PROTECTED AREAS OF BANGLADESH: CURRENT STATUS AND EFFICACY FOR BIODIVERSITY CONSERVATION

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Abstract: This paper reviews the present status of, challenges to, and prospects for protected areas (PAs) in Bangladesh. The purpose of the study was to provide up-to-date information on country's PAs to various national and international donor and conservation agencies. So far, a total of eighteen PAs have been notified and managed by the country's Forest Department (FD). Although PAs have been established for all of Bangladesh's forest types, in reality these areas are not really protected, mainly due to poor focus on public involvement in PA management process. Furthermore, the distribution, area and number of PAs are not adequate to conserve the rich biological diversity exceptionally possessed by the country. The study concluded that effective co-management, between PA managers and local forest user groups, which ensures clearly defined rights of various stakeholders on PAs and their active participation in decision-making processes, is necessary to secure the future of PAs in Bangladesh.

Keywords: Protected Area, status and distribution, biodiversity conservation, co-management

Introduction

Human beings are dependent on a variety of living resources for their survival. Biodiversity is vital for many reasons - for example, to sustain the production of food or to conserve the ecological foundations needed to sustain people's livelihoods. Over the past few decades, the loss of and threats to biodiversity have become issues of global concern. It is also the case that the majority of the world's biodiversity is found in the world's economically poorest countries [1]. In some quarters, it is also believed that the poorest people of those poor countries, who depend most immediately upon local ecosystems for their livelihoods, are responsible for the degradation of biodiversity, as well as being those who will be most affected by the consequences of this biodiversity loss [2-3]. As a result of both international and national concerns about biodiversity loss and degradation, a succession of strategies (dating from the first World Conservation Strategy in 1980) have been developed and adopted to conserve biodiversity. Protected areas have been central to these strategies [4-6].

Protected areas are "areas especially dedicated to the protection and maintenance of biological diversity and associated cultural resources, which are managed through legal or other effective means" [7], "designated or regulated and managed to achieve specific conservation objectives" [4]. PAs have long been considered as the cornerstone of all national and regional conservation strategies. While it is often argued that they are the most effective and widespread measure for conserving forests and biodiversity [4,5], the importance of complementary off-reserve management has also been acknowledged [6,8,9]. Globally, the number of PAs

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has increased significantly over the last few decades in recognition of their importance for conservation. At present, there are more than 100,000 protected area sites worldwide, covering nearly 12% of the world’s land surface [10-12].

Bangladesh, the world largest deltaic region, lies in the northeastern part of South Asia between 20° 34’ and 26° 38’ North latitude and 88° 01’ and 92° 41’ East longitude [13]. The majority of country’s land is formed by alluvium from the Ganges and the Brahmaputra Rivers and their tributaries, and consists mostly of flood plains (80%), with some hilly areas (12%) [14]. Bangladesh has a sub-tropical monsoon climate; its natural forests are classified into three major vegetation types occurring in three distinctly different land types: hill forests (evergreen to semi-

<table>
<thead>
<tr>
<th>Forest type</th>
<th>Location</th>
<th>Area (million ha)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hill forest</strong></td>
<td><strong>Managed reserved forest</strong></td>
<td><strong>Eastern part of the country (Chittagong, Chittagong Hill Tracts and Sylhet)</strong></td>
<td><strong>0.67</strong></td>
</tr>
<tr>
<td><strong>Unclassed state forest (USF)</strong></td>
<td><strong>Chittagong Hill Tracts</strong></td>
<td><strong>0.73</strong></td>
<td>Under the control of district administration and demuded mainly due to faulty management and shifting cultivation. Mainly scrub forest.</td>
</tr>
<tr>
<td><strong>Plain land forest</strong></td>
<td><strong>Central and north-western region (Dhaka, Mymensingh, Tangail etc.)</strong></td>
<td><strong>0.12</strong></td>
<td>Mainly Sal forest but now converting to exotic short rotation plantations. Managed by the Forest Department.</td>
</tr>
<tr>
<td><strong>Mangrove</strong></td>
<td><strong>Sundarbans</strong></td>
<td><strong>Southwest (Khulna, Satkhira)</strong></td>
<td><strong>0.57</strong></td>
</tr>
<tr>
<td><strong>Coastal forest</strong></td>
<td><strong>Along the shoreline of twelve districts</strong></td>
<td><strong>0.10</strong></td>
<td>Mangrove plantations along the shoreline of 12 districts. Managed by Forest Department.</td>
</tr>
<tr>
<td><strong>Village forest</strong></td>
<td><strong>Homestead Forests all over the country</strong></td>
<td><strong>0.27</strong></td>
<td>Diversified productive system. Fulfill majority of country’s domestic timber, fuelwood and bamboo requirements.</td>
</tr>
<tr>
<td><strong>Plantation in tea and rubber gardens</strong></td>
<td><strong>Chittagong Hill Tracts and Sylhet</strong></td>
<td><strong>0.07</strong></td>
<td>Plantations of various short rotation species (mainly exotics).</td>
</tr>
<tr>
<td><strong>Total forest</strong></td>
<td></td>
<td><strong>2.53</strong></td>
<td>17.49% of country’s total landmass</td>
</tr>
</tbody>
</table>
evergreen), plain land Sal (Shorea robusta) forests, and mangrove forests. There is contradictory information on the actual forest extent of Bangladesh. According to the Bangladesh Forest Department and some other sources [15,16], forests cover is about 2.53 million ha, representing approximately 17.5% of the country's total surface area (Table 1), but according to FAO's FRA-2005, forest extent is only about 0.87 million ha [17]. Officially, the FD manages 1.53 million hectares of forest land of the country [18].

Bangladesh is part of the Indo-Burma region, which is one of the ten global hot-spot areas for biodiversity, with 7,000 endemic plant species [19]. Due to its unique geo-physical location and characteristics, Bangladesh is characterized by an exceptionally rich biological diversity [13,20,21]. Its flora includes an estimated 5,700 species of angiosperms alone, including 68 woody legume species, 130 species of fibre-yielding plants, 500 medicinal plant species, 29 orchid species, three species of gymnosperms, and 1,700 pteridophytes [22,23]. Some 2,260 plant species have been reported from the hilly region of Chittagong alone, which falls between two major floristic regions of Asia [24]. Correspondingly, Bangladesh also possesses rich faunal diversity and has approximately 113 species of mammals, more than 628 species of birds, 126 species of reptiles, 22 species of amphibians, 708 species of marine and freshwater fish, 2,493 species of insects, 19 species of mites, 164 species of algae (or seaweed) and 4 species of echinoderms [25,26].

The biodiversity situation of Bangladesh has worsened day by day mainly because of its high population pressure and extreme poverty. However, the establishment of PAs for conserving biodiversity in the country is relatively recent. In fact, majority of the PAs of the country are relatively young and being declared very recently (Table 2). Our paper is an initial attempt to review the present status, trends and challenges of PA management for biodiversity conservation in Bangladesh. It also tries to figure out some direction for the future management of country's PAs.

**Protected Areas of Bangladesh**

Three types of protected area were defined under the Bangladesh Wildlife Preservation Act, 1974 (Box 1), with the objective of conserving biodiversity (*in situ*) and the natural environment within various forest type. The first PAs had been established in the 1960s and 1970s; a second group of PAs were declared in between 1980 and 1986, and a third group since 2000 (Table 2).

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**Box 1. Protected Areas defined under Bangladesh Wildlife Preservation Act, 1974**

Following are the three different types of protected area defined under Bangladesh Wildlife Preservation Act, 1974;

**A. National Park:** a comparatively large area of natural beauty to which the members of the public have access for recreation, education and research, and in which the wildlife is protected.

**B. Wildlife Sanctuary:** an area maintained as an undisturbed breeding ground for wild fauna and where the habitat is protected for the continued well-being of the resident or migratory fauna.

**C. Game Reserve:** normally comprises a relatively isolated area meant for protection of wildlife in general and to increase the population of specified species.
Presently, there are eighteen notified PAs - comprising ten national parks, seven wildlife sanctuaries and one game reserve - under the jurisdiction of the FD [27,28] (Table 2; Figure 1). Other categories of PAs managed by the government include eco-parks, safari parks, ecologically critical areas (ECAs), World Heritage sites, and Ramsar sites. Presently, the PAs (IUCN categorized) of the country represents an area of 242,596 ha - covering a tiny proportion of total land mass (i.e. 55,598 sq. miles) of the country; which is as well the second lowest per capita area under PAs in any country [29].

### Efficacy of Bangladesh Protected Areas for Biodiversity Conservation

If PAs are to be effective in conserving biodiversity, the PA system must be representative of all ecosystem types [30-32]. Although the PAs of Bangladesh represent around 11% of the country’s total forest area (Table 2), they do not effectively represent all ecosystems, and thus include all habitats and species important for conservation. The proportions of each of the three major forest types - hill forests, deciduous Sal...
forests and mangrove forests - represented in PAs are 5.2%, 11.2% and 23.3%, respectively (Figure 2).

The effectiveness of Bangladesh’s PAs is also limited because they are portions of reserved forests which have, in most cases, only been declared after being degraded heavily by activities such as illegal logging, land clearing, burning, and poaching [33]. Many of country’s mammals, birds and reptiles have already been lost, due to the belated awareness of and action for biodiversity conservation (Table 3), and the limited effectiveness of measures implemented to conserve biodiversity. The population size and number of the remaining wild fauna are also not satisfactory and these are confined and distributed irregularly in limited forest patches of the country. IUCN listed a further 40 mammalian species, 41 avian species, 58 reptilian species and 8 species of amphibians are under various degrees of threat in Bangladesh (Table 4). Although data regarding the country’s threatened flora is not complete, it has been assumed that 10% of it is already extinct due to uncontrolled over-exploitation [34]. The Bangladesh National Herbarium (BNH) has previously reported 106 vascular plant species at varying degrees of risk of extinction [35], and Dey [36] has prepared a list of 167 plant species considered vulnerable or endangered in the country.

**Challenges of PA Management in Bangladesh**

The high and rapidly growing population of Bangladesh places great strain on all natural resources, and PAs are no exception [38]. The situation in Bangladesh is not atypical; the majority of PAs around the world, not only those in developing countries or the tropics, face a variety of problems [39]. A recent survey of ten developing countries with major forest resources had found that only 1% of forests PAs are secure, with more than 20% suffering degradation, and 60% likely to be threatened in the near future [40]. The major factors responsible for poor PA management in Bangladesh are:

- **Poverty and unemployment:** Poverty and unemployment are two basic and related problems in Bangladesh. Around 38 percent people of the country live below the pov-
Many rural poor people living adjacent to forest areas collect forest resources (e.g., food, fodder, medicine, firewood, timber, house building materials) to sustain their livelihoods, mainly in unsustainable ways. Further, unemployment drives rural people to various illegal forest practices (e.g., illegal logging or poaching of wild animals).

- **Tenure insecurity:** Poor recognition of traditional forest practices, and of the rights of indigenous and local communities at the time PAs are declared is another important factor leading to the poor management of PAs. There are many misunderstandings between various forest user groups and the FD, particularly among indigenous communities as their culture and lifestyle are solely based on forests. In most cases, the declaration of PA is made without providing the affected group any alternative livelihood strategies, although such declarations impose significant restrictions on their customary forest uses and practices.

- **Forest Department's limitations:** The Forest Department of Bangladesh has long suffered a number of limitations, such as inadequate staffing and facilities, and poor ac-

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**Table 3.**
List of animal species extinct from Bangladesh in the last century.

<table>
<thead>
<tr>
<th>Wildlife class</th>
<th>Common name</th>
<th>Scientific name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammals</td>
<td>Great one-horned rhinoceros</td>
<td>Rhinoceros unicornis</td>
</tr>
<tr>
<td></td>
<td>Javan rhinoceros</td>
<td>Rhinoceros sondaicus</td>
</tr>
<tr>
<td></td>
<td>Asiatic two-horned rhinoceros</td>
<td>Dicerorhinus sumatrensis</td>
</tr>
<tr>
<td></td>
<td>Blue bull/nilgai</td>
<td>Boselaphus tragocamelus</td>
</tr>
<tr>
<td></td>
<td>Wild buffalo</td>
<td>Bubalus bubalis</td>
</tr>
<tr>
<td></td>
<td>Gaur</td>
<td>Bos gaurus</td>
</tr>
<tr>
<td></td>
<td>Banteng</td>
<td>Bos banteng</td>
</tr>
<tr>
<td></td>
<td>Swamp deer/barasinga</td>
<td>Cervus duvauceli</td>
</tr>
<tr>
<td></td>
<td>Marbled cat</td>
<td>Canis lupus</td>
</tr>
<tr>
<td>Birds</td>
<td>Pink headed duck</td>
<td>Rhodonessa caryophyllacea</td>
</tr>
<tr>
<td></td>
<td>Common peafowl</td>
<td>Pavo cristatus</td>
</tr>
<tr>
<td>Reptiles</td>
<td>Marsh crocodile</td>
<td>Crocodylus palustris</td>
</tr>
</tbody>
</table>

**Source:** Rahman [37]

**Table 4.**
Number and conservation status of inland and resident vertebrate species of Bangladesh.

<table>
<thead>
<tr>
<th>Group</th>
<th>Total no. of living species</th>
<th>Extinct</th>
<th>Critically endangered</th>
<th>Endangered</th>
<th>Vulnerable</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amphibians</td>
<td>22</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Reptiles</td>
<td>109</td>
<td>1</td>
<td>12</td>
<td>24</td>
<td>22</td>
<td>58</td>
</tr>
<tr>
<td>Birds</td>
<td>388*</td>
<td>2</td>
<td>19</td>
<td>18</td>
<td>4</td>
<td>41</td>
</tr>
<tr>
<td>Mammals</td>
<td>110</td>
<td>10</td>
<td>21</td>
<td>13</td>
<td>6</td>
<td>40</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>629</td>
<td>13</td>
<td>52</td>
<td>48</td>
<td>38</td>
<td>147</td>
</tr>
</tbody>
</table>

**Source:** IUCN (2000) [26]

* Excluding migratory birds
cess to modern technologies and equipment. As a result, FD has limited capacity for PA management. This is manifested in a number of ways, including the lack of proper management plans and of their implementation.

- **Lack of people's awareness:** Most of Bangladesh's people are still ignorant about PAs and their importance to conservation. People's knowledge regarding biodiversity; conservation and sustainable resource collection is also very poor. Although local and indigenous communities are sometimes believed to possess some more effective and site-specific management regimes and practices, these traditional skills are now highly challenged by resource scarcity and poor government recognition.

- **Other pressures and issues:** Fuelwood collection for domestic cooking is a major resource pressure impacting on sound PA management. Sawmills and brickfields located in and around PAs indirectly threaten the existence of PAs by encouraging local people in illegal logging activities. Inadequate law enforcement is another significant factor responsible for deterioration of Bangladesh PAs.

Co-management of PAs: A new concept for people oriented conservation

A focus on ecological aspects of PAs, and exclusion of rural forest-related livelihoods, has been one of the most significant difficulties for PA management [41]. In response, several people-oriented approaches have been developed and promoted by various international conservation agencies to improve the effectiveness of PAs [42]; co-management or collaborative management is a common strategy, with both historical roots and more recent manifestations. Bangladesh has a long history of community involvement in forest management; this dates from 1871, when tribal *jhum* (swidden) farmers in the Chittagong Hill Tracts were engaged in the planting of teak (*Tectona grandis*) trees in abandoned dry land fields under the *taungya* system. While the concept of co-management or joint forest management has been applied in "traditional" forestry in the form of social and or participatory forestry [43,44], it is novel in relation to PA management. With the financial assistance of USAID, FD launched a pilot PA co-management program in 2003 in its five protected areas (two national parks; two wildlife sanctuaries and one game reserve), known as the Nishorgo Support Project. The project has already facilitated some social motivation programmes in and around the selected PAs, giving local people micro-credit facilities, technical assistance and financial aid for activities such as nursery raising, livestock rearing, poultry farming, fisheries, home gardening, handicrafts, and developing small cottage industries. The project also developed infrastructure for eco-tourism, trained local people as eco-tour guides, and formed some community forest patrolling groups and a co-management committee. Most of these efforts have demonstrated encouraging preliminary outcomes, but they are still confined to a small number of PAs, and need to be extended to other PAs across the country.

Conclusion

Unquestionably the government and various public/civil groups of Bangladesh are now much more aware about PAs and their potential conservation value. However, the mere establishment PAs has not been effective in the country in conserving it's rapidly decreasing biodiversity. This may be because of it's different and complicated socio-economic and political context. Significant changes in the approach to PA system and its management are necessary for long-term and effective biodiversity conservation in the country. These may include:
Bringing all remaining natural forest patches under a well defined PA management system and ensuring representation of all vegetation types under this system;

- Developing poverty reduction strategies in areas around PAs, through developing alternative income generating (AIG) activities and providing micro-credit facilities to rural people;

- Creating opportunities to develop eco-tourist industries based on PAs, and using these to generate local income sources (e.g., selling entry tickets, permissions for photograph, and souvenirs) for sustainable financing of PAs;

- Adopting a participatory PA management regime, that recognizes local people's interests and rights in both benefit sharing and decision making processes;

- Restoring and managing buffer zones as an alternative resource exploitation zone to PAs, and identifying allowable resource exploitation limits from PAs, which offer both ecological and economic sustainability;

- Establishing a separate institution specifically for the management and monitoring of PAs;

- Capacity building of PA managerial staff, including conservation and management of PAs.

The significant pressures on Bangladesh's forests and PAs mean that these tasks are urgent if the remaining forests and biodiversity in Bangladesh are to be conserved.

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