wetlands). Presently there are 18 notified PAs under the management of Forest Department, covering an area of nearly 242,000 ha under three PA categories – National Parks (NP), Wildlife Sanctuaries (WS) and Game Reserve (GR).

Although natural forests in Bangladesh have severely degraded over the period, some PAs, particularly in north-eastern and south-western parts of the country, still have comparatively good forests. They are biologically rich and form important catchments of numerous water bodies with intense forests-water interactions that, as a part of a network of transnational watersheds, have regional implications. Socio-economic values of the PAs are important because a number of communities including ethnic minorities reside within and around the forests on which they traditionally depended for their livelihood opportunities. Conservationists recognize that many PAs have limited future prospects without the cooperation and support of local people, especially in developing countries (Wells and McShane, 2004).

The management of tropical PAs is one of the most significant issues in natural resource management today, for these areas are major global repositories for biodiversity but are often exposed to ongoing anthropogenic change (Baird and Dearden, 2003). The protection and conservation of the forests of PAs are particularly important in view of significant loss of natural forests in the country. An attempt has been made in this paper to evaluate forest protection efforts taken up by the local communities in and around the 5 pilot PAs covered under Nishorgo Support Project (NSP). It has been argued that an active association of local people based on gainful partnership is essential for providing an effective protection to forests against illicit felling, forest fires, poaching and forest grazing. However, adequate flexibility and adaptability are critical to establishing cooperative partnerships that can advance both conservation and development goals

(Mcpeak, 2004). The process of community patrolling being evolved for the protection of biodiversity in the five pilot PAs is discussed and future protection patterns discerned.

## **2. Habitat Protection Practices: An Assessment**

The country's forests have historically been subjected to unrestricted biotic interference (e.g. shifting cultivation, illicit felling, forest fires, grazing and poaching). The natural forests, parts of which are now covered under PAs, were declared as RFs and PFs during early nineteenth century in order to provide protection under the colonial Forest Acts of 1878 and 1927. Although the legal status of forests thus got enhanced, an effective protection against smugglers and poachers could not be ensured due mainly to lack of resources with the FD. In this process the traditional/customary rights of local people on the nearby forests were abandoned, thereby alienating local communities from hitherto open access forest resources. Forest Department exercised control over forests by awarding harvesting rights through purchase contract system based on a minimum guaranteed royalty under which a purchaser was allowed to fell any tree over and above a certain girth. The system of marking trees and timber coupe demarcation by FD staff was subsequently introduced for minimizing scope for illicit removals by timber traders. The provisions of Wildlife (Amendment) (Preservation) Act, 1974 provided for enhanced protection to wildlife and biodiversity of gazetted PAs. However, these provisions have not been invoked by FD field staff as most of the forest offence cases within PAs have been handled under the Forest Act of 1927.

The country's natural forests including PAs have not in past attracted adequate funds for their proper management in view of strong emphasis on social forestry that was initially encouraged on non-forest land. As a result, adequate management of PAs was not taken up till conservation area management was taken up in 7 PAs covered under Forestry Sector Project (FSP, 1997-2006). Although the outlay for conservation activities was not significant under FSP, an important policy decision was taken by FD to associate local people in the conservation of PAs based on the sharing of usufructury benefits. For example, buffer plantations and enrichment plantations have been taken under FSP in and around 7 PAs by associating local people and sharing benefits in *lieu* of their efforts for the protection of biodiversity. Buffer plantations were raised in the 3 PAs (Lawachara NP, Rema-Kalenga WS and Teknaf GR), but an effective protection to core area forests could not be ensured. The main objective of protecting the core forests could not be achieved as the participants have only protected the plantations, leaving the core forests unprotected. It has also not been possible to provide effective protection to the core forests in view of lack of adequate resources with FD.

## **3. Community Initiatives in Pilot Protected Areas**

The close relationships of forest dwellers with, and their knowledge of the forests, have been used as a basis for increasing their involvement in biodiversity conservation projects and programs (Hegde and Enters, 2000). An appropriate form of access, control and management by the local stakeholders was thought to be necessary for the protection of

biodiversity in the PAs. Biodiversity conservation efforts got boost in Bangladesh when USAID funded NSP (2004-2009) was started in 5 pilot PAs (Lawachara National Park, Rema-Kalenga Wildlife Sanctuary, Satchari National Park, Chunoti Wildlife Sanctuary and Teknaf Game Reserve) with the following six main objectives :

- i) develop a functional model for formalized co-management of PAs,
- ii) create alternative income generation opportunities for key local stakeholders associated with pilot co-managed PAs,
- iii) develop policies conducive to improved PA management and build constituencies to further these policy goals,
- iv) strengthen the institutional systems and capacity of the FD and key stakeholders so that improvements in co-management under the Project can be made permanent,
- v) build or reinforce the infrastructure within PAs that will enable better management and provision of visitor services at co-managed sites, and
- vi) design and implement a program of habitat management and restoration for pilot PAs.

The co-management model developed and being implemented under the NSP involves establishing gainful partnerships of key stakeholders in the management of PAs. As a part of achieving the above-stated objectives the following community patrolling practices for biodiversity protection have evolved in the 5 pilot PAs :

### **3.1 Teknaf Game Reserve**

Teknaf Game Reserve, located in the country's far south-eastern corner near to Myanmar border, occupies the middle part of the Teknaf peninsula from Ukhia south to the town of Teknaf. It was established in 1983 over a RF area of 11,610 ha covering 10 RF blocks, spread over 3 Forest Ranges (Whykeong, Silkhali and Teknaf) of Cox's Bazar (south) Division. The GR is a part of linear hill range (reaching an altitude of 700m), gently slopping to rugged hills and cliffs running down the central part of the peninsula, with a north-south length of nearly 28 km and an east-west width of 3-5 km. Forest degradation has taken place in the GR due mainly to heavy biotic pressure brought by huge population in a large number of villages/*paras* located in around the forests. In addition, a large number of trees mainly of *garjan*, *teak* and *telchur* got uprooted during the cyclones of 1991 and 1994. But a patch of good forest, mainly of *garjan* and *telchur*, remained intact in Silkhali sample plot area. So the illicit fellers targeted the remainder forests and FD was not able to meet this challenge in view of tight staff position.

A Deputy Range Officer was posted in August 2002 in Silkhali Beat with a special mandate to check smuggling of trees from the sample plot area. After holding consultations with the local people he concluded that it is not possible to protect the *garjan* forest without active association of local people. After field inspections he found that armed smugglers, particularly from Hneela and Componia towns are involved in tree felling activities. Accordingly the Divisional Forest Officer (DFO) was apprised by the

Deputy Range Officer, who stressed the necessity of involving local people in forest protection efforts. He emphasized that catching poor people, who take timber on their shoulders will not be helpful as illicit felling has to be stopped at the point of felling of standing trees in the sample plot itself. So the DFO inspected the area and held consultations with local people and FD field staff at Jahajpura Market. In this meeting the local people assured the DFO about extending their active support for the protection of remainder *garjan* forests. Accordingly, the DFO instructed the concerned Range Officer to form an informal protection committee, comprising mainly of influential and active people from the area. A 13-member forest protection committee was, therefore, formed by including local people, FD staff and local Police Officer.

The committee met every month to deliberate on forest protection issues. The committee members helped local people by making them aware about the necessity of protecting the remaining forests. The committee, with the assistance of local FD and police staff, recovered unauthorized timber and helped FD in filing offence cases against smugglers. This had a positive impact in checking illicit felling of trees and the number of forest offences reduced considerably. The committee thus proved effective for nearly 2 years. But over the period some selfish members of the committee got involved with timber smugglers. As a result the illicit felling again started and the committee in the process got bad name as local people started raising fingers that its members are themselves involved in timber smuggling. A special meeting of the committee was then convened by FD wherein it was decided to restructure it. Accordingly the committee was reconstituted by increasing its membership to 23 (the present and previous Chairman of the Union Parishad were included in the committee as advisors).

At this time the NSP staff held consultations with the committee members and offered support for their forest protection efforts. An unanimous resolution was passed (in a committee meeting held on 9 December 2004) that if local people, particularly from Halbania and Jahajpura towns, do not help in refraining their relatives from illicit felling then FD staff will be requested to issue offence cases against them. In the same meeting it also was decided to form 3 patrolling parties comprising each of 40 persons amongst local people, FD field staff and committee members. They will be responsible for night protection duties on daily basis. In the meantime the NSP staff held a number of meetings with the committee members to help provide needed support required for committee strengthening. After many meetings between the NSP staff and committee members all the three groups were formalized by including them as formal Forest User Groups (FUGs) so as to gradually associate them with alternative income generation (AIG) activities. Based on the recommendations of the committee members, each of the 3 groups were provided protection equipments such as torches, rain coats, shoes and uniforms. The community patrolling groups have been effective in checking illicit felling. The AIG activities are continuing and will gradually be extended to all the willing members of 3 patrolling groups. The newly formed co-management committee has taken the responsibility of overseeing the performance of all the three patrolling groups.



The community patrolling groups are being formed and mobilized to protect remainder forest patches. For example, a community patrolling group has been formed to provide protection to a patch of forest near Kudum Guha, which is an eco-tourist attraction. It has been connected with a one-hour hiking trail. A total number of 40 FUGs have been formed under NSP by involving 926 local households with a main objective of reducing biotic pressure on the forests of GR. Not only they themselves have stopped going to nearby forests for fetching fuelwood/timber, they also are motivating/obstructing others from illicit removal of forest produce. After imparting skill development training they are being provided demonstration grant for starting AIG activities including fish culture, nursery development, poultry rearing, vegetable gardening, etc. The user groups formed under FSP are being motivated to provide protection to the forests in core zone in addition to their protection to assigned buffer plantations (a total of 455 ha of buffer plantations have been raised by FD during 2002-05 by involving nearly 500 households).

### **3.2 Chunoti Wildlife Sanctuary**

Chunoti WS, located in south-eastern region, was gazetted in 1986 with RF area of 7,764 ha. Elephants use the Sanctuary as movement corridor, and many small mammal species that can survive in limited forest areas are found in the disturbed and fragmented habitats of Chunoti. It originally supported mixed tropical evergreen and semi-evergreen forests that have over the period become substantially degraded due to heavy biotic interference. Many low lying areas in the valleys have been converted into paddy cultivation. There are 70 settlements (locally called *paras*) in 15 villages in and around the Sanctuary. Except few scattered patches of garjan trees that are under different stages of degradation, there is hardly any natural forest left presently. FUGs, formed around these patches by involving forest dependent people from nearby *paras*, help FD field staff in forest protection. They are being helped through income generation activities for which monetary and technical assistance is being provided under NSP.

A forest patch of *garjan* trees, located near Bonpukur on Chittagong-Cox's Bazar Highway, was rapidly degrading due to illicit felling activities by the villagers of neighboring *paras*. A number of FUGs were formed for the involvement of forest dependent communities in NSP activities. Although the members of FUGs restricted their forest extraction activities, the outsiders still continued with illicit felling activities. So a community patrolling group comprising 20 male members from the local *paras* (located around the garjan patch) was formed and made responsible for community patrolling along with 2 Forest Guards (FGs). The strength of community patrolling group was subsequently increased to 35 so that one group of 5 persons could provide patrolling along with a FG each day. The group has been provided assistance for patrolling equipments, and also being involved in AIG activities depending upon the preference of group members. Benchmark data has been collected for monitoring the incidences of illicit felling. Six monthly progress in controlling illicit felling will be monitored based on the actual field situation and also based on the offence register records maintained by FD.

Another community patrolling effort (by mobilizing local poor as FUGs) has recently been taken for the protection of good natural regeneration coming up in Chambal Beat of Jaldi Range. Nearly 200 ha of forest area comprises natural regeneration of *garjan*, *akashmoni*, *eucalyptus*, etc. Local people, who cut the sapling mainly for firewood, are being motivated to allow the saplings/seedlings grow. NSP support is being provided to them through demonstration skill development and grants. As most parts of the Sanctuary have degraded, a massive initiative is required for the rehabilitation of degraded forest ecosystem. Heavy dependence of local people on the forests and forest land has in past resulted in their active opposition to wildlife conservation efforts inside the Sanctuary. So an extensive awareness program has been launched for the wider communication and motivation of key stakeholders.

Elephant habitat fragmentation due to encroachment of forest land is being checked by making local people aware about future potential of the Sanctuary in the local economy, particularly of eco-tourism due to its strategic location (it lies halfway in between Chittagong and Cox's Bazar – two important cities). So far 30 FUGs have been formed by associating 567 households. They are being provided technical skills and demonstration grant for taking up AIG activities for raising their subsistence income. The recently constituted co-management councils and committees have helped in building favorable public opinion for biodiversity conservation. Nishorgo clubs comprising local youth are being developed as a watchdog for forest protection efforts. Alternative energy devices such as improved stoves are being promoted in order to reduce fuelwood exploitation from the Sanctuary.

### **3.3 Lawachara National Park**

Lawachara National Park (NP), located nearly 160 km north-east of Dhaka, was gazetted in 1996 with a total forest area of 1250 ha. Due to its good connectivity, the Park is very attractive to eco-tourists, particularly for people from urban centres such as Dhaka. The Park is surrounded by a number of villages that bring enormous biotic pressure on its forests. Based on a study conducted by NACOM (2004), a total of 22 villages (including 2 Forest Villages located within the NP) have been identified having stakes in the Park's forests. Two Forest Villages (Magurchara and Lawachara), inhabited by Khasia tribe, were set up within the RF in 50s by FD in order to ensure regular supply of labour for the plantations to be raised by clearing natural forests. In addition to constructing their houses they have since been practicing betel leaf cultivation on the forest land assigned to them by FD.

Local people have been involved in unauthorized exploitation of timber and fuelwood for cash sale in nearby towns. Some organized timber smugglers, mainly from nearby towns, also were involved in illicit felling activities. Based on the stakeholders consultations it emerged that it will not be possible to extend effective forest protection without involving local people from the identified 22 villages. So FUGs (total 40 groups formed by involving 536 households) were formed gradually in all the 22 villages wherein the members were drawn from the poor sections (who did not have adequate means of

livelihood and so depended on neighboring forests). Based on their revealed preferences, a portfolio of suitable AIG activities was identified in order to provide alternative means of income to key stakeholders in order to reduce exploitative dependency on the nearby forests.

Intensive consultations were held with all the FUGs for providing effective protection as the forests were depleting rapidly. The forest areas of NP were divided into 4 sectors and consultations were held with the members of FUGs who could take up responsibility for providing protection to each of the four identified sectors. As the tribal communities from Lawachara and Magurchara Forest Villages were already helping FD in their patrolling efforts, they were first consulted to provide patrolling parties for the 2 sectors in which the two villages were located. An eight-member community patrolling group from Lawachara Forest Village was designated by the Village Chief to provide protection to the forests of Lawachara Sector. Similarly a ten-member community patrolling group was designated for the protection of forests in Magurchara Sector. These two community patrolling groups have since been providing effective protection to the assigned forests.

Dolubari (comprising a Muslim *para* and a Tipra tribal *para*) village was identified as having an important stake in the Park's forests as it was located on the southern periphery of NP with the villagers' substantial dependency on the neighboring forests. Two FUGs, one each for Muslim *para* and Tipra *para*, were formed by NSP staff for implementing AIG activities. The members of Muslim *para* FUG, some of whom were earlier involved in illicit felling activities, were successfully convinced to take up active community patrolling in this southern sector by associating all its 20 members.

Unlike Lawachara and Magurchara Forest Villages, no formal benefits accrued to the members of Dolubari FUG and so they demanded wage payments for their forest protection efforts. Regular wage payments for community patrol were not, however, favored by NSP staff in view of its ensuing dependency effects. After detailed consultations it was agreed that the community forest protection efforts would be linked with socio-economic development of the area/community through AIG activities. It was decided to deposit each month a sum of Tk. 45,000/- to the FUG account (opened in a local scheduled Bank and operated jointly by the Chairman and Treasurer) that will be used on income generation/community development activities. The members of FUG have been helped through skill development training and demonstration grants being provided to the willing members for identified AIGs (cow rearing, nursery and vegetable gardens). For example, a member has developed a nursery in his house compound through his own investment (a sum of only Tk. 4,000/- was provided to him under NSP along with nursery development training). Similarly vegetables are being produced by other members to whom home gardening training has been provided. It is being planned to develop small enterprises (e.g. eco-tourist lodges/cottages, handicrafts) by associating the willing FUG members. One of the FUG members, who also acts as trained Eco-tour Guide, has volunteered to develop a Eco-Cottage on his own land for the use of NSP staff and other tourists.

The organization of community patrolling proved rather time taking in the northern sector, where intense biotic pressure on the nearby teak forests was coming mainly from the neighboring two villages - Baghmara and Baligonj. Not only the village communities in the two villages were divided along party lines, some of the villagers were themselves actively involved in illicit felling of valuable *teak* trees. So achieving an early community consensus for forest patrolling did not prove easy, as expected. After field visits it came out that a number of elite individuals wield influence and so they were contacted personally. Finally it was agreed to form a community patrolling group by including equal number of members from each of the two villages.

In view of strong influence of the current Chairman and ex-Chairman of Komalgonj Union Parishad it was decided to request them for nominating 10 young members from each of the two village for forest patrolling. Accordingly, a community patrolling group comprising 20 members was formed by following the payment mechanism as evolved in the southern sector. Interestingly, some members of the community patrolling group have earlier been involved in illicit felling activities as evident from the forest offence cases registered by FD in their names. The patrolling equipments such as torch, whistle, battery, uniforms, boots, etc. were provided to the group. The community patrolling group was subsequently adopted as a FUG in order to extend AIG assistance to its members.

As a result of community patrolling the incidence of illicit felling has reduced considerably in Lawachara; for example, the number of trees felled (as per the offence register maintained by FD) has reduced from 450 during the 4<sup>th</sup> quarter of 2004 to 10 during the same quarter in 2005. In the meantime, a co-management committee has been formed by electing representative members from the earlier formed co-management councils. The presidents of Dolubari FUG and Magurchara Mantri are members of Lawachara co-management committee. The responsibility for the forest patrolling by all the four community groups is now being looked after by the respective co-management committees. The representatives of all the four groups meet every month for coordinating their patrolling activities.

A total of 218 ha of buffer plantations have been raised around the Park by FD during 2002-03 by associating 220 local households. They are being motivated to extend protection to the neighboring forests in addition to the plantations assigned to them.

### **3.4 Rema-Kalenga Wildlife Sanctuary**

Rema-Kalenga Wildlife Sanctuary (1795 ha), originally notified in 1981, still has comparatively better forest stock due mainly to its remote location (bordering on east and south by India, and tea estates and forests on other sides) and poor road linkages. The accessibility of Rema-Kalenga, the forests of which form international boundary with north-eastern India, is presently limited during rains as it is presently connected with fair weather roads only. There is currently no road access to the interior of the Sanctuary, except an unsurfaced road forming nearly 5 km of the western boundary. This is

intersected by a number of foot rails leading into or across the Sanctuary, providing access to paddy fields and subsistence harvest areas in the interior.

There are 23 villages (including Debrabari Forest Village located inside the Sanctuary) that have stakes in the Sanctuary. Due to its peculiar geography the incidences of organized smuggling inside the Sanctuary are effectively checked whenever FD field staff have close vigil on some routes through which only illicitly felled timber could be transported. This means that instead of round the clock patrolling inside the forests, smuggling of timber can be checked by closing the exit routes. The recently formed co-management council and committee have, therefore, identified such routes and community patrolling groups have been formed around the identified exit routes. These groups keep a close vigil on any movement of illegally felled timber and suspected people through these routes. The community patrolling groups are being organized into FUGs so that they can be involved in AIG activities. In other areas FUGs have been formed by involving local poor dependent on nearby forests. So far 60 FUGs have been formed by involving 807 poor households. In addition, strong linkages are being made with the user groups formed under FSP for raising buffer plantations (223 ha raised by FD during the period 2002-05 by associating 225 households).

### **3.5 Satchari National Park**

Of all the five pilot PAs, Satchari NP is the smallest in area (243 ha) and has only recently been gazetted (in 2005). The Park's forests, though rich in biodiversity, are less prone to illicit felling due mainly to lack of valuable timber trees such as *teak* and also the NP being surrounded by tea estates on eastern and western sides, and Indian border on southern side. Presently forest protection efforts are required mainly to check removal of fuelwood by forest dependent local people. Accordingly, Tiprapara Forest Village having 24 households and located within the NP was identified for forming a FUG responsible for providing community patrolling. All the member households of this FUG are being involved in AIG activities *in lieu* of their help in controlling illicit removal of fuelwood from the forests of NP. Forest Villagers are patrolling the forests in association with the FD field staff. Motivation and public awareness activities are continuing under NSP. A total of 30 FUGs have been mobilized by including 400 households from the neighboring villages. As per the offence register maintained by FD the total number of logs seized by FD field staff has come down from 40 in November 2004 to 17 in March 2005. So it is evident that the incidences of illicit felling have decreased over the period.

## **4. Community Biodiversity Protection and Livelihood Opportunities**

In an agrarian economy of Bangladesh that is characterized by natural calamities and food deficit, the country's natural forests including PAs have been an intimate

interspersed human habitations and cultivation. In addition to development pressures on forest land, the traditional dependence (for forest products and services) of local communities on natural forests including PAs has historically been an important aspect of forests management in Bangladesh. Anthropogenic pressures including increased commercial extraction of forest produce, and forest land encroachment for habitations and agriculture, brought by manifold increase in human and cattle population, led to shrinkage and degradation of the country's forests and PAs. The protection efforts of FD have not been adequate due mainly to lack of infrastructure including shortage of field staff. The costs and benefits of conservation have often been shown to be skewed in favour of the rich in developed countries and against the poor in developing countries (Brown, 1998). A strategy that has been embraced as suitable for attaining both economic and ecological success is eco-tourism (Marnie *et al.* 1998).

The forest resource base in Bangladesh has degraded, thereby disrupting the symbiotic relationship that existed historically between the livelihoods of local people and surrounding natural resources. A great challenge in front of FD is thus to restore this positive linkage by coupling biodiversity conservation with livelihood opportunities for local people. NSP is attempting to address this important issue in a number of ways. Livelihood activities that make use of ecological services have strong linkages with biodiversity conservation (Salafsky, N and Woolenber, E. 2000). Biodiversity based livelihood opportunities such as eco-tourism, nursery development, medicinal plants, and NTFPs based small enterprise development are being encouraged in order to create direct vested interests of local community in the sustainance of forests and constituent biodiversity. The forest degradation in this situation adversely affects the livelihood opportunities of local people as economic value of forest resource is due mainly to its continuance and consequent opportunities to benefit directly from the existence and use of biodiversity. A well defined sharing mechanism of PA entry fees and other related revenues from eco-tourism is being finalized.

Social forestry activities including buffer plantations are being implemented by FD by associating FUGs and community patrolling groups based on usufructory benefits being provided *in lieu* of their forest protection efforts. Indirect linkages between forest protection and livelihoods are being established by implementing land-based AIG activities (such as home gardening, fish culture and animal husbandry) by associating the willing members of FUGs. Here economic growth is being encouraged through wage employment and self-employment opportunities being provided as a substitute for extractive forest-use practices.

## **5. Community Monitoring for Biodiversity Protection**

As per the guidelines as contained in the Performance Monitoring Plan (USAID, 2003) the following 3 indicators are being used for tracking the health of biodiversity as a result of NSP interventions.

- i) Declining incidence in illegal logging in the forests of the 5 pilot PAs;
- ii) Increased production of renewable natural resources in targeted areas of the PA; and
- iii) Increased biodiversity in targeted areas of the PAs.

A detailed methodology for establishing benchmark data and measuring the volume of timber loss (cubic meter/ha) during the project period is being used for assessing effectiveness of project interventions in controlling unauthorized felling in the sampled patches of all the 5 pilot PAs. Photo monitoring, focusing on changes in plants height as a visual evidence of success of NSP interventions, is underway. Forest dwelling bird species are being counted for assessing changing patterns of biodiversity due to NSP efforts. A simple procedure of sighting and counting (either population or nests) the indicator bird species using the forests as their habitat is being employed by associating local stakeholders in identified transect walks.

## **6. Emerging Issues in Protected Area Protection**

Overall focus of PA co-management in Bangladesh is to manage them in as natural and less disturbed conditions as possible, but also to provide protection to their constituent biodiversity by establishing gainful partnerships with key stakeholders. Management of biodiversity within PAs and generating forest functions and services while maintaining their environmental roles and multiple functions are central in such a PA co-management. The co-management of PAs as a part of biodiversity and forest land management strategy is necessary so that perennial vegetative cover is maintained. Biodiversity conservation is wrought with difficult decisions and how those decisions are made will, in many cases, affect the future existence of innumerable plant and animal species (Brechin, *et al.* 2002). PA protection and co-management systems need to be perceived as husbandry of renewable biodiversity with attention to the protection, conservation, recreational and other values in gainful partnerships with key stakeholders. When local communities have a direct stake in the outcome of conservation projects, they are more likely to provide the political support necessary to balance development pressures that may arise for the diversion of PA land for non-biodiversity purposes (Chhatre and Saberwal, 2005). The value of PA functions and services such as socio-ecological security, cultural diversity, regulation of steam flow, source of biological diversity and sink for carbon content is to be increasingly recognized in PA protection and co-management decisions.

Sustainable forest protection and use practices are to be increasingly allowed to local forest dependent people, particularly in interface landscapes based on co-management agreements with specific roles and responsibilities for gainful stakeholders' partnerships. Natural regeneration and eco-restoration are to be encouraged wherever possible. Enrichment planting of indigenous species of shrubs and trees may be taken in those areas where regenerative rootstock and/or mother trees do not exist. Visitor use for outdoor recreation, research and educational purposes is to be encouraged in designated zones, classified according to specific co-management objectives.

With the promulgation of progressive forest policies and legislations, the PA protection and co-management focuses on ecological requirements, conservation of biological diversity, and meeting bonafide consumption needs of local people by associating them in gainful partnerships. Management zoning by these objectives has been attempted in the management plans recently prepared under NSP for the 5 pilot PAs. Given protection against illicit felling, land encroachment, forest fire and grazing (to be achieved through co-management initiatives) it should be possible to naturally regenerate PAs in Bangladesh in view of favourable above-ground and below-ground biophysical factors. The required capital resources for taking up natural regeneration technologies are planned to be tapped from global initiatives such as GEF, CDM and other Carbon Funds. This requires taking up applied research initiatives, particularly on assessing intangible benefits accruing from the PAs.

International surge on biodiversity conservation as reflected in enhanced funding for environmental functions and services of forests and PAs has brought the above-discussed PA protection and management issues in mainstream international discourse. Enabling policies and legislations compatible with relevant international conventions and protocols are being increasingly adopted in Bangladesh. With Kyoto Protocol coming in force, the value of PAs as carbon sink will increasingly attract funding from international funding mechanisms such as CDM and Carbon Funds, which can be tapped through careful planning.

## **7. Conclusion**

Appropriate PA protection and co-management practices are evolving in Bangladesh, where local communities are increasingly taking up collective forest protection efforts in the face of degrading forest ecosystem. Such initiatives are being further strengthened under donor funded biodiversity co-management projects such as NSP. In the process, many relevant lessons are being learnt for biodiversity protection through co-management of PAs. The future success of the protection and co-management of PAs in Bangladesh would depend on successfully implementing such lessons. Earmarking new PAs, and better protecting and co-managing the existing PAs are necessary for *in-situ* biodiversity conservation, and also for checking loss of forest land and degradation of vegetation cover. Putting in place relevant institutional mechanisms and sustainability tools for biodiversity protection is equally important for sustainable biodiversity conservation.



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