Local Knowledge of Indicator Birds: Implications for Community-Based Ecological Monitoring in Teknaf Game Reserve

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Abstract

The Bangladesh Forest Department (FD)'s Nishorgo Support Project (NSP) has initiated an ecological monitoring program that observes the populations of eight indicator bird species to assess forest health. The selection of indicator birds was done based on scientific knowledge and did not consider the interest and knowledge of forest dwellers. Recognizing the need for involving forest dwellers in sustainable community-based ecological monitoring, this study explores local knowledge of indicator birds used for the ecological monitoring program at the Teknaf Game Reserve (TGR). Most local people could identify the Hill Myna, Oriental Pied Hornbill, Red Jungle Fowl, Greater Racket-tailed Drongo and Red-headed Trogon and knew their ecological value. Only members of the Chakma community living within the game reserve, however, could identify all eight birds, including the White-crested Laughing Thrush, Puff-throated (Spotted) Babbler and White-rumped Shama. This study's findings suggest that the usefulness of these birds as indicator species depends on the community that will be monitoring them. Among people living near or outside the game reserve, the more easily identifiable species are more useful. Among people living within the game reserve, all eight species are easily recognized.

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Introduction

Community-based monitoring has become popular among natural resource managers in many countries around the world. However, the incorporation of local ecological knowledge (LEK) into community-based monitoring has been difficult due to the ambiguity of the term and uncertainty amongst natural resource managers of how to integrate LEK into monitoring practices. The application of LEK in impact assessments and conservation monitoring has been more widely accepted within the scientific research community (Huntington 2000). Gilchrist (2005), referring to Johannes (1989), states that LEK is synonymous with "oral tradition", "indigenous knowledge", "local or community knowledge", or "traditional ecological knowledge". He also summarizes the LEK definition of others (e.g., Duerden and Kuhn 1998, Pierotti and Wildcat 2000) as "a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission". Huntington (2000) states that traditional ecological knowledge is the knowledge and insight acquired through extensive observation of an area or species, which is not only restricted to the indigenous people.

There is controversy about who were the first settlers in the region surrounding the Teknaf Game Reserve (TGR). Some people believe that the Chakma are the oldest ethnic group to have settled this area, arriving nearly 500 years ago (Bari and Dutta 2004). Others believe that Bengali Hindus, Buddhists and Muslim have been living in this region for the last 1,000 years (Bari and Dutta 2004). Regardless of the history of settlement, the fact remains that the livelihood of inhabitants living in and near TGR is deeply rooted in the reserve's natural resources. The LEK of these people has evolved with their livelihood, culture and interests and is a great source of information that needs to be recognized and properly utilized for the management of natural resources in this area.

Bangladesh's Forest Department (FD) currently seeks to involve local people in the management of TGR through the Nishorgo Support Project (NSP), a co-management project that aims to conserve the valuable biodiversity of the reserve. This project has started an ecological monitoring program similar to other conservation management projects worldwide. A group of scientists working for NSP determined eight indicator birds and a methodology for detecting changes in biodiversity due to management interventions. The scientists selected the indicator

birds on the basis of their scientific knowledge of the protected area and did not take into consideration local knowledge of the reserve's ecosystem. Failure to consider and incorporate local ecological knowledge will reduce the effectiveness of community-based ecological monitoring. This study aims to explore the knowledge of local people of the eight indicator birds used by NSP for ecological monitoring of TGR. It is hypothesized that differences exist among longtime local residents in terms of what they know about the ecology of the indicator birds. The ability of local people to identify these species may vary with respect to their age, gender, religion, profession, and ethnicity. In addition, the age of the village and its proximity to the forest may influence local knowledge about the ecology of the indicator birds. The main objectives of this study are: (a) to understand and document local knowledge and capacity of the forest dwellers to identify the indicator birds, (b) to understand local knowledge of the ecology of the indicator birds, and (c) to assess the scope for introducing community-based ecological monitoring into the co-management process. I believe that local perspectives on the eight NSP indicator birds will provide critical information for community-based ecological monitoring in the co-management process of the protected areas of Bangladesh.

Background

Teknaf Game Reserve is the only game reserve in Bangladesh, and is located at the extreme southeastern part of the country on the Teknaf Peninsula of Cox's Bazaar District, almost 600 km from Dhaka. The reserve is bounded by the Naf River to the east, the Bay of Bengal to the southwest, and the Thainkhali Reserve Forest of Ukhya Upazilla District to the north. TGR covers an area of 11,615 hectares and lies between $20^{\circ}52' - 21^{\circ}09'$ N latitude and $92^{\circ}08' - 92^{\circ}18'$ E longitude (Mollah *et al.* 2004, Rosario 1997). TGR was previously a reserve forest under the Forest Act 1927. Because of its importance for wildlife conservation, the area was declared a game reserve in 1983 under the Wildlife Act of 1973, which provided it with a different legal, managerial and institution status.

A total of 112 villages are located inside the reserve – some near the periphery and some deep within the forest. These villages range in age from approximately 50 to 150 years. The oldest villages were settled by members of the Rakhain and Chakma ethnic communities. Bengali Muslims, Buddhist Borua and some Hindu people

settled in the comparatively newer villages. The total population residing within the reserve is approximately 150,000 people, consisting of about 52% men and 48% women. Approximately 67% of the total population is adult (at least 18 years old), 12% are youth (9-17 years old), and 19% are children (8 years of age and younger) (Bari and Dutta 2004).

The forest of TGR falls under the tropical evergreen and semi-evergreen forest biogeographic zone. Four main habitat types (high forest, low forest, grasslands and water bodies) have been identified in TGR (FRA 2000). In addition to other wildlife species, there are about 286 species of birds in Teknaf Game Reserve (Aziz *et al.* 2004). Of these species, the following eight were selected as indicator birds by the TGR authorities for ecological monitoring:

1. Greater Racket-tailed Drongo (*Dicrurus paradiseus*)
2. Hill Myna (*Gracula religiosa*)
3. Oriental Pied Hornbill (*Anthracoceros albirostris*)
4. Red-headed Trogon (*Harpactes erythrocephalus*)
5. Red Jungle Fowl (*Gallus gallus*)
6. White-crested Laughing Thrush (*Garrulax leucolophus*)
7. Puff-throated (Spotted) Babbler (*Pellorneum ruficeps*)
8. White-rumped Shama (*Copsychus malabaricus*)

The FD and scientists working for NSP suggested that indicator birds be selected based on the following criteria: a) they are associated with a particular habitat (e.g., forest birds, wetland birds, and grassland birds) (Browder *et al.* 2002), (b) they have potential to demonstrate a cause-effect relationship because they are associated with particular structures within a habitat (i.e., upper, middle and lower canopies or shrub versus ground dwellers) (Canterbury *et al.* 2000), and (c) they are likely to be responsive within a relatively short time span to environmental impacts (Browder *et al.* 2002) (Aziz *et al.* 2004). In general, the indicator bird species are seasonal and colorful songbirds that are not uncommon and represent distinct structural components of the forest.

The FD and NSP had conventional scientific monitoring in mind when selecting indicator bird species. The interest of local people and their ecological knowledge was not taken into consideration when selecting the criteria for choosing the

indicator species. Science-based monitoring might not be sustainable at TGR because it requires people trained in specific skills to carry out monitoring. The FD and NSP considered involving amateur and professional ornithologists and bird watchers in monitoring indicator bird species, but this would result in the monitoring not being community-based.

Methods

Between February and June of 2007, I collected data by interviewing forest dwellers in different parts of the Teknaf Game Reserve. The respondents were members of forest user groups (FUGs) formed by the TGR authorities. An FUG is comprised of local inhabitants of the reserve and consists primarily of forest users. Of the one 100 FUGs in the reserve, I selected six FUGs from across the geographical spectrum. Of the six sampled FUGs, two were female FUGs and four were male FUGs. Ten people were interviewed from each FUG for a total of 60 people (20 female and 40 male respondents) (Table 1).

I used two interviewing techniques to better understand the LEK of forest dwellers about the indicator bird species selected by NSP. First, I conducted a structured interview (with questionnaire) to learn whether respondents could correctly identify the eight bird species. I showed individual respondents color photographs of the NSP indicator birds and asked them to not discuss what they had seen with other respondents. I then collected information about the age, gender, religion, and ethnicity of the respondents. The distance of the village from the main forest area was also recorded.

Second, I conducted key respondent interviews with four FUG members who were very knowledgeable on local birds to learn detailed ecological information on the NSP indicator species. I selected the key respondents based on their performance in the structured questionnaire interview. Key respondents were from the Bengali, Rakhain and Chakma ethnic groups and also represented the Muslim and Buddhist religious groups. I collected detailed information about the birds' characteristics according to local ecological knowledge (i.e., common habits and habitats, nesting and roosting behaviors, breeding patterns, ecological indicator values, religious and ethnic significance, and economic importance) and about the local name used by each ethnic group for each bird species.

Table 1: Demographic profile, village age & distance from the forest of the sampled forest user groups

Forest user group	Gender		Religion			Ethnicity			Age group			Distance from the forest(km)			
	Male	Female	Muslim	Hindu	Buddhist	Bengali	Chakma	Rakhain	Young (18 - 29 Years)	Middle (30 - 49 years)	Old (50 years to older)	0	0.5	1.5	3
Kerangtoli Female FUG	-	10	9	1	-	10	-	-	2	5	3			X	
Kerangtoli Male FUG	10	-	10	-	-	10	-	-	2	5	3			X	X
Baruapara Female FUG	-	10	-	4	6	10	-	-	2	4	4				X
Wingchipru Male FUG	10	-	10	-	-	10	-	-	3	6	1				X
Domdomia Male FUG	10	-	6	-	4	6	-	4	2	5	3		X		
Horikhola Male FUG	10	-	-	-	10	-	10	-	3	4	3	X			
Total	40	20	35	5	20	46	10	4	14	29	17	1	1	2	2

Results

Bird identification by demographic profile

Gender. Table 1 shows the results from the sixty people I interviewed from six FUGs. Overall, I asked 40 male and 20 female respondents to identify the eight indicator birds (Table 1).
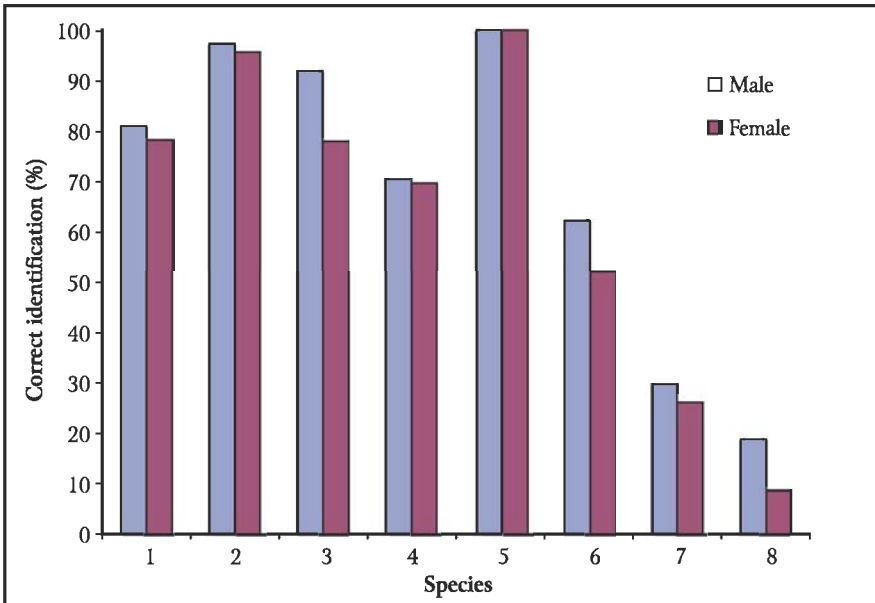

Figure 1: Correct identification of indicator birds by gender

Key: 1 = Greater Racket-tailed Drongo, 2 = Hill Myna, 3 = Oriental Pied Hornbill, 4 = Red-headed Trogon, 5 = Red Jungle Fowl, 6 = White-crested Laughing Thrush, 7 = Puff-throated (Spotted) Babbler, 8 = White-rumped Shama

This study revealed that most male and female respondents were capable of identifying six out of the eight indicator birds. Interviewees could also provide correct ecological information about these birds. Both men and women had less knowledge about the Puff-throated Babbler and White-rumped Shama (Figure 1).

Religion. I interviewed a total of thirty-five Muslims, five Hindus and twenty Buddhists among the sixty respondents in the reserve (Table 1).
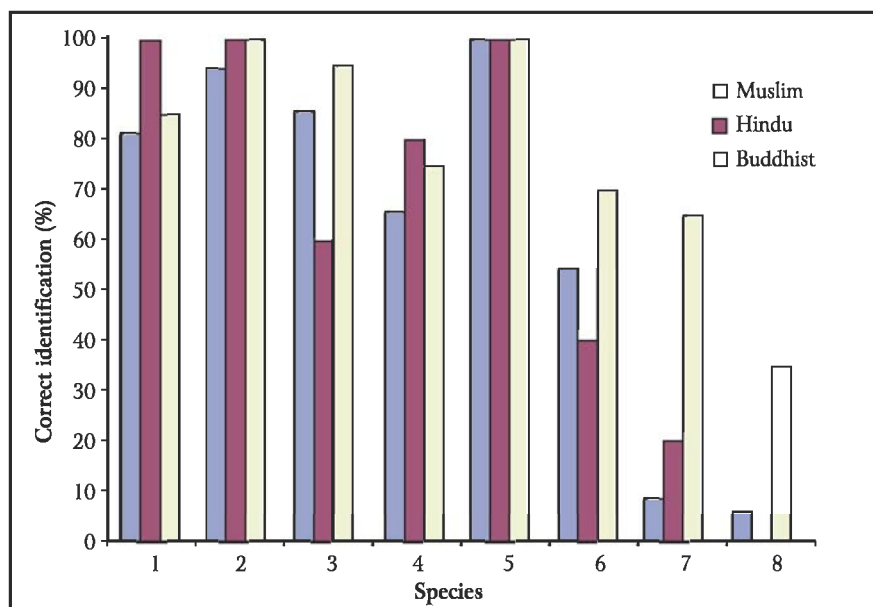
Figure 2: Correct identification of indicator birds by religion

Key: 1 = Greater Racket-tailed Drongo, 2 = Hill Myna, 3 = Oriental Pied Hornbill, 4 = Red-headed Trogon, 5 = Red Jungle Fowl, 6 = White-crested Laughing Thrush, 7 = Puff-throated (Spotted) Babbler, 8 = White-rumped Shama

Figure 2 shows that, in general, the Buddhists were more knowledgeable than the Muslims and Hindus about the indicator birds. Members of the Buddhist community could identify all eight species while members of the Muslim and Hindu communities could only readily identify the five species known by most locals (Greater Racket-tailed Drongo, Hill Myna, Oriental Pied Hornbill, Red-headed Trogon, and Red Jungle Fowl). The majority of interviewees from the Muslim community could also identify the White-crested Laughing Thrush.

Ethnicity. In the interview, there were forty-six Bengali, ten Chakma and four Rakhain respondents (Table 1). Figure 3 shows that members of the Chakma community in the reserve are knowledgeable about all eight of the indicator bird species and have comparatively greater knowledge of these species than the other two ethnic groups. Members of the Rakhain community did not identify all eight species as well as members of the Chakma community, but still a majority of the

Rakhain respondents correctly identified all of the birds. The Bengali respondents had poor knowledge about the Puff-throated Babbler and the White-rumped Shama, but the majority of Bengali respondents were still able to identify six species correctly. In general, members of the Bengali community had less ecological knowledge about these birds. This is most likely because their communities are located further from the reserve.
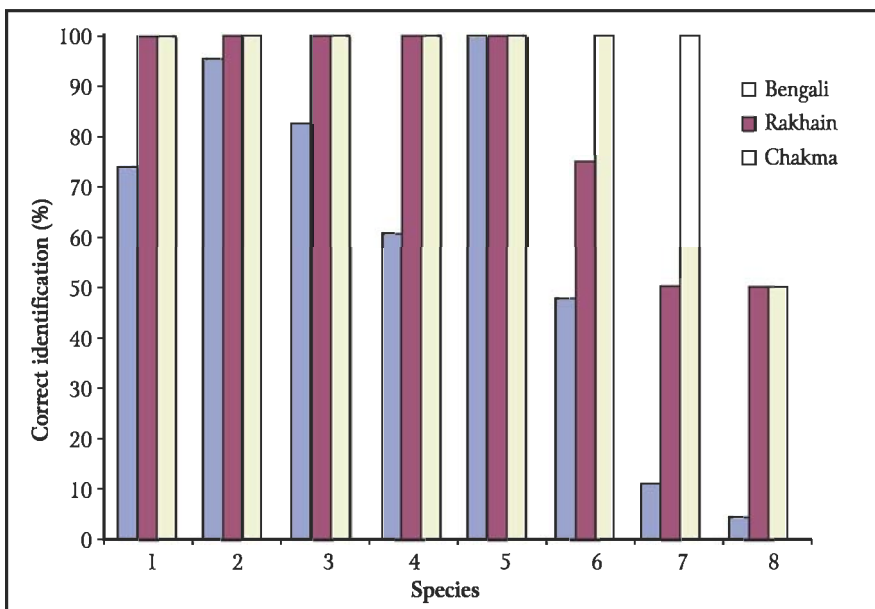

Figure 3: Correct identification of indicator birds by ethnicity

Key: 1 = Greater Racket-tailed Drongo, 2 = Hill Myna, 3 = Oriental Pied Hornbill, 4 = Red-headed Trogon, 5 = Red Jungle Fowl, 6 = White-crested Laughing Thrush, 7 = Puff-throated (Spotted) Babbler, 8 = White-rumped Shama

Age. I categorized the sixty interviewees into three age groups: young, medium and old. The young group was composed of people between the ages of 18 and 29 years, the medium group of interviewees was between 30 and 49 years old, and the older group was 50 years old and older. Of the 60 interviewees, I interviewed 14, 29 and 17 people from the young, medium and old age groups respectively (Table 1).
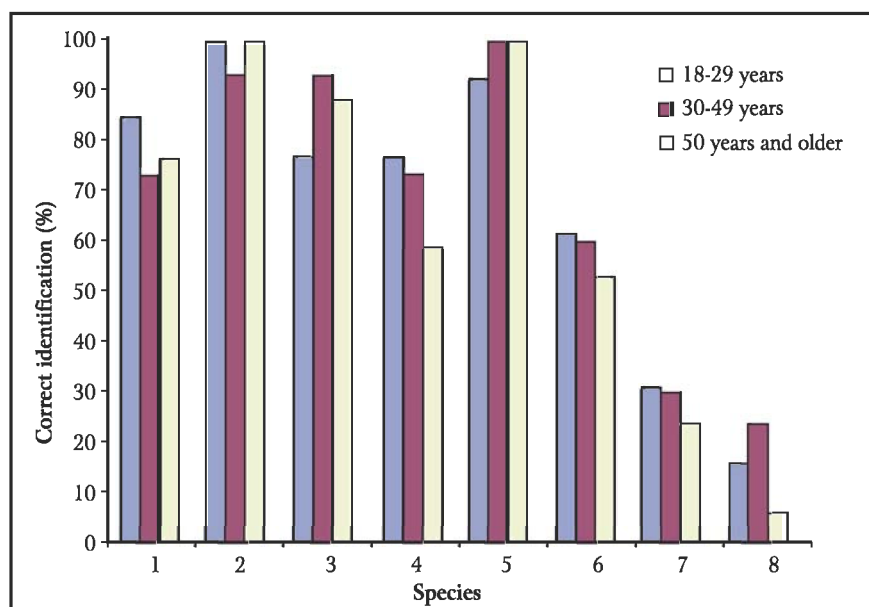
Figure 4: Correct identification of indicator birds by age group

Key: 1 = Greater Racket-tailed Drongo, 2 = Hill Myna, 3 = Oriental Pied Hornbill, 4 = Red-headed Trogon, 5 = Red Jungle Fowl, 6 = White-crested Laughing Thrush, 7 = Puff-throated (Spotted) Babbler, 8 = White-rumped Shama

Figure 4 shows that people of different age classes have more or less similar knowledge of the eight indicator birds. The majority of respondents in all age brackets could correctly identify Greater Racket-tailed Drongo, Hill Myna, Oriental Pied Hornbill, Red-headed Trogon, Red Jungle Fowl, and White-crested Laughing Thrush. Most respondents could not identify the Puff-throated (Spotted) Babbler and the White-rumped Shama.

Distance from the forest. Of the six sampled FUGs, one was located within the forest, another was located 0.5 km away from the forest, two were located 1.5 km from the forest, and the remaining two were located 3 km away from the forest (Table 1).
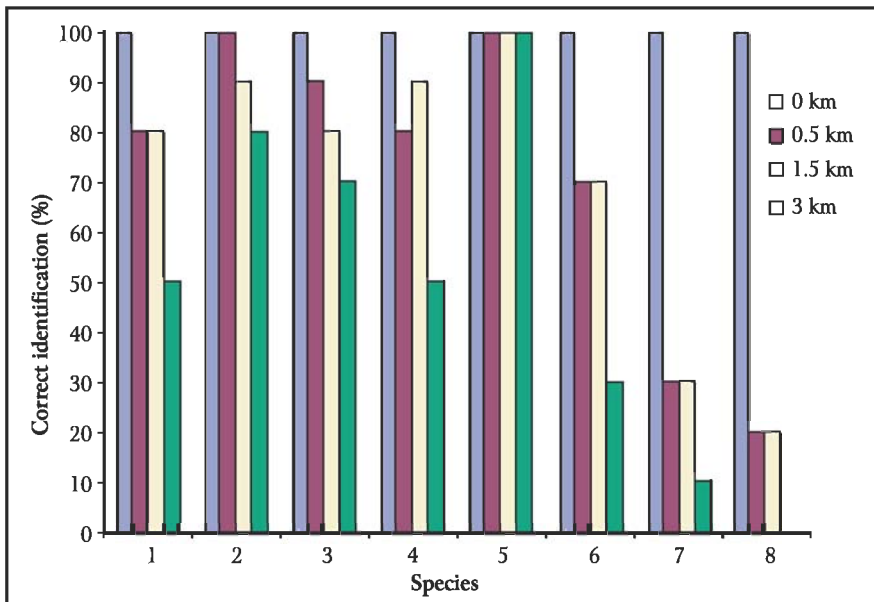
Figure 5: Correct identification of indicator birds by distance of village from forest

Key: 1 = Greater Racket-tailed Drongo, 2 = Hill Myna, 3 = Oriental Pied Hornbill, 4 = Red-headed Trogon, 5 = Red Jungle Fowl, 6 = White-crested Laughing Thrush, 7 = Puff-throated (Spotted) Babbler, 8 = White-rumped Shama

The results revealed that 100% of the respondents that lived in the forest could identify all eight of the bird species correctly. The ability of respondents to correctly identify the birds decreased with the distance they lived from the forest. The majority of respondents were able to identify the Greater Racket-tailed Drongo, Hill Myna, Oriental Pied Hornbill, Red-headed Trogon and Red Jungle Fowl. People living away from the forest were less able to identify the White-crested Laughing Thrush, Puff-throated Babbler and the White-rumped Shama (Figure 5).

Demographic factors. I anticipated that some of the demographic factors affecting LEK would have an association with each other. There is a clear association between ethnicity and religion. All members of the Chakma and Rakhain communities are Buddhist (Table 1). There is also a high association between ethnicity/religion and distance from the forest. Ten of the Chakma respondents live in the forest and the four Rakhain respondents live 0.5 km from the forest

(Table 1). In general, we can say that respondents from the Chakma Buddhist community who live within the forest (10 interviewees) have the best understand-ing of the indicator bird species. Members of the Rakhain Buddhist community who live 0.5 km from the forest (four interviewees) also have good knowledge of these birds. The Bengali respondents come from all three religions, live 1.5 to 3 km from the forests, and have the most diverse levels of knowledge of the bird species but their overall knowledge of these birds is not as good as that of the Chakma and Rakhain Buddhist communities who live in or closer to the forest.

Local ecological knowledge about indicator birds in the reserve

This section summarizes local ecological knowledge about the indicator bird species and explores which species are better known and why. Information from the key respondents about the indicator birds is presented in Boxes 1-8.

Red Jungle Fowl *(Gallus gallus)*

The results from structured interviews reveal that the Red Jungle Fowl is the most common and well-known bird in local communities. Most people from different age groups, religions, and ethnicities as well as from different locations within and near the forest know this bird. Local people are knowledgeable about the Red Jungle Fowl's food, nesting and breeding season. One of the main reasons people are knowledgeable about this bird is that it is a popular game bird. Some local people reported that the Red Jungle Fowl is indicative of rich undergrowth in the lower canopy of the forest. This bird can be a practical indicator for community-based ecological monitoring because it provides useful information about the condition of the lower strata of the forest and is well known among local people.

Box 1: Local ecological knowledge of the Red Jungle Fowl

The Red Jungle Fowl is known as *Shikari Kura*, *Jar Kura* and *Toacro* to the Bengali, Chakama and Rakhain communities respectively. Key respondents report that the male Red Jungle Fowl has an upper plumage of russet-gold and lower plumage of red and deep green. The female jungle fowl has puffed upper plumage and russet in their lower plumage. These birds prefer living in the dense undergrowth and bamboo groves of the semi-evergreen tropical forest. They are also found in forest gaps and edges and on agricultural lands close to forests. Local people report that this bird builds nests in the bushes of the densely covered forest floor and that the breeding season is from March-June (*Choitro-Ashar* in the Bengali calendar) when the birds lay eggs and the nestlings hatch.

Photo: NSP 2006

Results from the questionnaire show that the Hill Myna (*Gracula religiosa*) is well known among people of different genders, age groups, religions and ethnicities. This bird is also easily found in all of the focal villages and is the second best known of the indicator species. This bird's food preferences, breeding season, and nesting habits are also known to most people. The bird's unique ability to mimic the voice of animals – including human beings – is the main reason why it is so well known. Because of this special attribute, this bird has become an attractive pet, which has led to illegal trapping and selling of the species. Many forest dwellers in this area maintain their livelihood by capturing and selling these birds.

Local people suggest this bird is a useful indicator species for ecological monitoring because it is indicative of old and tall trees and rich middle strata in the forest. People also reported that the Hill Myna serves as an important propagator for seeds of trees valuable to wildlife. Because of people's interest in this bird and its ecological significance, the Hill Myna makes a useful indicator species for participatory ecological monitoring.

Box 2: Local ecological knowledge of the Hill Myna

Locally this bird is known as *Paliga* in the Rakhain community and *Shayer* in the Bengali and Chakma communities. The word "shayer" in Bengali means, "talking bird". This is a medium size bird with black, green and violet shimmering plumage. The orange colored bill and yellowish skin beneath and next to their eyes are identifying characteristics to local people. Key

informants report that forest with tall trees and dense middle and lower strata are the preferred habitat of this bird. They also report that this bird builds nest in the cavities of trees made by other animals, especially in older trees with softer wood such as Shimul (*Bombax spp.*) and Koroi (*Albizia spp.*), and they usually roost in a flock in the middle strata of the forest. Various fruits such as Dumur (*Ficus spp.*), Jam (*Syzygium spp.*) and banana are their main food and they occasionally eat insects. According to local people, the Hill Myna's breeding season falls between March and July (Choitro-Ashar). In recent years local people have rarely observed this bird.

Oriental Pied Hornbill (*Anthracoceros albirostris*)

Survey results reveal that the Oriental Pied Hornbill is another locally well-known bird that most people of different genders, religions, ethnicities and age groups can identify correctly. People are knowledgeable about the bird's food preferences, nesting habits, and breeding season. This bird is well known among interviewees living at various distances from the forest and from village settlements of different ages. The bird's spectacular bill, unique color combination, and harsh voice are reasons that people are more familiar with it. Moreover, this is an important game bird as it is thought to have significant medicinal value. An oil can be extracted from the bird's bill after it is cooked and used as a pain reliever. Many people also eat the meat of this bird to get rid of chronic bone and muscle pain. Local people report that the bird propagates seeds of trees that are valuable to wildlife. The bird

also indicates the presence of tall trees and a dense middle stratum in the forest. Considering people's interest in the Oriental Pied Hornbill and its ecological significance, this bird could be a useful indicator for participatory ecological monitoring.

Box 3: Local ecological knowledge of the Oriental Pied Hornbill

Locally this bird is known as *Resulla* or *Kao Dhonesh* to the Bengali, as *Keguiya* among the Chakma, and as *Aoshao* among the Rakhain. This is a well-known and popular bird among the people in and around Teknaf Game Reserve. However, local people report that this bird is rarely seen in the forest nowadays. Key respondents described the bird as having a black neck and back, wings with pale blue orbital skin, and a white belly and wingtips. These birds are arboreal in nature and usually build their nest in holes of tall trees of semi-evergreen forest such as *Garjan* and *Jam*. Local people report that females plaster themselves in their nest with mud and remain inside this nest during the whole period from egg-laying until the nestlings are able to fly. The female birds and nestlings are fed by the male bird during this period. They roost in pairs in trees in the middle strata of forests where they cannot be easily seen. The breeding season of this bird is between April and August (*Boishak–Shrabon*). On rare occasions, the predation of eggs and nestlings was reported by local people. Fruits of trees such as *Dumur* (*Ficus* spp.), *Bot* (*Ficus* spp.), *Dewa* (*Artocarpus* spp.), and *Bottaa* (*Artocarpus* spp.) are these birds' main food.

Photo: NSP 2006

Greater Racket-tailed Drongo (*Dicrurus paradiseus*)

Results from the structured interviews revealed that the Greater Racket-tailed Drongo is quite common and well known to local people of different genders, age groups, ethnicities and religions. This beneficial bird is known by people because it

destroys some insects that are harmful to crops. Moreover, the bold and noisy nature of this bird makes it easily recognizable. However, this bird is less known to people living further away from Teknaf Game Reserve in comparison to those people living inside the forest (Figure 5). The reason behind this trend might be that there are fewer tall trees for roosting in the villages away from the forest. The Greater Racket-tailed Drongo is also less known to people living further from the forest because it is not a bird that is hunted nor does it have any direct economic value to local people.

Box 4: Local ecological knowledge of the Greater Racket-tailed Drongo

Photo: NSP 2006

Locally, this indicator bird is known as *Viraj* (as well as *Vimraaj* and *Vingraj*) to the Bengali and as *Howatua* to the Rakhain. Key respondents report that this bird's common roosting habitat is in the upper to middle canopy of semi-evergreen tropical forests along the forest edge. The bird is arboreal in nature and builds a cup-shaped nest by loosely intertwining dry twigs in the branches of tall forest trees found in the middle strata of the forest. The Greater Racket-tailed Drongo typically breeds, lays eggs, and has hatchlings between March and July (Choitro – Ashar). They usually lay three eggs in a clutch and both parents incubate and feed the young. The color of the egg is off-white with tinted brown spots. Various kinds of flying insects are their favorite food, including those harmful to crops. According to local people, this species is a good indicator of forest quality because the birds are often found in areas with tall trees near gaps in the forest canopy.

Red-headed Trogon (*Harpactes erythrocephalus*)

Interview results suggest that this bird is not as well known among local people as the birds discussed above. Nonetheless, local people report that the presence of this bird in the forest indicates a rich forest floor cover with dense vegetation and thick

litter. People do not know this bird as well because they do not receive any direct economic benefits from it. This bird is a good indicator of improving lower and middle strata of the forest. If used as an indicator species, information should be collected from communities that live deep in the forests, as they are more knowledgeable about its existence. Otherwise this bird may not be a suitable indicator species for community-based monitoring because local people that live near (but not within) the forests are not familiar with it.

Box 5: Local ecological knowledge of the Red-headed Trogon

This bird is locally known as *Køl* to the Bengali, *Vatoa Pait* to the Chakma, and *Gung* among the Rakhain. As reported by the key respondents, Trogons have soft, often colorful, feathers with distinctive male and female plumage and a long and broad square-cut tail. Local people also reported that Red-headed Trogons prefer to build nests in the tree holes of the dense middle strata of the forests and to roost alone in these same areas. Insects from the forest floor provide the majority of their food. Their breeding period is from March to June (Choitro – Ashar).
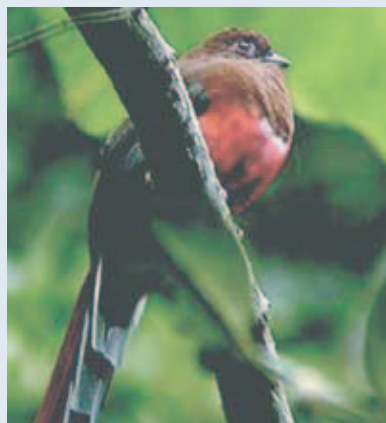

Photo: NSP 2006

The Laughing Thrush is not easily recognizable to local people. However, this bird is quite well known to the Chakma community who live inside the forest, and they were able to identify this bird and give accurate information about its breeding season, diet and nesting behavior (Figure 3). Although no economic importance of this bird has been reported, the bird has ecological significance as an indicator of rich forest floor cover with full forest litter. This bird also plays an important role in decomposing the forest litter because it turns the litter when searching for insects. Considering the ecological significance of the White-crested Laughing Thrush, it has the potential to be a useful indicator species. Its usefulness, however, will be limited at TGR to members of the Chakma community, as only they are knowledgeable of the bird and its habits.

Box 6: Local ecological knowledge of the White-crested Laughing Thrush

The Bengali know this bird as *Pata Urali*, meaning the bird who removes

Photo: NSP 2006

the litter from the forest floor to find insects. The Chakma call it *Shota Pait* and the Rakhain refer to it as *Sagong Gri*. Local people report that this small bird has an erect crest on its white head, a white throat and breast, and black mask-like markings on its head. It also has a floppy tail with soft fluffy plumage. This bird is occasionally seen picking out insects from the forest litter below large trees where lots of litter is deposited. They roost in the forest's middle strata in a flock moving from one place to another. This species builds small nests in the forest's middle strata and breeds between March and July (Choitro – Shrabon). Locals report that these birds lay three to four eggs.

Puffed-throated (Spotted) Babbler (*Pellorneum ruficeps*)

These birds have a chestnut crown, long buff supercilium and dusty cheeks (Ali and Ripley 1987, Hossain 1979). Survey results suggest that this bird is less common and not as well known to the people of TGR. Most people of different genders, religions, and age groups were unable to identify this bird and were not knowledgeable about its breeding season, nesting habits and food preferences. However, this bird is well known to members of the Chakma community who live deep inside the forest. Local people report that the bird is an indicator of scrub forest but that it has no known economic value. This bird is not a good indicator species for community-based ecological monitoring because it does not have any significant ecological or economic value for local people and it is not easily recognizable.

Box 7: Local ecological knowledge of the Puffed-throated (Spotted) Babbler

The Bengali and Chakma people do not have a local name for the Puffed-throated Babbler. In the Rakhain community it is known as *Pyunshi*. Key respondents report that these birds are commonly found in a flock in the low bush or bamboo groves of scrub forests. They describe the bird as plain brown above and white heavily streaked with brown below.

Photo: NSP 2006

White-rumped Shama (*Copsychus malabaricus*)

The White-rumped Shama is less well known to the people in TGR. Most people of different genders, religions, and age groups were unable to identify this bird and were not knowledgeable about its breeding season, nesting habits and food preferences. This species is, however, well known to members of the Chakma community who live deep inside the forest. People report that the bird is an indicator of scrub forest and that it has no known economic value. This bird is not a preferred indicator species for community-based ecological monitoring because it does not have any significant ecological or economic value for local people.

Box 8: Local ecological knowledge of the White-rumped Shama

In Bengali this bird is known as *Shama*. In the Rakhain and Chakma communities, this bird is known as *Sobehlao* and *Turing* respectively. Key respondents report that these birds are commonly found in a flock in the low bush or bamboo groves along hill streams. These birds build nests in the dense bushes along the streams of TGR.

Photo: NSP 2006

Conclusion

This case study explored the local ecological knowledge of forest dwellers about eight birds being used as indicator species by the TGR for ecological monitoring. The study found that local people of different genders, religions, ethnicities and ages are knowledgeable of most of the selected indicator bird species. The evolution of LEK about indicator birds in TGR appears to be mainly driven by the value of the birds as game. Some forest dwellers were also aware of the ecological value of these birds. Nonetheless, ecological value does not seem to be an important factor for identifying these birds. Selecting indicator species based solely on ecological values and a scientific point of view might not be the best strategy for community-based ecological monitoring.

This study suggests that the Hill Myna, Oriental Pied Hornbill, Red Jungle Fowl and Greater Racket-Tailed Drongo are the most suitable indicator birds for community-based ecological monitoring because they are well known to local people for their game value as well as for their ecological value. This study also suggests that the White-crested Laughing Thrush, Puff-throated (Spotted) Babbler and the White-rumped Shama are less suitable indicator birds for community-based monitoring by the Bengali forest dwellers living at the periphery of TGR. However, these birds are rather suitable indicator birds to the Chakma forest dwellers, living deep inside the forest area of TGR for community-based monitoring. These findings provide important information for park managers designing and introducing long-term community-based ecological monitoring.

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