A BRIEF REPORT ON PARTICIPATORY BIODIVERSITY MONITORING OF BUFFER ZONE COMMUNITY FORESTS IN THE BARDIA NATIONAL PARK

CARE NEPAL, SAGUN PROGRAM
DECEMBER 2008

REPORT PREPARATION
CARE Nepal, SAGUN Program

COVER PHOTO
Sathkhaluwa Lake of Bardia National Park offering Prosperous Biodiversity Significance to Human Being and Aquatic Life, Taken by: Man B B.K.

DESIGNED & PROCESSED BY
Blitz Media Pvt. Ltd., 4246450

PUBLISHED IN 2009 BY
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A Brief Report on Participatory Biodiversity Monitoring of Buffer Zone Community Forests in the Bardia National Park

Strengthened Actions for Governance in Utilization of Natural Resources (SAGUN) Program

Acknowledgements

I would like to express my sincere thanks to Mr. Man Bahadur Bishwokarma for conducting this study and preparing the report. Similarly, I express my deep appreciation and sincere thanks to Dr. Maksha Ram Maharjan Chief of Party , Mr. Sunit Adhikari, Team Leader and Mr. Popular Gentle, the former Team Leader of SAGUN Program, for their continued support and guidance during the study period and while preparing the report. My thanks are also extended to Mr. Mitra Prasad Upadhayaya, District Program Coordinator and to all members of the SAGUN Extension Program Team who encouraged Mr. Bishwokarma in this work. Moreover, without the support of the Buffer Zone Community Forest User Groups and Bardia National Park Officials, this study would not have been completed on time. I am very thankful to them. Last but not least, I express my sincere thanks to USAID for its financial support to the SAGUN Extension Program.

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Foreword

The ‘Strengthened Actions for Governance in the Utilization of Natural Resources’ (SAGUN) Program with financial support from USAID has been in operation since November 2002, fostering grassroots democracy through the democratic and sustainable management of natural resources. The Program has been implemented by CARE Nepal in collaboration with WWF Nepal, RIMS Nepal and FECOFUN. As a part of documentation and dissemination of key experiences gained from its more than six years outstanding performance, the SAGUN Program has produced this report on ‘Participatory Bio-diversity Monitoring’ that reflect the status of bio-diversity conservation in the Bardia National Park buffer zone community forests.

As key findings, this report reflects that Participatory Biodiversity Monitoring (PBM) process is very useful tool to build upon and strengthen biodiversity monitoring by communities living in buffer zone or community forest areas and their vicinity. Importantly, the PBM monitors trends in the quality of forest cover, incidents of encroachment, wildlife movements, population growth and wildlife-induced socio-economic casualties to build the capacity of local communities particularly to develop linkage between biodiversity conservation and their livelihoods improvement. In this regard, I believe this report will be a very useful reference to enhance community based bio-diversity conservation in Nepal. I request the readers for their feedbacks that will help us improve the next edition.

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ABBREVIATION

APU	Anti Poaching Unit
BCP	Bardia Conservation Program
BNP	Bardia National Park
BZ	Buffer Zone
BZCF	Buffer Zone Community Forest
BZ-CFUG	Buffer Zone Community Forest User Group
BZDP	Buffer Zone Development Program
BZMC	Buffer Zone Management Committee
BZUC	Buffer Zone Users Committee
DFRS	Department of Forest Research and Survey
DNPWC	Department of National Parks and Wildlife Conservation
GPS	Geographical Positioning System
Ha	Hectare
GoN	Government of Nepal
NRs	Nepali Rupees
NTFP	Non Timber Forest Products
PBM	Participatory Biodiversity Monitoring
PCP	Participatory Conservation Program
SAGUN	Strengthened Actions for Governance in Utilization of Natural Resources
TAL	Terai Arc Landscape Program
UC	Users' Committee
VDC	Village Development Committee

Table of Content

List of Tables

1. BACKGROUND

Nepal's biodiversity is a reflection of its unique geographic position and altitudinal and climatic variation. Its location in the central Himalaya places it in the transitional zone between the Palearctic and Indo-Malayan bio-graphical regions and the major floristic province of Asia, which makes its biodiversity so unique. The latest physiographic data shows that of the total land mass, 4.27 million hectares (29 %) is covered by forests whereas 1.56 million hectares (10.6%) is covered by shrubs. The forest and shrub areas together make up 39.6% of the total land area. However, between 1978/79 and 1990/91, the forest cover in the Terai and the Hills decreased at an annual rate of 1.3 percent and 2.3 percent, respectively (DFRS, 1999).

Nepal is indeed a treasure house of biological and cultural diversity. The country's extreme altitudinal gradient encompasses 10 bio-climatic zones ranging from tropical to naval within a horizontal span of less than 180 km. A total of 118 ecosystems, 75 forms of vegetation and 35 forest types have been identified (Stainton, 1972), among which 80 ecosystems are to be found in Nepal's protected area system (Maskey, 1996) (Table 1).

Although Nepal comprises only 0.09% of the world land area, its biodiversity is disproportionately rich in terms of flora, fauna, genetic species and ecosystems (MoFSC, 2002). These species are to be found both in the deciduous and conifers forests of the sub-tropical and temperate regions as well as the sub-alpine and alpine pastures and snow covered Himalayan peaks. Table 2 shows a comprehensive summary of the diversity of species in Nepal.

In this context, Nepal has adopted a unique approach to biodiversity conservation. It entails collaborating with local communities to manage protected areas while maintaining strict law enforcement by the Government. It is based on the notion that the successful management of protected areas requires both natural habitat as well as

***Table 1**: Ecosystems Identified in Nepal*

S.N	Physiographic Zone	Total No. of Ecosystem	Total in PAs
1	Terai	10	10
2	Siwalik hills	13	5
3	Mid hills	52	33
4	Highlands	38	30
5	Others	5	2
	Total	**118**	**80**

***Source**: Maskey, 1996*

biological diversity conservation. Over time, the protected parks and wildlife reserves have resulted in improved habitats and ecosystems for wildlife and increased wildlife species. At the same time incidents of livestock depredation and wildlife-induced crop damage have increased, thereby resulting in conflicts between the park management and the people living in and around the area. The future challenge for Nepal is, therefore, to manage its protected areas in such a way that such conflicts are avoided as far as possible.

Table 2: *An Overview of Nepal's Species Richness*

S.N.	Group of Organisms	No. of Species			Remarks
		Globally	Nepal	Percentage	
1	Bacteria	3000-4000	-	-	Not Recorded
2	Lichens	20000	465	2.3	
3	Fungi	69000	1822	2.4	
4	Algae	26000	687	2.6	
5	Bryophytes	16600	853	5.1	
6	Pteridophytes	11300	380	3.4	
7	Gymnosperm	529	28	5.1	
8	Angiosperm	220000	5856	2.7	
9	Platy helminthes	12200	168	1.4	
10	Spiders	73000	-144	0.2	
11	Butterflies/Moths	112000	2893	2.6	
12	Other insects	751000	5052	0.7	
13	Fishes	18950	182	1.0	
14	Amphibian	4184	43	1.0	
15	Reptiles	63000	100	1.6	
16	Birds	9040	582	9.3	
17	Mammals	4000	181	4.5	

Source: *Adapted from MoFSC, 2002, pp 26*

2. BARDIA NATIONAL PARK

Bardia National Park (BNP) covers an area of 968 sq. km. which is 47% of the total area of Bardia district. It is located in the district's southern corner and is the largest lowland protected area in Nepal. Originally established as a Royal Hunting Reserve in 1967, a small area was officially recognized and recorded as the Royal Karnali Wildlife Reserve in the gazette of 1976. It was given the status of a National Park in 1988 (DNPWC, 2006).

The BNP is well-known for its biodiversity. It is rich in species, ecosystems and habitat diversity, and represents both tropical and sub-tropical ecosystems that are relatively undisturbed. It contains diverse ecosystems ranging from old-field to pristine reverine forests. The park area consists of approximately 70% of Sal forest (*Shorea robusta*) and the remainder is a combination of reverine grassland, Khair-Sissoo forest, savanna, and other hardwood species. *Shorea robusta*, *Buchanania latifolia*, *Dalbergia sissoo*, *Acacia catechu*, *Ficus glomerata*, *Mallotus philippinensis* and *Eugenea jambolana* are the most common forest species in the area. Grasslands and savannas are mainly of the *Imperata Spp*. type, often dominated by *Simal* trees (*Bombax ceiba*).

The BNP is also home to several endangered wildlife species including swamp deer, wild elephants, rhinoceros, tigers, common leopards, sloth bears, gangetic dolphins and gharial crocodiles, in addition to a large population of common ungulates including deer, blue bulls and wild boar. A large number of avian, herpeto fauna and invertebrates further enrich the biological diversity of the park. Endangered birds found in the park include the bengal florican, the lesser florican and the sarus crane. In all, an estimated 50 types of mammals, 400 species of birds and several species of snakes, lizards and fish are to be found in the BNP's forest area, grasslands and rivers (Table 3). Moreover, several migratory birds visit the park too (DNPWC, 2006).

Table: 3 *Recorded Faunal Diversity of Bardia National Park*

S.N	Group of Organism	No. of Species
1	Mammals	53
2	Reptiles	25
3	Birds	400
4	Fishes	121

Source: *Basnet, 1995*

3. THE BUFFER ZONE IN BARDIA NATIONAL PARK

The buffer zone area of the BNP was established in 1997 and comprises of an area of 327 sq. km. This includes 147 clusters of 94 wards and 17 Village Development Committees (VDCs). The total population of the area is approximately 1 million with 11,504 households. The buffer zone consists of both forest area (41%) and private agricultural land. It is managed by park officials together with the local communities (DNPWC, 2006). Fifteen user committees (UCs) and one Buffer Zone Management Committee have been formed for this purpose.

Additionally, several integrated conservation and development activities have been initiated to mitigate parks/people conflicts. Undertaken in collaboration with the USAID funded Strengthened Actions for Governance in Utilization of Natural Resources (SAGUN) Program, Terai Arc Landscape Program (TAL), Participatory Conservation Program (PCP) and Bardia Conservation Program (BCP), these efforts have aimed to motivate communities to conserve the biodiversity of the park and buffer zone area.

4. PARTICIPATORY BIODIVERSITY MONITORING AND ITS RATIONALE

In order to effectively manage protected areas it is necessary to have some basic information on their floral and faunal status. In relation to the BNP, such attempts have been made in the past. For example, Dr. Khadga Basnet carried out a biodiversity inventory of the area in 1995. However, there has been little in-depth monitoring of biodiversity within the buffer zone area so far. With limited access to the necessary resources, both human and financial, it is a challenge for park officials to accomplish this task on their own. While forest quality cover and incidents of encroachment, wildlife sightings and wildlife-induced casualties are currently being monitored to a limited extent, more extensive biodiversity monitoring is not taking place. The scope for mobilizing local communities and benefiting from their indigenous knowledge has also not been explored so far.

In this context, the Participatory Biodiversity Monitoring (PBM) process has been designed to build upon and strengthen biodiversity monitoring by communities living in buffer zone/CF areas and their vicinity. Importantly, the PBM monitors trends in the quality of forest cover, incidents of encroachment, wildlife movements, population growth and wildlife-induced socio-economic casualties. It also provides a database of the flora and fauna within the Buffer Zone Community Forest (BZCF). The result is a database that can be used to address biodiversity-related issues and problems as they arise. This can assist in the management of vegetation cover, for instance, and to control the consumption of firewood, timber and NTFPs. It can also help mitigate problems of agricultural crop damage, livestock depredation and human injuries caused by wildlife. Seen in this way, PBM is a pre-requisite for more effective flora and fauna conversation in buffer zone areas.

The PBM process also builds the capacity of local communities. Not only does it train them in natural resource management, particularly in biodiversity conservation activities, it additionally helps them understand wildlife behavior, movements and population trends. Finally, since the process encourages information sharing amongst buffer zone community forest users and between them and parks officials, it helps generate trust and cooperation in the process of natural resource management.

In spite of its multiple advantages, the PBM process has yet to be formally integrated in buffer zone management in Nepal. From its side, CARE Nepal has been promoting the practice in its work. In the context of the Bardia Buffer Zone Development Project (BZDP) funded by the EU and implemented by CARE Nepal until 30 June 2004, PBM was the main biodiversity conservation activity carried out in the buffer zone area of the BNP. The practice was continued in the SAGUN Program from November 2002 until December 2006.

5. OBJECTIVES OF THE PBM

The overall objective of the PBM is to empower local communities to monitor biodiversity in the buffer zones of CF areas and their vicinity, by building up their understanding and sense of ownership of the habitat therein. Its specific objectives are to: -

- Record the number, status and use value of plant species found in the BZCF and on farmlands;
- Record the number and status of animals and wildlife species found in the BZCF and on farmlands;
- Record the number and status of bird species in BZCF;
- Record the frequency of wildlife-related human casualty, livestock loss and crop depredation incidents in the UCs' area, with valuation if possible;
- Record the frequency of crop raiding incidents (by type of animal and season) and possible means of their mitigation; and
- Evaluate changes in biodiversity in terms of forest cover density and numbers and types of species present.

6. PBM GUIDELINES

With the aim of involving local communities in biodiversity monitoring, BNP officials and BZDP/CARE Nepal prepared a set of "Participatory Biodiversity Monitoring Guidelines" in Nepali. The major objectives of the guidelines were to:

- Develop a simple and participatory methodology for biodiversity_monitoring;
- Identify the present condition of biodiversity, wetlands and agricultural land in the BZCFs; and
- Propose management intervention areas and policy guidelines for biodiversity conservation in the future.

7. PBM IN THE BUFFER ZONE OF BARDIA NATIONAL PARK

The PBM process was implemented in the buffer zone area of the BNP over a 5 year period (2002 – 2006). It was conducted jointly by BNP officials and SAGUN Program/CARE Nepal. To start with, a PBM team was formed comprising of eight trained park officials (rangers and game scouts) and nine local people (BZCFUG members). The team was oriented on the rationale, objectives and methodology of the PBM. Local people were also selected as participatory biodiversity monitors to regularly monitor the activities in the field (see Annex 1).

Due to the conflict situation prevalent at the time, the role of the park officials was eventually reduced to supporting and providing feedback to the local monitors. The main task of the trained local people (PBM Monitors) was to collect the monthly data in the prescribed format as indicated in the PBM guidelines. Some of the equipment required in the process included cameras, compasses, measuring tapes, stop-watches, binoculars, diameter tapes and reference books (e.g. *Mammals of Nepal* and *Birds of Nepal*).

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8. METHODOLOGY

8.1 The Location of PBM Sites

PBM monitoring sites were located in the buffer zone on the eastern side of the BNP. Out of 24 BZCFs four were selected for the PBM. These were the Rammapur, Satkhaluwa, Baghkhor and Ranjha Bichtole BZCFs. All four BZCFs had been formally handed over to the local communities. While the Rammapur BZCF was situated south of the Mahendra Highway, the other three lay to its north.

The BZFCs were selected on the basis of the forest area condition, the prevalent forest management practices and the relative willingness of the local communities to participate in PBM activities. The Satkhaluwa BZCF was additionally selected to allow for wetland/waterhole monitoring in the Satkhaluwa Tal (Lake). Detailed information on the selected sites is depicted in Table 4.

8.2 Information Collection

The methods and tools were employed to collect the information required by the PBM process.

8.2.1 Transect Line Monitoring

Transect line monitoring was used to observe wildlife movement three times a day, once each in the morning, afternoon and evening and altogether, three times a month. In this way, information was recorded on the presence of wild animals and in particular their footprints, tracks and droppings. In addition, floral monitoring was carried out once a year. Both permanent and temporary transect lines were established during the transect line monitoring process.

Permanent transect lines were established according to the size and type of BZCF. With the help of a Silva compass, GPS and a measuring tape, one or two permanent transect lines were constructed with a pre-fixed bearing and distance. Wild animals were

Table 4: *Status of the BZCFUGs Selected for the PBM*

BZCFUG	Area of BZCF (Ha.)	Area of Cultivated Land (Ha.)	Household		Population	
			Total	Dalit	Male	Female
Rammapur	503.94	235	512	32	1762	1669
Satkhaluwa	609.27	180	511	22	2065	1940
Baghkhor	731.88	62	463	90	1529	1469
Ranjha Bichtole	320.78	28.20	79	12	253	223
Total	**2165.87**	**505.20**	**1565**	**156**	**2609**	5301

Source: *Office records of BNP /BZDP* monitored 3 times a month at a fixed time on a fixed day and by the same person, while vegetation was monitored once a year. In this way, it was possible to observe and record the relative presence and absence of wild animals and the occurrence of any new species. More information about the permanent transact line methodology is provided in Table 5.

Temporary transect lines were established for vegetation monitoring. The number of transect lines constructed and the distance between two lines and points was determined according to the size and type of forest. This procedure was used to record changes in floral composition as well as signs of wildlife presence in the area between the lines. It was undertaken once a year at a fixed time on a fixed date.

8.2.2 Wetland /Water Hole Monitoring

Information on avifauna, reptiles, mammals and other small aquatic plants was collected through wetland/water hole monitoring. PBM Monitors were trained in special observation and listening techniques and then positioned on watch-towers (*Machan*) close to the wetland/water hole. Their prime responsibility was to record the occurrence and movement of residential and migratory birds around the water hole, as well as the occurrence of other aquatic flora and fauna species. Since changes in the depth and quality of the water affects the living conditions of aquatic flora and fauna, these too were monitored. Wildlife carcasses were also examined and records kept in each case of the probable cause of death. Overall, wetland/waterhole monitoring took place once a month by the same person.

8.2.3 Focus Group Discussions

Elderly people and communities indigenous to a local area tend to have rich knowledge about farming and agricultural practices as well as forestry activities. Focused Group Discussions (FGDs) were conducted with groups of such people to gain information on issues such as wild animal occurrences, incidents of crop damage and recent trends in the availability of natural resources (including incidents of timber smuggling, poaching and other illegal activities). FGDs were held once in three months. The people's recommendations of how best to address the over-consumption of forest products, by

Table 5: *Details of the Permanent Transect Lines and Sample Plots in the Selected BZCFs*

BZCF	Length of Transects (m)	No. of Plots	Monitoring Frequency	
			Date per Month	Time
Rammapur	5365	54	7, 17, 27	6:30 - 9:30 AM
Satkhaluwa	2957	29	6, 14, 20	6:30 - 8:00 AM
Baghkhor	2340	23	5, 15, 25	6:00 - 9:00 AM
Ranjha Bichtole (A)	2150	21	6, 14, 28	6:30 - 9:00 AM
Ranjha Bichtole (B)	3500	35	7, 20, 29	6:30 - 9:00 AM

Source: *Field Survey, 2002-2006*

adopting improved cooking stoves, for instance, or by switching to bio-gas, were also recorded.

8.2.4 Photo-Point Monitoring

Photo- point monitoring is a means of recording changes in forest cover and quality. Selected areas of forest vegetation were photographed from two angles (north and south, or east and west) on the same day. Two GPS points were fixed in both directions so that subsequent photos could be shot from the same location. The selected forest area was photographed from the same point and in the same direction once in 6 months. The photographs were then compared to examine changes in the biodiversity status of the selected forest area over time. Moreover, the conditions in the monitored area were also periodically compared with the conditions in the rest of the forest, in order to identify relevant management prescriptions.

8.2.5 Field Diary Reports

While spending time in the BZ/CF, PBM Monitors were asked to record diverse biodiversity-related incidents in a daily field diary. They were provided with some orientation beforehand to ensure that only authentic data was recorded. Once a month, the information collected in this way was compiled and used to investigate incidents of poaching and other illegal activities in the area, wildlife movements and incidents of human interference in forest areas.

9. FINDINGS

Wildlife monitoring was carried out along 16,812 meter transects in the four BZCFs. The idea was to record the movement (presence or absence) and occurrence of wild animals. In the course of the monitoring, 12 wild animals of different species were found to be present in the area. These were: the wild boar, the barking deer, the common leopard, the blue bull, the spotted deer, the tiger, the fox, the monkey, the hyena, the four-horned antelope, the bear and the samber. Among them, the tiger, the hyena and the four horned antelope are recognized as endangered species. Overall, there appeared to be a greater presence of prey-base species in relation to predators. Also, seventy-one different bird species were recorded in the Satkhaluwa wetlands, while 41 species were recorded in the Duddha wetlands. Some mammal tracks were observed near the wetlands. This means that in all, the presence of 422 bird species was recorded in the buffer zone area of the BNP.

Changes in forest composition, forest density and crown cover were examined by establishing 167 permanent observation plots. These varied by forest layer (storey), ecological niche and wildlife habitat. Regular monitoring of the plots revealed changes in vegetation cover and forest quality. Some of these changes were also recorded in the vegetation photos taken during the photo-point monitoring. A total of 250 types of flora were recorded in the BZCFs including: *Siru, kuro ghans, banso, dabsu, kush, Chari amilo, dubo* and *narkat*. The changes in floral diversity that occurred between 2002 and 2006 are shown in Table 6. Unfortunately, records for 2004 and 2005 could not be collected due to the poor security situation at the time.

In terms of livestock, local communities were found to rear local breeds of cows, buffaloes, sheep, goats, pigs, hens, ducks and horses, mainly for economic purposes. During the study period, it was found that 66 persons had been afflicted with livestock depredation and had incurred losses worth NRs. 155,580. It was also estimated that communities had incurred losses of about NRs. 131,509 a year due to incidents of wildlife-induced crop damage.

Overall, participatory biodiversity monitoring has recorded an increase in floral and

Table 6: *Changes in Floral Diversity in the BZCFs*

S.N	Name of BZ-CF	Species in 2002 (Baseline)	Species in 2003	Species in 2006
1	Rammapur	185	187	191
2	Khaireni	155	174	174
3	Amohiya	134	148	149
4	Ranjha Bichtole	134	158	162

Source: *Field Survey, 2002-2006*

faunal diversity in the four BZCFs examined. The reasons for this are summarized below.

a) Both the Buffer Zone Development Project and the SAGUN Program have worked to promote biodiversity conservation in CFs and BZCFs. As a result, local communities have become more interested in and concerned about biodiversity conservation. Their sense of ownership of their forests has also increased.

b) Local communities are now more actively engaged in biodiversity conservation activities. In the BZDP and SAGUN Program areas, CF and BZCF users are themselves curbing incidents of forest encroachment, forest fires, over-grazing by domestic animals, wildlife poaching and the illegal felling of trees and other non-timber forest species.

c) An Anti-Poaching Unit (APU) has been set up on the eastern side of the BNP buffer zone (a SAGUN Program working area). This has started to control wildlife poaching and illegal tree felling activities.

d) The buffer zone UCs and management committees as well as the BZ-CFUGs in the area have incorporated the PBM process in their 5 year and annual plans. This has occurred since government agencies operating in the buffer zone and community forest areas have viewed the practice very positively.

10. MAJOR ISSUES AND CHALLENGES

The major issues and challenges faced while conducting the PBM process are listed below.

a) A large proportion of users in the BZCFUGs still do not fully understand the concept of biodiversity conservation and are unaware of its importance. At the same time, only a few BZ management committees and BZCFUGs have been able to grasp and practiced PBM so far. There is also a shortage of skilled personnel in government agencies and civil society that are able to facilitate the PBM process.

b) The conflict situation in the buffer zone and in the surrounding area has hampered biodiversity monitoring activities.

c) The human-wildlife conflict continues to challenge biodiversity conservation activities in buffer zone areas.

d) For the PBM process to be effective, the monitoring and information collection process must be regular with constant follow-up. Unless buffer zone management authorities or national park officials become involved in this follow-up activity, therefore, it will be difficult to truly institutionalize the PBM practice.

11. CONCLUSIONS

Biodiversity conservation is not possible without the participation of local communities. The PBM process, which generates field level information on the status of biodiversity, is an effective conservation tool since it involves local communities in biodiversity monitoring activities, particularly in community forest and buffer zone areas. It encourages the participation of women, *Dalits* and poor people in biodiversity conservation so it is real and long-lasting. The SAGUN Program of CARE Nepal has recognized the importance of local community participation in biodiversity conservation. As a result, it has been implementing PBM as one of its major biodiversity conservation activities in its community forest and buffer zone working areas.

REFERENCES

Basnet, K., 1995: Biodiversity Inventory: Bardia National Park, Bardia, Nepal.

DFRS, 1999: Forest Resources of Nepal (1987-1998), Publication No.74, Ministry of Forests and Soil Conservation, Department of Forest Research and Survey (DFRS), Kathmandu, Nepal.

DNPWC, 2006: Protected Areas of Nepal, Department of National Parks and Wildlife Conservation, Kathmandu, Nepal.
(Also available from: http://www.dnpwc.gov.np/protected-areas.asp)

Maskey, T. M. 1996: Status of Biodiversity in Nepal. A Review Paper, in Shengji, P. (ed) Banking on Biodiversity: Report of the Regional Consultation on Biodiversity Assessment in the Hindu Hush-Himalaya, International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal, pp. 327–364.

MoFSC, 2002: Nepal Biodiversity Strategy, Ministry of Forests and Soil Conservation, Kathmandu, Nepal.

Stainton, J. D. A. 197: Forests of Nepal. John Murray, London.

Annexes

Annex 1: *Name List of the Participatory Biodiversity Monitors*

S.N	Name	Name of BZCF	Address
1	Mr. Jagat Tiwari	Rammapur	Magaragadi - 8 ,Bardia
2	Mr. Yan Bdr Chand	Rammapur	Magaragadi - 8, Bardia
3	Mr. Prem Bdr. Tharu	Satkhaluwa	Dhadwar - 6, Bardia
4	Mr. Gyan Pd. Sapkota	Satkhaluwa	Dhadwar - 6, Bardia
5	Mr. Tek Bdr. Chand	Baghkhor	Belwa - 2, Bardia
6	Mr. Sant Bdr. Dangi	Baghkhor	Belwa - 2, Bardia
7	Mr. Ghamand Chanda	RajhaBichtole	Belwa - 7, Bardia
8	Mr. Chitra Bdr. Hamal	RajhaBichtole	Belwa - 7, Bardia
9	Mr. Dip Bdr. Shahi	RajhaBichtole	Belwa - 7, Bardia