Towards Dynamic Policy Instruments for Enhancing Biodiversity Conservation in National Parks: A Case Study on Bangladesh and Sarawak, Malaysia

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ABSTRACT

Asia is the most populous region, with a substantial number of global biodiversity hotspots and several megadiverse countries, including Malaysia, with rich cultural and natural heritages. In this region, natural heritages within protected areas is under threat with high tendency of biodiversity losses. Exploitation is widespread but effective conservation is hampered by lack of systematically dynamic policies and instruments. This study attempts to relook at key factors that strengthen policies towards conserving biodiversity at national parks (NPs) in Bangladesh and Sarawak, Malaysia. It focuses on the analysis and review of the present tools (policy, growth of national parks and legal aspects) used to enhance conservation activities within and around these areas through literature review, observations of some of the parks, as well as interviews with relevant staff and indigenous community. The study showed that the growth of NPs maximized for the period of 2010 to 2014 both in Bangladesh and Sarawak, Malaysia reflecting the importance that both countries are placing on the conservation of biodiversity and the ecosystem services they provide. This is indeed a positive sign that both two countries reveal towards achieving Aichi Biodiversity Target 11 for the global protected areas network. Overall, the study suggests that the dynamic policy-based decision-making on sustainable biodiversity protection at NPs in both countries should incorporate development with environmental, economic, social, institutional and administrative domains.

Keywords: Policy Instruments, Biodiversity, Growth of National Parks, Bangladesh and Malaysia.

INTRODUCTION

National parks (NPs) are instrumental in supporting biodiversity conservation as well as providing many benefits to the society. Globally, they are on an increase. Their management requires consideration of their multiple functions to enable combination of relevant ecological, economic and social aspects (Liaison Unit Vienna, 2000). The 113,000 NPs and similar protected areas in the world cover approximately 6% of the Earth's land surface, covering some 149 million square kilometres (NPFF, 2016). In the Asian region, there are 10,900 protected areas covering 13.9% of the terrestrial environment and 1.8% of the marine and coastal areas (Juffe *et al*., 2014). These protected areas, unfortunately, are under threat and losing biodiversity rapidly. The main threats to these protected areas are over-exploitation of biodiversity due to high population density and increasing demands from a globalised markets, as well as habitat loss and degradation in adjacent areas. Consequently additional problems are now emerging. Among them are excessive invasive alien species, deforestation, poverty, fragmentation and illegal wildlife trade, man-made fire and other interferences that urgently need to be addressed (Juffe *et al*., 2014).

In Sarawak, majority of people living around protected areas are indigenous groups, who are involved in tourism activities and others, particularly their traditional planting-nursing-harvesting agricrops, fishing, gathering and hunting such as in Batang Ai National Park. Meanwhile, local communities surrounding Lawachara National Park are involved in agricultural activities like agricrops, betel-leaf planting, and working in tea estates, as well as illegal logging and illicit tree-felling.

In NPs management, there are different actors namely local communities, policy-makers, municipalities, union councils and others surrounding the NPs. Policies on NPs

usually consider parks' vegetation cover as indicators of conservation effectiveness (Pattanayak *et al*., 2010). However, such view could be rather incomplete as it leaves other vital components such as the fauna and the general environmental conditions unevaluated.

The state-of-the-art ways to sustain nature conservation, better-enforced legislation and new innovative ideas with political commitments may be the possible avenues to effectively govern and restore protected areas. Based on the various national reports sent to CBD in 2016 (DoE, 2016), to date, there is no comprehensive model developed incorporating the diverse pertinent ecological, economic, technological, institutional, individual and societal processes for NPs management in this region particularly in Malaysia and Bangladesh.

This study attempts to make an assessment of the policy instruments towards conserving biodiversity at Lawachara National Park of Bangladesh and Batang Ai National Park in Sarawak, Malaysia. It focuses on the analysis and review of the present tools (policy formulation, growth of national parks, and legal aspects) towards enhancing environmental conservation activities within and around the areas.

MATERIALS AND METHODS

Two methods were used in obtaining information/data related to the study:

Secondary Data/Information

Information pertaining to biodiversity conservation and protection worldwide especially within Asian region were obtained from various sources such as the internet and library at Universiti Malaysia Sarawak (UNIMAS) on related journals, reports and books of the countries that are parties to the Convention on Biological Diversity (CBD), as well as International/National-NGOs. Information obtained is being used to Also referred was the World Database on Protected Areas (WDPA) published by UNEP (2013) which contains the most comprehensive and update dataset on the world's protected areas covering both terrestrial and marine protected areas with above 200,000 records currently understand updates and trends in biodiversity conservation.

Then two areas within Asian region were chosen i.e. Bangladesh and Malaysia as examples to determine how these two countries fair in relation to the CBD requirements by looking at their respective national biodiversity policy, ordinances, and national biodiversity-related reports, and National Biodiversity Strategy and Action Plans (NBSAPs) as well as Sarawak Annual Reports, Bangladesh Bureau of Statistics (BBS), Forest Departments (FD) of Bangladesh and Sarawak, Malaysia; before undertaking fieldwork data collection. Also based on the information from WDPA, the selected parameters of protected areas between Bangladesh and Malaysia were compared.

Fieldwork/Data Collection

The two national parks in south and south-east Asia where survey was undertaken are (i) Lawachara National Park (LNP) at Kamalaganj sub-district in Moulvibazar district of Sylhet division, Bangladesh, and (ii) Batang Ai National Park (BANP) at Lubok Antu district in Sri Aman division of Sarawak, Malaysia.

Study Area

The Lawachara National Park (LNP) is one of three national parks at the Sylhet region in northeastern part of Bangladesh (Figure 1). Declared as a National Park in 1996 under the legal status of the Wildlife Preservation Ordinance 1974 (now this Ordinance repealed. and developed new Act as the Wildlife Conservation and Security Act, 2012) (Table 1), it consists of highly diverse hilly evergreen forest and surrounded with human habitats. It is a critical home for several primate species including the only ape of the country, the Hoolock Gibbon (*Hylobates hoolock*). The Park is also a hotspot for biodiversity with several species of new and regional records for Bangladesh (Hossain, 2001).

The Batang Ai National Park (BANP) is located in Lubok Antu, about 250 kilometres east of administrative capital, Kuching of Sarawak (Figure 1). The Park was proclaimed in 1991 (Table 1) with artificial lake created by the Batang Ai hydroelectric reservoir. The Park is accessible by bus from Sri Aman town or a 4-hour drive from Kuching. Access within the Park is possible by boat, as water is the main method of transportation here. The Park, which is also the water catchment area for the Batang

Figure 1. Location of Lawachara National Park in Kamalganj sub-district, Sylhet, Bangladesh and Batang Ai National Park at Lubok Antu district in Sarawak, Malaysia.

Table 1. Some basic parameters of Lawachara National Park and Batang Ai National Park.

Name of Park	Coordinates	Area (ha)	Gazette Date	IUCN Category	Country
Lawachara National Park	24°32′12″N, 91°47′03″E	1250	1996	II	Bangladesh
Batang Ai National Park	1°8′ N, 111°53′E	24024	1991	II	Malaysia

Ai Dam, is dominated by beautiful lowland mixed dipterocarp forest and home to the Orangutan (*Pongo pygmaeus*), globally recognized as endangered, in addition to hornbills and gibbons. This Park is part of the region's largest transnational protected area for tropical rainforest conservation (SF, 2016).

Sampling

The study undertook a survey on only two villages (one from LNP and another from BANP) to determine the effectiveness of present biodiversity-related instruments on the ground by looking at data related to legal knowledge, biodiversity conservation policy and protected areas management perspectives of the stakeholders especially the locals (Table 2). Sampling methods used include observations, semi-structured interviews and questionnaires. Semi-structured interviews were used and selected based on the opinions related to the conceptual questions (Rufford, 2014). Secondary data were collected from

Table 2. Information on respondents in the studied areas of **LNP,** Bangladesh and **BANP,** Sarawak, Malaysia

Gender	LNP, Bangladesh Village: Lawachera Punji				BANP, Sarawak, Malaysia Village: Nanga Ukom			
	Khasia	Garo	Tipra	Total	Orang Ulu	Bidayuh	Iban	Total
Male	7	3	4	14	3	2	8	13
Female	3	2	1	6	1	1	5	7
Total	10	5	5	20	4	3	13	20

journals, books, Bangladesh Bureau of Statistics (BBS), Forest Departments (FD) of Bangladesh and Sarawak, Malaysia; and Government other relevant institutions, Universities, International/National-NGOs, Stakeholders, existing policies reviews and pertinent other sources.

Data/Information Analyses

All general information regarding the occurrence of biodiversity and national parks including legal systems in the protected area and their diversity, status and distribution were checked for accuracy from the different sources and sources of information were also verified. Information regarding the initiatives of the authority towards the conservation of biodiversity was collected through relevant secondary information and field survey. Then the information were included in the preparation of data master sheet and incorporated into convenient forms used in the result and discussion section. The data were compiled and analyzed using standard data analysis software like MS Office Suite 2013, and R programming Version 3.4.

RESULTS AND DISCUSSION

Compliance in Biodiversity Policy

Based on secondary information from different sources, both Malaysia and Bangladesh had sent five national reports on national parks to CBD within 2016. These are in line with COP 2010 that all State Parties to CBD are required to send five national reports to CBD by 2016.

Based on the World Database on Protected Areas (WDPA), in particular, the Convention on Biological Diversity (CBD)–Aichi Target 11, Malaysia with 19.10% for terrestrial protect areas meets this criteria but not on the marine protect areas as it has only 1.40% instead of 10% in Table 3 (WDPA, 2016).

Although the percentage of marine protected area in Bangladesh is higher by almost four times (Bangladesh 5.4% while Malaysia 1.4%).

This is in contrast with the global trend in the protected terrestrial areas which shows an increased from 8.9% in 1990 to 14.6% in 2012, while the marine protected areas during this time, have more than doubled in coverage from 4.6% to 9.7% (UNEP, 2013).

Biodiversity related Law and Policy for National Parks in Bangladesh and Malaysia

Biological diversity is the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (CBD, 2003). Biodiversity is defined as genetic and species diversity of all species or sub-species of flora and fauna living in aquatic, terrestrial and marine ecosystems or diversity of their ecosystems (WCS, 2012). It is used to describe the number, variety and variability of living organisms in a given assemblage (Pearce and Moran, 1994). Protected Areas (PAs) serve a vital role in providing *in-situ* conservation of biodiversity and the ecological processes that maintain it. A good network of protected areas forms perhaps the pinnacle of a nation's effort to protect biodiversity (Lingue, 2014), ensuring that the most valuable sites and representative populations of important species covers in a variety of ways (Vreugdenhil *et al.*, 2003). National Park is a comparatively large area of outstanding scenic and natural beauty with the primary object of providing education, research and recreational facilities to the public and are managed for conservation

Table 3. Selected parameters on protected areas in Bangladesh and Malaysia as mentioned in WDPA

Parameters	Malaysia	Bangladesh
Number of Protected Areas (declared and proposed)	739	51
Polygons ratio	29%	98%
Points ratio	71%	2%
Number of sources-International designations	3	2
Number of sources-National designations	23	1
Total Land Areas (sq. km)	331,700.6	140,160.2
Percentage of terrestrial coverage, (%)	19.10%	4.60%
Land Area Protected (sq. km)	63,474	6,456
Marine Area coverage (%)	1.40%	5.40%
Marine Area Protected (sq. km)	6,358	4,530
Total Marine Area (sq. km)	451,741.5	84,563.2
PAME (Protected Area Management Effectiveness)	72.00%	39.30%

of natural environment of plants and wild animals and outstanding charming scenery. All these are declared by notification officially gazette under Section 17 of this Act (WCS, 2012). Many national parks and wildlife sanctuaries have been declared primarily for their scenic, touristic and recreational value (McNeely, 1994). In Bangladesh and Malaysia, there are some laws and policies related on biodiversity conservation towards protected areas management, as shown in Table 4.

Legislations Related National Parks between Bangladesh and Malaysia

Policy is a continuum of formulation, implementation, evaluation and adjustment of measures, it is of paramount importance that the policy assistance process follow a strategic design and consider human factors (communication, participation, ownership, timing and capacity building) with national context of critical dimensions (Materne and Balie. 2008). Information on these legislations between Bangladesh and Malaysia are shown in Table 5, that Malaysia basically has three sources of legislation on biodiversity with The National Forestry Act 1984 applicable to Peninsular while Sarawak and Sabah each has their own (BFD, 2016; FDS, 2016; FRIM, 2016). Although Bangladesh has two, both are applicable to the whole country. It also shows that the fines for offences both in terms of money and period of imprisonment are comparatively much lower in Bangladesh than in Malaysia as a whole. Furthermore, Bangladesh do not has any indication at all on compensation for offence on biodiversity.

Regional and International Treaties

Bangladesh and Malaysia are signatory parties to some regional and international conventions which have bearing on national parks areas. These conventions are (1) Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The purpose of CITES is to protect certain endangered species from over-exploitation by means of a system of import and export control, (2) Convention Concerning the Protection of the World Cultural and Natural Heritage. The purpose is to establish an effective system of collective protection of the cultural and natural heritage of outstanding universe value, organized on a permanent basis and in accordance with modern scientific methods, (3) International Plant Protection Convention. The objective is to maintain and increase international cooperation in controlling pests and diseases of plants and plant products, and in preventing their introduction and spread across national boundaries, (4) Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention) to stem the progressive encroachment on and loss of wetlands now and in the future, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific and recreational value, (5) Convention on Biological Diversity (CBD) to conserve biological diversity, promote

Table 4. Law and Policies on the priorities of Biodiversity Conservation at protected areas

Sl. No.	Country/State		Law/Policy/Ordinance
i.	Bangladesh		Wildlife (Conservation and Security) Act, 2012
ii.			Forest Act, 1927 (amended 2000),
iii.			The Bangladesh Environment Conservation Act, 1995 (amended 2010)
iv.			National Forest Policy, 2016 (Draft)
v.			Environmental Policy, 1992
vi.			Plant Quarantine Act, 2011
vii.			Environmental Court Act, 2010
viii.			Ecologically Critical Area Rules 2016
ix.			Co-management Rules
x.			Forest Products Transit Rules 2011
xi.			Forestry Master Plan
i.	Malaysia	Peninsular	Wildlife Conservation Act, 2010
ii.			National Forestry Act 1984
iii.			National Forest Policy 1992
iv.			National Policy on Environment 2002
v.			National Policy on Biodiversity 1998
vi.			National Wetland Policy 2004
vii.			National Biotechnology Policy 2005
viii.			Environmental Quality 1974
ix.			Pesticide Act 1974
x.			Fisheries Act 1985
xi.			Biosafety Act, 2007
xii.			International Trade in Endangered Species Act, 2008
xiii.			Land Conservation Act 1960
xiv.			National Land Code 1965
xv.			National Park Act, 1984
xvi.			Central Forest Spine Master Plan
xvii.			Heart of Borneo Initiative
xviii.			Plant Quarantine Act
xix.		Sarawak	Wildlife Protection Ordinance 1998
xx.			Forest Ordinance, 2015
xxi.			Forest Rules 1962
xxii.			The Forest (Planted Forest) Rules 1997
xxiii.			The National Parks and Nature Reserves Ordinance 1998
xxiv.			National Park and Nature Reserve Regulations 1999
xxv.			Sarawak Timber Industry Corporation Development Ordinance 1995
xxvi.			Sarawak Forestry Corporation Ordinance1995
xxvii.			Natural Resource and Environmental Ordinance 1993
xxviii.			Wildlife Protection Ordinance 1998
xxix			Wildlife Protection Rules 1998
xxx.			Sarawak Biodiversity Centre Ordinance
xxxi.			Wildlife (Edible Birds' Nests) Rules 1998
xxxii.			Sarawak Biodiversity (Access, Collection and Research) Regulation 1998
xxxiii.		Sabah	Forest Enactment 1968
xxxiv.			Sabah Biodiversity Enactment 2000
xxxv.			Sabah Parks Enactment 1984

Table 5. Comparative analysis of different legislations between Bangladesh and Malaysia including Federal Governments regarding biodiversity conservation and National Parks Management.

Parameters	Malaysia				Bangladesh	
	Peninsular	Sarawak		Sabah		
Legislation	**National Forestry Act 1984**	**Forest Ordinance, 2015**	**Wildlife Protection Ordinance 1998**	**Forest Enactment 1968**	**Forest Act 1927**	**Wildlife Conservation and Security Act 2012**
Number of Part/Chapters	10	8	6	5	13	10
Number of Sections	121	114	56	61	86	54
Number of Schedules	6	4	2	1	4	4
Maximum Fine (RM**)	500,000	10,000,000	50,000	500,000	2,500	75,000
Minimum Fine (RM)	10,000	100	10,00	10,000	100	2,500
Maximum Imprisonment	20 years	10 years	5 years	20 years	7 years	12 years
Minimum Imprisonment	1 year	Less than 1 year	3 months	1 year	Not less than 1 month	1 year
Compensation	10 times the royalty, premium, seize and value of forest produce	10 times the value of forest produce	----	10 times the royalty, premium, seize and value of forest produce	----	-----

**RM 1= 20 BD Taka; and US $ 1=80 BD Taka=4 RM

the sustainable use of its components, and encourage equitable sharing of the benefits arising out of the utilization of genetic resources and International Treaty on Plant Genetic Resources for Food and Agriculture as shown in Table 6 (BRC, 2016; CITES, 2016; APAP, 2016).

The adoption of legislation and administrative authority for national park areas lies in national policy on resource conservation and development. The most pertinent portion of the National Forest Policy, 1994 of Bangladesh and Forest Ordinance 2015 of Sarawak has bearing on protected areas management. Table 7 is an example of biodiversity-related section of Forest Policy in Bangladesh which shows the targets by the government for reforestation and afforestation for biodiversity conservation (NFP, 1994).

Till to date Bangladesh has no self-adopted Biodiversity Conservation Policy, but Malaysia has already developed such a policy. Many Laws, Acts, Ordinances, Presidents Orders, Rules, Regulations, Policies and Administrative Orders relating to management and control of forests, environment, wildlife and protected areas are in force in Bangladesh and Malaysia. Some of which are special and some are general laws (Banik, 2003; Farooque & Hassan, 1996; Farooque, 1997; Rahman, 1997; Rahman, 2000). A sound and lasting protected area programme requires careful, realistic deliberation to ensure the existence of adequate legal strategies and institutional arrangements (MacKinnon *et al*., 1986). The legal status of land designated as a protected area is a critical preliminary consideration which may require different approaches in different countries. In Bangladesh, invariably all the protected area declared under the Bangladesh Wild Life Conservation and Security Act 2012 (WCS, 2012). All activities that may deteriorate the environment further are prohibited in these Ecologically Critical Areas (DoE, 2002) which mentions in the Section 5(2) of Bangladesh Environmental Conservation Act, 1995. For this purpose, we suggested nine guidelines of the WCS (2012) for both countries (Table 8) for betterment of biodiversity conservation.

Table 6. National and International Agreements and Treaties

Sl.	Agreement/Treaties	Bangladesh	Malaysia
i.	CBD (Convention on Biological Diversity)	State Party	State Party
ii.	Asia Protected Area Partnership (APAP)	Joined 2014	Non-member
iii.	UNESCO (Convention Concerning the Protection of the World Cultural and Natural Heritage)	Member	Member
iv.	South Asia Wildlife Enforcement Network (SAWEN)	Member	Non-member
v.	Ramsar Convention (Convention on Wetlands of International Importance specially as waterfowl Habitat)	Signatory Member	Signatory Member
vi.	UNCCD (United Nations Conventions to Combat Desertification)	Member	Member
vii.	CITES Convention (Convention on International Trade in Endangered Species)	Ratification 1981	Accession 1977
viii.	Mangrove for Future (MFF)	State member	Non-member
ix.	International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)	Signature Member-2002 And Ratified 2003	Accession Member 2003
x.	EAAFP (East Asian Australasian Flyway Partnership)	Joined 2010	Joined 2012
xii.	GTI (Global Tiger Initiative)	Member country	Member country
xiii.	International Plant Protection Convention (IPPC)	Registration on 13 September, 2016	Registration on 11 September, 2014
xiv.	EAAFP (East Asian Australasian Flyway Partnership)	Partner country	Partner country
xv.	APFNet (Asia Pacific Network for Sustainable Forest Management)	Member	Non-member
xvi.	GTF (Global Tiger Forum)	State member	State member

Table 7. Policy related characteristics outlined from National Forest Policy 1994

Sl. #	Policy related Characteristics
(i).	Attempts were made to bring about 20% of the country's land under the afforestation programmes of the government and private sector by year 2015 by accelerating the pace of the programme through the coordinated efforts of the government and NGOs and active participation of the people in order to achieve self-reliance in forest products and maintenance of ecological balance.
(ii).	The priority protection areas are the habitats, which encompass representative samples of flora and fauna in the core area of National Parks, Wildlife Sanctuaries and Game Reserves. Attempts will be made to increase the amount of this protected area by 10% of the reserved forestland by the year 2015
(iii).	Strengthening educational, training and research organizations will support the implementation on National Forest Policy. This will contribute to forestry sector development.
(iv).	Laws, rules and regulations relating to the forestry sector will be amended and if necessary, new laws and rules will be promulgated in consonance with goals and objectives of National Forestry Policy

Table 8. Suggested modification to Guidelines for the Wildlife Conservation and Security Act-2012

Sl #	Particulars	Suggested Guidelines
(i)	Definition of Biodiversity	Need clearly definition of biodiversity with undergrowth species protections and according to guidelines of CBD
(ii)	National Biodiversity Strategic Action Plan (NBSAP)	Need National Biodiversity Conservation Policy and relevant guidelines according to CBD
(iii)	Species Conservation	Need appropriate security with also undergrowth species management except alien and invasive species.
(iv)	Endangered Species Protection	Need proper perpetuation with modern technological arena and application of national ICT-Act
(v)	Silvicultural Operations	Need community species stratifications with restrictions on massive weeding, thinning, pruning and poaching/stampeding
(vi)	Illegal Killing and Illicit felling	Need removal network of political bias and inherent power of administration
(vii)	Responsible for enforcement of Legislation	Need departmental enforcement team with modern technological arena for state-of-the-art monitoring, set-up and legal action according to NBSAP
(viii)	Biodiversity Research Group (BRG)	Need mention properly the formation of BRG according to NBSAP
(ix)	Co-management Team and others	Need proper biodiversity conservation knowledge and scientific guidelines among co-management team members, policy bureaucrats and managers.

Effective policy factors and optimum growth of national parks improve the adaptive management and biodiversity conservation at national parks. Generally, these factors enhance a manageable amount of meaningful information by summarizing, focusing and condensing on biodiversity conservation at national park areas which are mentioned as policy relevant, scientifically sound, easily understood, practical, affordable and sensitive to relevant changes (CBD 2003) and (TEEB Foundations 2010). For this purposes, a subgroup of collective factors could be established at global level, perfected by more and varied factors at national, regional and local levels to measure the quality of ecosystems and biodiversity monitoring particularly at national park areas.

Biodiversity monitoring system should not focus on a few aspects of biodiversity but cover a wide range of natural attributes, including habitat extent and condition (Balmford et. al., 2005). Besides, growth of national parks with update policies enhances proportionately to augment biodiversity. The Ministry of Environment and Forests (MoEF) and its agencies are the central apex body of the Government of Bangladesh responsible for the policy, planning and administration of all forestry and environment-related issues and development programmes (CC, 2016). National policies stress the benefits that nature provides in terms of ecological balance, ecosystem services, economic growth, anti-poverty measures (such as social protection) and disaster protection (Government Policy, 2016). Forests, biodiversity and other land issues are currently receiving greater attention in various government policies and strategy documents including the target to achieve by 2021 tree cover of 2.84 million hectares designated for diversified tree species, species to sustain ecological balance, increasing forestry employment under expanded social protection and increasing accountability with transparency in public forest management. The target is to raise productive forest coverage to 15% from 13% by 2021 (Perspective Plan, 2012). Overall, the above mentioned policy factors and growth of national parks between these countries, biodiversity conservation augments day by day sustainably.

Growth and Distribution of National Parks

Data from the Bangladesh Forest Department and the Sarawak Forest Department on national parks (Table 9) shows that both numbers and coverage of national parks in Sarawak are higher than that in Bangladesh. It also reveals that Bangladesh has no separate policy for biodiversity. However, in 2016, the Bangladesh Cabinet took decision for the development of the Bangladesh Biodiversity Law 2015. Malaysia has a biodiversity policy but no separate law on biodiversity, meanwhile, Sarawak Government amended the Forest Ordinance 2015 which put emphasis on biodiversity conservation and protection (BFD, 2016; FDS, 2016).

National parks are the most extensive instrument of protected areas in national and global biodiversity conservation. They comprise the highest percentage (23%) of the total area covered worldwide (Chape *et al*., 2003; Muhumuza, and Kevin, 2013). About 65% of protected areas in the WDPA have an IUCN Management Category, and 88% have a governance type (Juffe-Bignoli et.al. 2014). According to National Reports of State Parties to Convention on Biological Diversity stated that the growth of protected areas increased in 2014 than that of the 1990 (Figure 2). From study, the percentage of protected areas in Bangladesh was 0.8% in 1990 and increased to 4.6% in 2014 whereas in Malaysia, it was 17.2% in 1990 to 18.4% in 2014 Bhutan with its national park area at 14.2% of the land area in

Table 9. Some parameters on national parks for Bangladesh and Sarawak, Malaysia.

Parameters	Bangladesh	Sarawak (Malaysia)
Total Number of National Parks	17 national parks	30 national parks including extensions
Total Areas of National Parks	45,745.33 hectare	62,3463.00 hectare
Total Administrative Divisions	8 divisions	13 divisions
Administrative Capital and Control mechanisms	Dhaka and Bangladesh Forest Department	Sarawak Forestry Department
Divisions covered by National Parks	7 divisions	10 divisions
Division(s) without National Park	1 division (Khulna)	3 divisions (Betong, Sarikei and Serian)
National Policy on Biodiversity	No separate policy till to date	Country's Biodiversity Policy developed
National Park Dataset	No dataset, but take initiative for development	Yes, connected with Clearing House Mechanism
State Party of CBD ratified	1994	1994 (through Malaysia)
Co-management system	Present	Absent

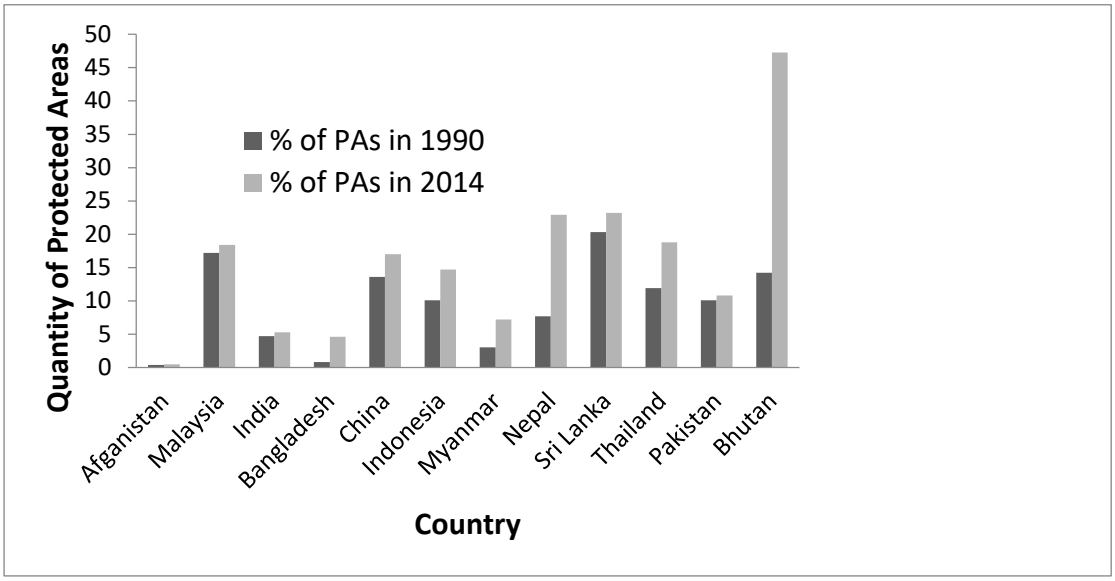

Figure 2. The growth of protected areas in percentage among different State Parties of Convention on Biological Diversity (CBD) in South-East Asia compared between the years 1990 and 2014.

1990 to 57.3% in 2014 is the country which had the highest increment in national park areas while Afghanistan the lowest with only 0.1% (0.4% in 1990 to 0.5% in 2014).

Protected Areas and Management Effectiveness

The studies investigated the relationship between Protected Areas management quality (using PAME), and conservation outcomes and impact based on Coad *et al*. (2015) and had recorded that PAME scores of 72% and 39.3% for Malaysia and Bangladesh respectively (Table 5). These are overall average scores where identified 36 separate indicators for protected areas assessment undertaken on 21,910km^2 on land areas in Malaysia and 1670 km^2 in Bangladesh.

From the study we can assume that the tracking progress is necessary for protected areas management effectively in these two countries towards Aichi Biodiversity Targets 2020 of the CBD. The Programme of Work on NPs of the Convention on Biological Diversity (CBD) states that NPs are essential components in national and global biodiversity conservation strategies (Bruner *et al*., 2001). The 10% target for NPs has become deeply entrenched in the thinking of many conservationists and incorporated into the national legislation of many countries for establishing NPs. It has often been generalized to apply to individual countries and to the entire planet, despite its major shortcomings (Soulé and Sanjayan, 1998) with CBD policy and technological arena showed in Table 10. The CBD, UNEP-WCMC and IUCN developed World Database on Protected Areas (WDPA) for all CBD Parties. This WDPA is an appropriate information dataset that presents status of protected areas of the CBD members. Bangladesh did not meet both criteria, and as such its Protected Area Management Effectiveness is way below 50%.

Biodiversity Conservation and National Parks Distribution

The Aichi Biodiversity Target (ABT) 11 is a global target for protected areas and it may be used by Governments as a reference to set targets at a national level. According to ABT 11 of Convention on Biological Diversity (CBD):

"By 2020, at least 17% of terrestrial and inland water areas and 10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measure, and integrated into the wider landscape and seascape".

Table 10. Comparison on the Protected Area Management Effectiveness (PAME) between Malaysia and Bangladesh

Study	Location	PAME type	Sample size (PAs)	Use of PAME data (predictor variable)	Counter factual method ology	PAME Score (%)	Outcome measure	Direction of relationship
Coad, *et al*. 2015	Malaysia	RAP*	26	A1*	Yes	72	A2**	A3***
	Bangladesh	RAP	1	A1	Yes	39.3	A2	A3

RAP*=measuring unit , A1*= Total score and individual scores, A2**= Change in forest cover, A3***= No correlation detected between management effectiveness and conservation outcomes

In Asia, decrease forest area and increase loss of biodiversity may be due different parameters which have been mentioned earlier. Figure 3, shows that the maximum forest area is 68.1% in Malaysia in the year 1990 and in 2015, it is 67.6%. In Bangladesh, it is 11.5% in 1990, and 11.0% in 2015. Only Bhutan and India have increased their respective forested area within the stipulated time (WB, 2016). Bangladesh and Malaysia are rich in species diversity of the flora and fauna. The unique geo-physical location, tropical climate, fertile land-peat-mass are the underlying factors to support such diversity communities to compare with worldwide, as shown in Table 11. Every group of species are less in Bangladesh than that of Malaysia, for example: vascular plants are 3,733 in Bangladesh where Malaysia contains 15000 species (MoEF, 2014). Besides, Malaysia is a mega-diversity country in Asia.

The Asian region has a long history of traditional conservation practices with significant repositories of biodiversity in unique governance systems. Widening governance types to more shared types and recognizing the role of local communities in protected areas governance is needed. Co-management systems is being introduced in Lawachara National Park for biodiversity conservation.

Protected areas in Malaysia and Bangladesh do not satisfactorily protect areas of importance for biodiversity and are not fully ecologically representative. In 2013, 16% of Important Bird and Biodiversity Areas (IBAs) and Alliance for Zero Extinction sites (AZEs)were completely covered by protected areas (Juffe *et al*., 2014).

Ecoregion coverage is low in both terrestrial and marine environments in Malaysia and Bangladesh. Only 35% of ecoregions and 15.4% of marine ecoregions in the Asian region are adequately protected (Juffe *et al*., 2014). Protected area system in two countries have primarily been established by national governments. However, Sarawak in Malaysia established Forest Ordinance 2015 and other relevant ordinance also.

Examination of Figure 5 permits the assumption of the loss of biodiversity and ecosystem collapse in South and South-east Asia, particularly in Bangladesh. Figure 4 illustrates that the global ranking for Malaysia is 7 but achieved a scoring 18.8, whereas ranking for Bangladesh 18 with a scoring of 7.1 (GRR,2016). This means that biodiversity in Malaysia better than Bangladesh.

Growth of National Parks in Bangladesh and Sarawak, Malaysia

National Parks (NPs) appear to be a suitable instrument of biodiversity conservation in State Parties of CBD. Several factors that affected biodiversity conservation at national parks in these countries were recognized. Bangladesh has 17 national parks designated and established in accordance withformal legal systems declared under the provisions of the Bangladesh Wild Life (Conservation and Security) Act 2012. These national parks are distributed in 13 administrative districts out of 64 districts among seven administrative divisions in Bangladesh. It means that there are no national parks in 51 districts and not a single national park in

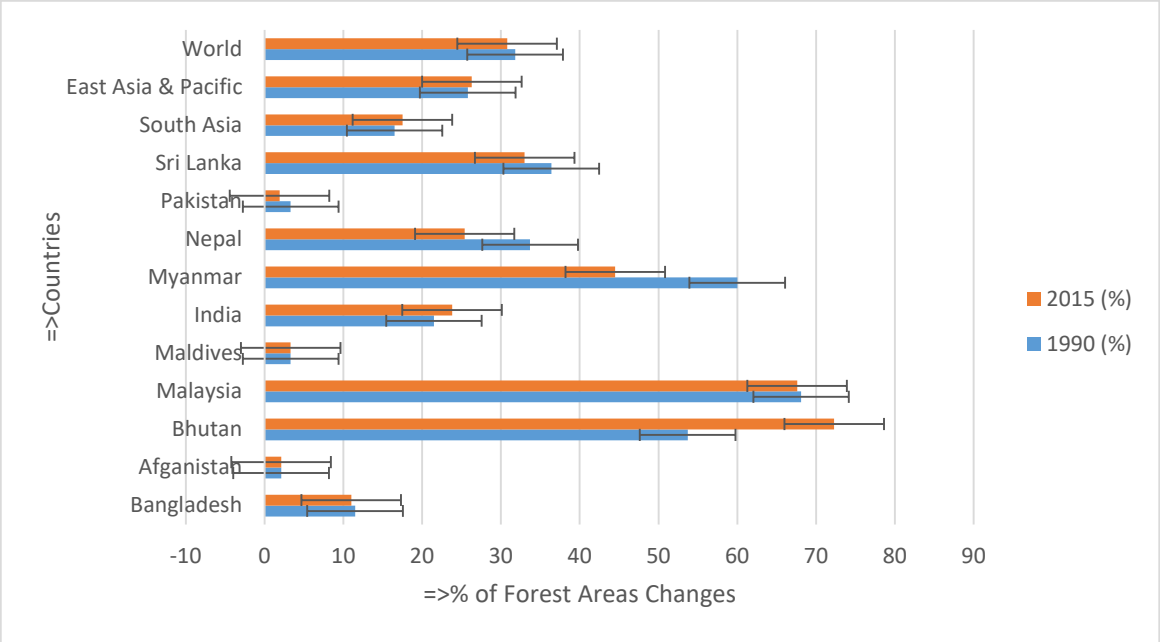

Figure 3. A comparative forest area changes from 1990 to 2015 in south and south-east Asia.

Table 11. Species diversity Richness in Bangladesh and Malaysia

Group	Estimated Species		
	Bangladesh	**Malaysia**	**World**
Mammals	128	306	5,416
Birds	650	742	9,026
Reptiles	154	567	10,499
Amphibians	49	242	7,591
Freshwater Fishes	267	449	32,210
Invertebrates	6,223	150,000	1,354,027
Vascular plants	3,733	15,000	250,000
Fungi	275	4,000	90,000
Mosses	248	522	-

Khulna division consisting of 10 administrative districts of Bangladesh. According to Article 18A of the Constitution of the Government of the People's Republic of Bangladesh, "the State shall endeavours to protect and improve the environment and to preserve and safeguard the natural resources, biodiversity, wetlands, forests and wild life for the present and future citizens"(TCPRB, 2012).

From the above Article, the number of NPs had grown from 1975 to 2014 which showed in Figure 5. The mentioned figure showed in the way of 5 years interval for declaration and gazette notification which is analyzed successively. In the year 1980-1984, there are three national parks declared but in 1990-1994, there is no a single notification for protected areas establishment which compares with that of

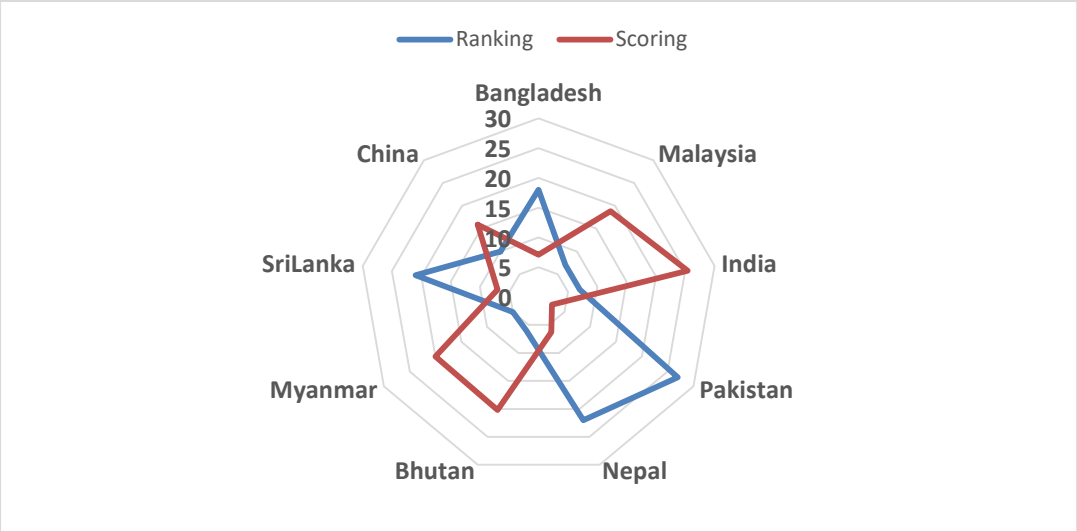

Figure 4. Ranking and scoring of loss of biodiversity and ecosystem collapse among different countries in south and south-east Asia.

Sarawak. On the other hand, seven national parks declared within 2010-2014. Because within this period, the relevant laws and policies are updated in Bangladesh and Malaysia from the facilitation of CBD, like Wildlife Conservation Acts.

Indigenous Community and Protected Areas

The success of management depends on the degree of support and respect awarded to the protected area by neighboring communities (MacKinnon, 1986). While there is a growing consensus that indigenous community participation in protected area management is needed and desirable (Ali and Habib, 1998), opinions regarding how to establish collaborative Management and what form it should take remain at odds (Poffenberger, 2000). It is difficult to involve the local and indigenous communities in protected area management without giving them any benefit or providing them with alternate source of income that are dependent on protected areas for their sustenance. There are many ways in which local people can benefit from protected areas, including utilization of some resources from certain protected areas and buffer zones, the preservation of traditional rights and cultural practices, and special preference for local residents in employment or social services. The research explored the perception of indigenous community on biodiversity conservation at Lawachara National Park and Batang Ai National Park. The Iban have been settled in and around the Batang Ai National Park. They have historically played a major role in orangutan conservation as they have a strict taboo against harming these animals; some group believe these animals are inhabited by the soul of departed ancestors. Local communities were involved in the planning process before the parks were established and agreed to limit their activities illegally. These perceptions are shown in Figure 6.

Challenges in National Park Management for Bangladesh and Malaysia

Bangladesh and Malaysia face a number of challenges for sustainable biodiversity policies. Federal policy can be effectively executed at the State Government and department levels in Malaysia, and in Bangladesh, it would to need sectorial/departmental policies integration. A major challenge between the two countries, is how to interconnect research findings in an easy to recognize matter to policy-makers and CBD so as to enable them to formulate policies that are favorable to national parks management for biodiversity conservation. However, a policy which included biodiversity conservation is a combination of policy instruments that has evolved to influence the quantity and quality of biodiversity conservation (Schroter-Schlaack, 2011a) and growth of national parks provision in public and private sectors. Bangladesh and Malaysia face a number of challenges for empirical dynamic policies. Mainly, it is alarming that matters such as federal policy can be effectively executed at the State Government

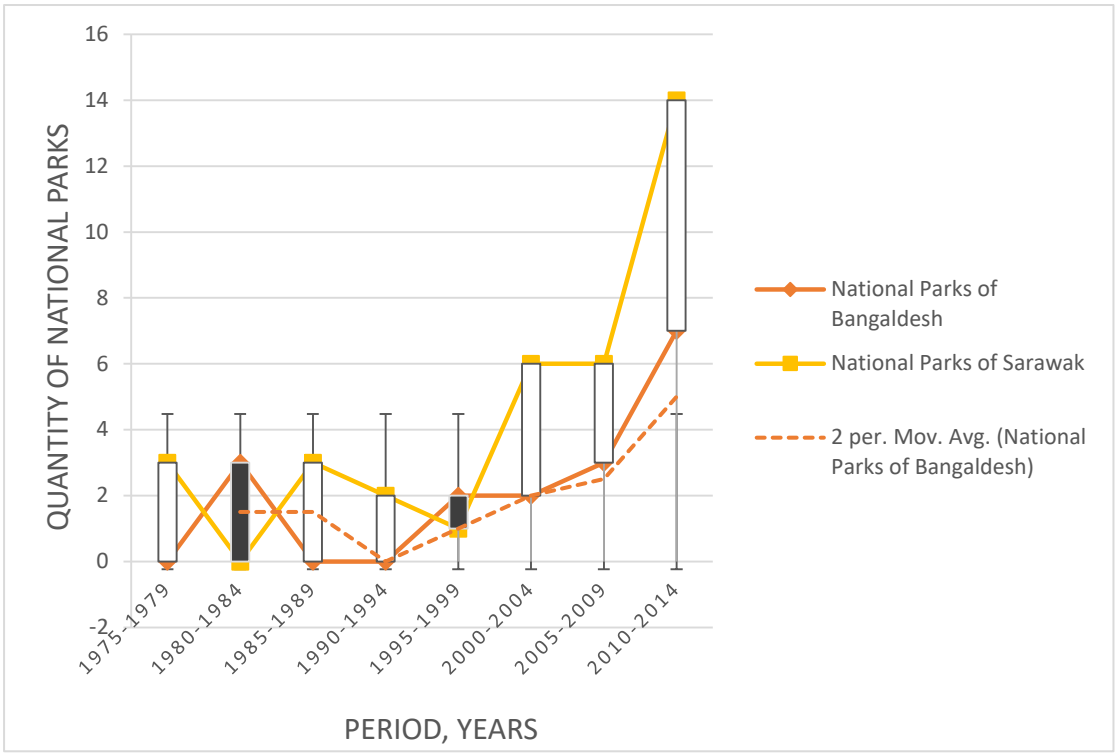

Figure 5. Growth of National Parks year wise in Bangladesh and Sarawak, Malaysia

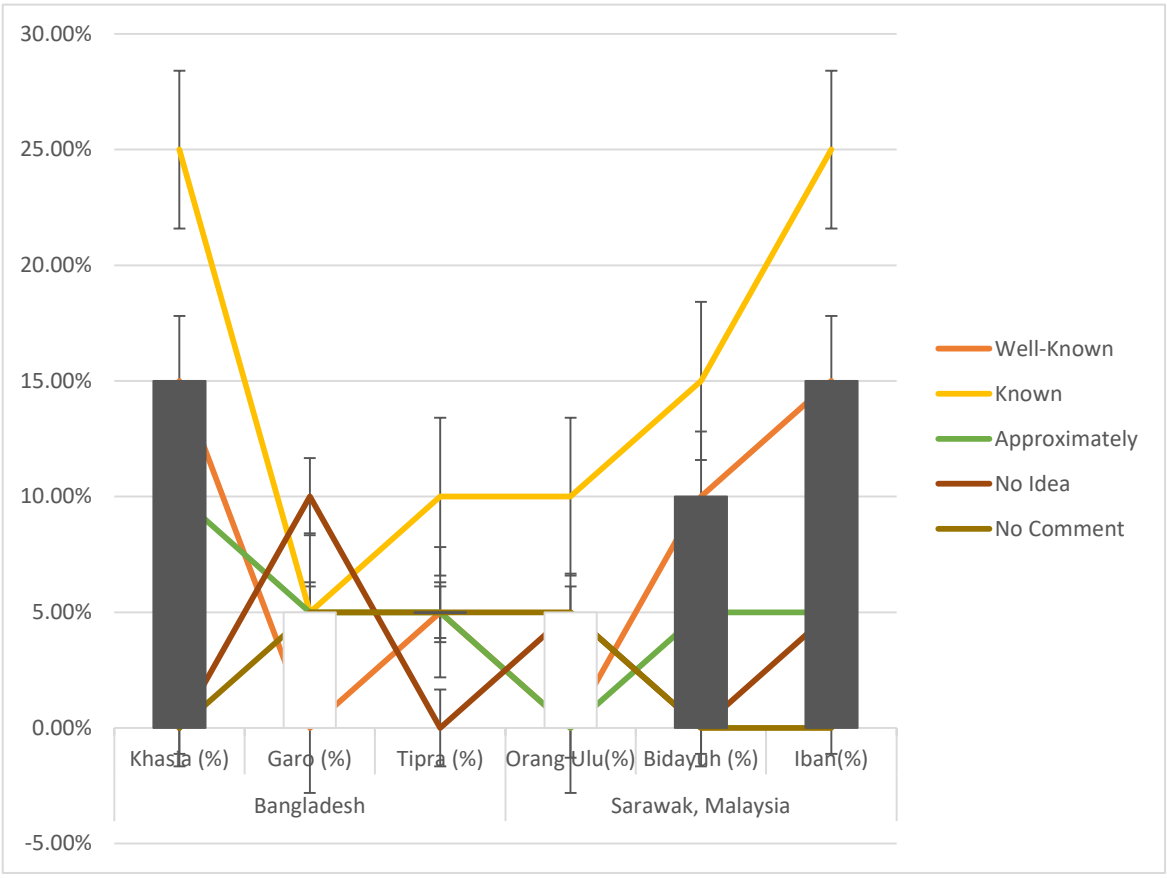

Figure 6. Perception on nature conservation of indigenous communities at Lawachara National Park in Bangladesh and Batang Ai National Park, Sarawak, Malaysia.

Table 12. Global Risks Report on technological arena between Bangladesh and Malaysia.

Parameters	Bangladesh		Malaysia	
	Ranking	Scoring	Ranking	Scoring
Cyber attacks	18	7.1	1	38.6
Natural Catastrophes	10	17.9	16	11.9
Data fraud/theft	24	3.6	4	21.8
Misuse of technologies	22	5.4	2	28.7
Critical Information Infrastructure breakdown	18	7.1	19	9.9

and department levels in Malaysia, and in Bangladesh, it would to need sectorial/departmental policies integration. On the other hand, Malaysia developed online biodiversity clearing house mechanism (BCHM) according to CBD's requirements; till date, the BCHM is in on-going process in Bangladesh. According to Global Risks Report (2016), Malaysia is more risks country on cyber-attacks, but Bangladesh is more vulnerable on natural catastrophes than that of Malaysia (Table 12), which impacts on national biodiversity. Additional major challenge between two countries, is how to interconnect research findings in an easy to recognize matter to policy-makers and CBD so as to enable them to formulate policies that are favorable to sustainable national parks management for biodiversity conservation. However, a policy mix in the context of biodiversity conservation is a combination of policy instruments that has evolved to influence the quantity and quality of biodiversity conservation (Schroter-Schlaack, 2011a) and growth of national parks provision in public and private sectors. So, several causes have been given to justify the cost effectiveness of policy integration for biodiversity conservation.

CONCLUSION

The study which explores the policy's factors with growth of national parks distribution in Bangladesh and Sarawak, Malaysia to enhance the biodiversity conservation shows that proper policy integration and effective management are absent till to date for enhancing -sustainable and healthy environment at Lawachara National Park and Batang Ai National Park. Ecosystem services which provide us free of charge resources, including drinking water, crop pollination, nutrient cycling, climate regulations– all rely on biodiversity within national parks. The total number of national parks has been increasing significantly over the last decade while biological diversity loss continues unabated. The research generally showed the need to train policy makers and relevant agencies on social-technical arena to improve policy towards sustainable nature conservation. Overall, the research suggests future research trajectories using a new collaborative approach to drive methodological agenda and recommends ways to further incorporate biodiversity management policy at protected areas with environmental sustainability for different levels of protection, utilization, participation, partnership and involvement of local, regional, national and global community. The National relevant updated policies on protected areas should be adopted to recognize that protected areas as the habitats of flora and fauna, which are all vital ingredients to the people's existence and important components of the country's ecological balance. The two States should endeavor to increase the valuation of dynamic forest policies instrument for conserving biodiversity at Protected Areas and ensure its sustainable management for the present and future generations.

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