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## Resident Forest Bird Monitoring 2014

(14 Protected Areas in Bangladesh)



**Bangladesh Forest Department**

**Bangladesh bird club, Dhaka and  
Climate-Resilient Ecosystems and Livelihoods (CREL) Project**

**September 2014**

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## **BACKGROUND**

USAID's Climate-Resilient Ecosystems and Livelihoods (CREL) Project envisages promoting collaborative management of natural resources in selected 31 bio-diverse ecosystems including forest protected areas, wetlands and ecologically critical areas of Bangladesh. In this connection a significant result of the project is to develop a robust baseline of biophysical changes in these areas. Bangladesh Forest Department adopted collaborative management approach of protected areas in 2003-04 in five forest PA sites namely Lawachara National Park (NP), Satchari NP, Rema-Kalenga Wildlife Sanctuary (WS), Chunati WS and Teknaf WS under Nishorgo Support Project (NSP, 2003-2008) with financial support from the USAID. Later this approach was scaled-up to 17 forest PAs in the country through Integrated Protected Area Co-management (IPAC, 2008-2013) Project supported by USAID. Since October 2012 CREL has been working to consolidate and sustain co-management in these sites and extend co-management to some additional sites.

Surveys of selected resident forest birds have been taken up as a proxy indicator to measure bio-physical changes in forest ecosystems since birds are more visible and responsive to habitat changes (Johnston 1956, Morrison 1986, Welsh 1987, Temple and Wiens 1989, Canterbury *et al.* 2000, Browder 2002). The pilot phase of indicator bird survey was conducted in initial five co-managed PAs (Lawachara NP, Satchari NP, Rema-Kalenga WS, Chunati WS and Teknaf WS) during 2005-2008. Later in IPAC project another five forest PAs viz. Kaptai NP, Fasiakhali WS, Medakachapia NP, Modhupur NP and Khadimnagar NP are included in bird survey during 2009-2010. In all ten of these PAs follow up impact surveys were conducted in 2012. All of those bird surveys were conducted by Dr Monirul Khan, a professional wildlife biologist supported by his students, using strip transect sampling and complemented by opportunistic recording of other species. To test how bird monitoring could be made more sustainable and incorporate it into CMOs monitoring tool, IPAC previously took an initiative with Bangladesh bird club (Bbc) to undertake surveys through volunteers from the bird club and to train interested local people (CMO members) using the same methods, applying this to the same ten PAs and transects in 2011. The same approach is adopted by CREL project and Bbc to conduct participatory resident forest bird surveys during June-September 2014, with a greater emphasis on the surveys being undertaken by experienced birdwatchers from the club following the same methods as used by Dr. M. H. Khan, to ensure comparability in methods, as well as developing local capacity. The survey covered 14 PAs including all ten previously monitored sites and four PAs (Inani Reserve Forests, Himchari NP, Hazarikhil WS and Dudpukuria-Dhopachari WS) where co-management has been adopted. ). The aim of this study is to establish baselines in the CREL sites, and to continue monitoring to determine change in forest health as a result of better NRM through collaborative management. This report highlights the results of June-September 2014 resident forest bird survey in 14 PAs and draws comparisons with previous (2005-2012) systematic surveys of bird population density in 10 PAs.

## **CONCEPTUAL FRAMEWORK**

Monitoring ecosystem health is a priority to determine the effectiveness of the shift to a co-management approach in forest PA sites in Bangladesh. Rigorous and scientifically valid indicators of changes in forest health are a challenge, but as noted earlier monitoring of populations of selected birds offers one measure of changes in forest condition. In addition co-management itself and recent interest in preparing for REDD+ funding mechanisms both emphasize the need for community based monitoring as a sustainable tool for PA management and for Monitoring Reporting and Verification (MRV). While the co-management organizations are progressing with their institutional and managerial capacity building for conservation of unique natural resources in their protected areas, they are also expected to take initiative in monitoring the trends of resources and uses, and to make use of monitoring results.

Hence the monitoring reported here also tried to develop greater community involvement in monitoring of indicator forest bird density.

Based on the nature of forests (e.g. tropical mixed evergreen and deciduous), resident bird species dependent on different forest strata, relatively easy to detect and identify by call/song, 16 indicator species were selected, with 10-11 species for each PA site - by bird experts (Table 1). The breakdown of indicator species by sites in past and current surveys is detailed in Table 2. Fifty two (52) transects were monitored following the same monitoring protocol and are implemented in 14 PA sites (Table 4).

**Table 1: List of indicator forest (resident) birds.**

SL	Indicator Birds	Scientific name	Resident in forest strata
1	Greater Racket-tailed Drongo	<i>Dicrurus paradiseus</i>	Middle
2	Crested Serpent Eagle	<i>Spilornis cheela</i>	Middle
3	Red Junglefowl	<i>Gallus gallus</i>	Lower
4	Green-billed Malkoha	<i>Phaenicophaeus tristis</i>	Middle
5	White-rumped Shama	<i>Copsychus malabaricus</i>	Middle
6	Hill Myna	<i>Gracula religiosa</i>	Upper
7	Puff-throated Babbler	<i>Pellorneum ruficeps</i>	Lower
8	Abbott's Babbler	<i>Malacocincla abbotti</i>	Lower
9	Scarlet Minivet	<i>Pericrocotus flammeus</i>	Upper
10	Crimson Sunbird	<i>Aethopyga siparaja</i>	Middle
11	Oriental Pied Hornbill	<i>Anthracoceros albirostris</i>	Upper
12	Red-headed Trogon	<i>Harpactes erythrocephalus</i>	Middle
13	Spangled Drongo	<i>Dicrurus hottentottus</i>	Middle
14	Black Crested Bulbul	<i>Pycnonotus melanicterus</i>	Middle
15	White-crested Laughingthrush	<i>Garrulax leucolophus</i>	Lower
16	Orange-headed Thrush	<i>Zoothera citrina</i>	Lower

Table 2: Indicator species and protected areas

Sl	English Name	Scientific Name	Strata	Main Food	Kaptai NP	Hazari-khil WS	Dudpukuria WS	Chunati WS	Fasia-khali WS	Medakachapia NP	Himchari NP	Inani RF	Teknaf WS	Lawa-chara NP	Satchari NP	Rema-Kalenga WS	Khadim-nagar NP	Modhupur NP
1	Red Junglefowl	<i>Gallus gallus</i>	G	Seeds	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2	Puff-throated Babbler	<i>Pellorneum ruficeps</i>	G	Insects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
3	Abbott's Babbler	<i>Malacocincla abbotti</i>	L	Insects	Y	Y	Y		Y	Y	Y	Y		Y	Y	Y	Y	
4	White-crested Laughingthrush	<i>Garrulax leucolophus</i>	L	Insects				Y					Y					
5	Orange-headed Thrush	<i>Zoothera citrina</i>	L	Insects														Y
6	White-rumped Shama	<i>Copsychus malabaricus</i>	L	Insects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
7	Crested Serpent Eagle	<i>Spilornis cheela</i>	M	Snakes	Y				Y	Y							Y	Y
8	Red-headed Trogon	<i>Harpactes erythrocephalus</i>	M	Insects		Y	Y	Y			Y	Y	Y	Y	Y	Y		
9	Green-billed Malkoha	<i>Phaenicophaeus tristis</i>	M	Insects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
10	Greater Racket-tailed Drongo	<i>Dicrurus paradiseus</i>	M	Insects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
11	Spangled Drongo	<i>Dicrurus hottentottus</i>	M	Insects														Y
12	Black-crested Bulbul	<i>Pycnonotus melanicterus</i>	M	Fruits														Y
13	Crimson Sunbird	<i>Aethopyga siparaja</i>	M	Nectar	Y	Y	Y		Y	Y	Y	Y					Y	Y
14	Oriental Pied Hornbill	<i>Anthracoceros albirostris</i>	U	Fruits	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
15	Hill Myna	<i>Gracula religiosa</i>	U	Fruits	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
16	Scarlet Minivet	<i>Pericrocotus flammeus</i>	U	Insects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	<b>Total species</b>				11	11	11	10	11	11	11	11	10	10	10	10	11	10

Grey indicates species not previously monitored in a given site.

*Context – NSP bird surveys (2005-2008, 2012)*

Indicator bird survey conducted in 5 pilot PA sites namely Lawachara NP, Satchari NP, Rema-Kalenga WS, Chunati WS and Teknaf WS during Feb-Aug of 2005-2008 and 2012 by Dr. Monirul H. Khan, Jahangirnagar University, Bangladesh, his students and local community members also took part in these surveys. The results of these survey shows increase of two birds viz. Red Junglefowl and Puff-throated Babbler however, the population densities of remaining birds remained more or less unchanged over 2005-12.

*Context – IPAC bird survey (2009-2012)*

In five other PAs namely Medakachapia NP, Fasiakhali WS, Kaptai NP, Modhupur NP and Khadimnagar NP indicator bird surveys were conducted during 2009, 2010 and 2012 with the same expertise and methods. Almost constant results were found, except that the density of Red Junglefowl showed a slight increase.

## METHODS

### *Bird Survey*

The strip transect sampling method was applied at 14 PAs to conduct this bird survey. This method is a combination of quadrat sampling and line transect sampling where objects (birds) are counted from straight, long and narrow strips. This is suitable for population estimation of visible and mobile organisms. In this method some permanent strips are selected where the total counts of the objects are made. The observer(s) slowly move (ca. 1.5 km/hr) along a relatively straight line (basal line) through the study area and count the objects from both sides. The observation-range (half-width of the strip) varies depending on the visibility of the study area. For these forest sites the observation-range of 25 m on either side was found suitable, so the width of transect was 50 m (but was treated as 20 m on each side with total width of 40m in the case of five NSP sites, as had been done in the earlier surveys; Table 4). The initial location of the object was considered while counting, because the object often moves away after seeing the observer(s). If any object was sighted beyond the pre-decided observation-range, or if the object was seen coming from the back (in order to avoid duplication), the object was not counted. For birds documented on call/song it was estimated from experience by the observer if it was within the defined transect width, this aspect of method was not documented in the previous surveys. A standard data sheet was used to record the counts of indicator birds (Appendix 5).

The opportunistic survey method is suitable for recording species diversity, composition and other important information, whenever available, without following any systematic approach, lists of all species recorded in 2014 are given in Appendix 1-4.

**Table 3: Sites and other details of 2014 resident forest bird survey, 2014.**

No.	Region	Protected Areas	Projects	Previous surveys	# of Trails	Survey Duration	# of visits/site/year
1	Cox	Teknaf WS	NSP	2005-2008, 2012	5	Jun-Sep 2014	4
2	Cox	Inani RF	CREL	<i>New site</i>	<b>2 Identified</b>	Jun-Sep 2014	4
3	Cox	Himchari NP	CREL	<i>New site</i>	<b>2 Identified</b>	Jun-Sep 2014	4
4	Cox	Medakachapia	IPAC	2009-2012	2	Jun-Sep 2014	4
5	Cox	Fasiakhali	IPAC	2009-2012	2	Jun-Sep 2014	4
6	Ctg	Chunati	NSP	2005-2008, 2012	5	Jun-Sep 2014	4
7	Ctg	Kaptai	IPAC	2009-2012	5	Jun-Sep 2014	4

8	Ctg	DDWS	CREL	<i>New site</i>	<b>4 Identified</b>	Jun-Sep 2014	4
9	Ctg	Hazarikhil	CREL	<i>New site</i>	<b>4 Identified</b>	Jun-Sep 2014	4
10	Central	Modhupur	IPAC	2009-2012	4	Jun-Sep 2014	4
11	Sylhet	Rema-Kalenga WS	NSP	2005-2008, 2012	4	Jun-Sep 2014	4
12	Sylhet	Satchari NP	NSP	2005-2008, 2012	3	Jun-Sep 2014	4
13	Sylhet	Lawachara NP	NSP	2005-2008, 2012	6	Jun-Sep 2014	4
14	Sylhet	Khadimnagar	IPAC	2009-2012	3	Jun-Sep 2014	4

#### *Identification of new trails*

Two broad habitat types were taken into consideration while transects were selected. (1) Mature Forest: moderately dense natural forest mixed with evergreen trees, streams with undergrowth and riparian growth. (2) Degraded Forest: degraded forest with few trees, plantations, orchards, moderate undergrowth etc. The aim was to represent both of these habitats roughly to the extent that they exist in each PA.

**Table 4: New strip transects at four PAs, identified in June 2014.**

Name of the PA	Transect Name	GPS coordinates of two ends	Landmarks at Two Ends	Length (km)
Inani RF	Shilbuniar Chara	N 21°13.599' E 92°03.202' N 21°13.316 E 92°03.507'	Shilbuniar Chara gonammore, Lui Kum	1.46
	Boro Khal	N 21°13.300' E 92°03.509' N 21°13.385 E 92°03.108'	Lui Kum, Patakata	1.50
Himchari NP	Sagar Nibash	N 21°21.509' E 92°01.145' N 21°21.451 E 92°02.244'	Hill slope, Banyan tree	1.87
	Barachara	N 21°22.000' E 92°02.100' N 21°23.455 E 92°02.023'	Chainda slope, Barachara culvert	3.00
Dudpukuria-Dhopachara WS	Chapachari (Dhopachari)	N 22°13.508' E 92°06.536' N 22°13.499 E 92°06.537'	Open field near pond, End of stream	1.90
	Nikhonchari (Dhopachari)	N 22°13.866' E 92°06.810' N 22°14.160' E 92°06.507'	Mango tree, End of stream	1.10
	Forest Office (Dudpukuria)	N 22°18.634' E 92°09.138' N 22°18.179' E 92°09.008'	Beat office, End of the hill,	1.70
	Guard Box (Dudpukuria)	N 22°18.796' E 92°09.061' N 22°19.017' E 92°08.905'	Guard box, Large Gorjon tree	1.40
Hazarikhil WS	Tea Garden	N 22°42.255' E 91°41.346' N 22°42.599' E 92°41.108'	Billerjer para, End of stream	1.10
	Butiakhola	N 22°42.616' E 91°41.094' N 22°42.178' E 92°40.688'	Teak plantation, Hill top	1.70
	New Bridge	N 22°42.213' E 91°42.184' N 22°41.972' E 92°40.839'	New bridge, Wall of sedimentary rock	1.20
	Shabhuddin	N 22°42.384' E 91°41.603' N 22°42.341' E 92°41.443'	Shabhuddin's house, FD rest house	0.50

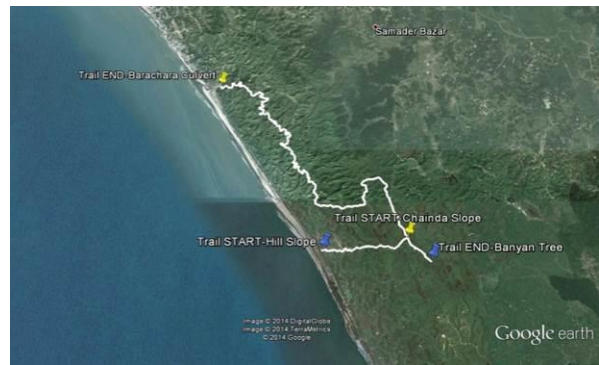
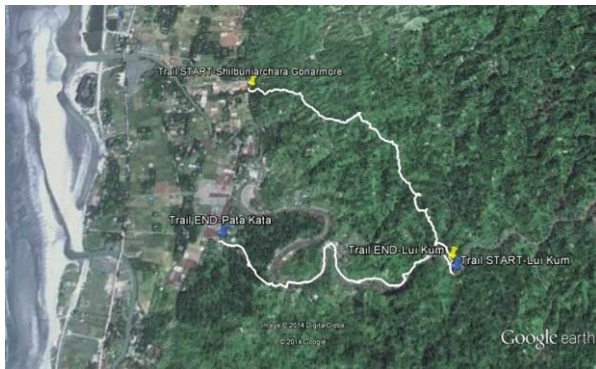
Table 5: Strip transects at existing 10 PAs.

Name of Project Site	Name of Transect	Location in Project Site	Geographic Locations of Two Ends	Landmarks at Two Ends	Length (km)
<b><i>Kaptai National Park</i></b>	Rampahar Stream	Northwest	22°29.709' N, 92°11.123' E; 22°30.469' N, 92°10.440' E	Balurchar, intersection	1.80
	Rampahar Hill	West	22°30.469' N, 92°10.440' E; 22°29.880' N, 92°10.583' E	Intersection, culvert	1.10
	Jamaichara	Southwest	22°29.668' N, 92°10.683' E; 22°29.345' N, 92°10.752' E	Karnaphuli south bank, narrow pass	0.61
	Rangamati Road	Centre	22°30.663' N, 92°12.451' E; 22°30.937' N, 92°12.182' E	Milestone, forest end	0.69
	Bangchhari	Centre	22°30.040' N, 92°11.697' E; 22°31.576' N, 92°11.138' E	Main road, Debachari	3.00
<b><i>Fasiakhali Wildlife Sanctuary</i></b>	Lama Road	Centre	21°43.090' N, 92°05.516' E; 21°42.761' N, 92°06.408' E	Cox's Bazar Road, culvert	1.70
	Natunpahar East	West	21°42.338' N, 92°04.765' E; 21°42.369' N, 92°05.315' E	Natunpahar mosque, Garzanbunia	0.95
<b><i>Meda-Kacchapia National Park</i></b>	Meda-Kacchapia East	East	21°38.484' N, 92°04.402' E; 21°38.329' N, 92°05.080' E	Cox's Bazar road, Kurahari	1.20
	Meda-Kacchapia West	West	21°38.632' N, 92°04.392' E; 21°38.783' N, 92°03.592' E	Cox's Bazar Road, Kacchapia office	1.40
<b><i>Khadimnagar National Park</i></b>	Kalagool Road	West	24°57.248' N, 91°56.311' E; 24°56.673' N, 91°55.689' E	Khadimnagar office, Kalagool	1.50
	Khadimnagar Central	Centre	24°56.677' N, 91°56.391' E; 24°57.248' N, 91°56.311' E	South border, Khadimnagar office	1.10
	Choragang Road	East	24°57.248' N, 91°56.311' E; 24°56.975' N, 91°57.198' E	Hindur Jhiri, brick field	1.91
<b><i>Madhupur National Park</i></b>	Rasulpur	East	24°41.342' N, 90°08.350' E; 24°41.488' N, 90°07.015' E	Rasulpur office, Koia Pukur	2.30
	Jalui	East	24°41.342' N, 90°08.350' E; 24°40.779' N, 90°07.683' E	Rasulpur office, Jalui office	1.50
	Lahoria	Centre	24°41.730' N, 90°06.283' E; 24°41.631' N, 90°05.760' E	Lahoria office, west intersection	0.90
	Monar Bide	West	24°40.211' N, 90°06.287' E; 24°40.811' N, 90°06.137' E	Metalled road, Gaira	1.10

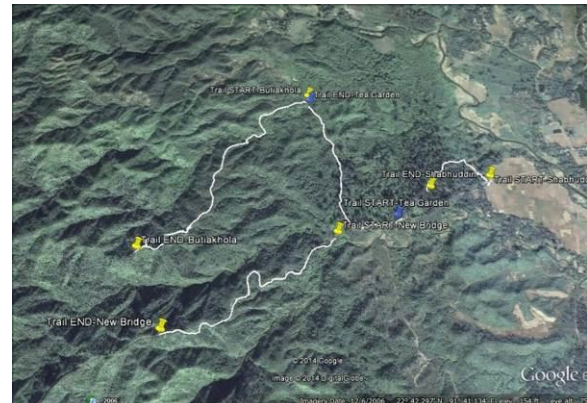
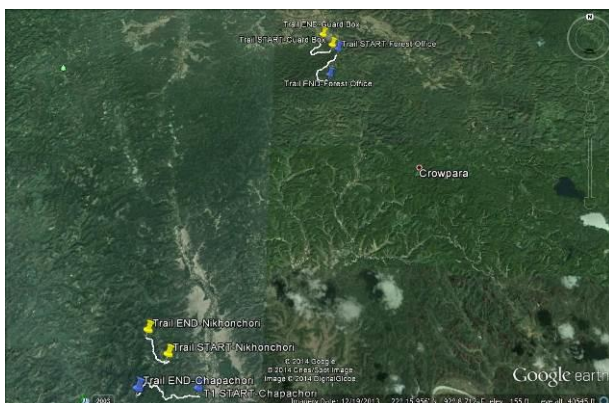


Maps of each PA showing the new transect details

**Figure 1:** Detailed map of Inani Reserve Forest (right) and Himchari NP (left), the white lines represent the transects, yellow and blue mark represent the start and end points of each transect.



**Figure 2:** Detailed map of DDWS (left) and Hazarikhil WS (right) the white lines represent the transects, yellow and blue mark represent the start and end points of each transect.



## RESULTS AND DISCUSSION

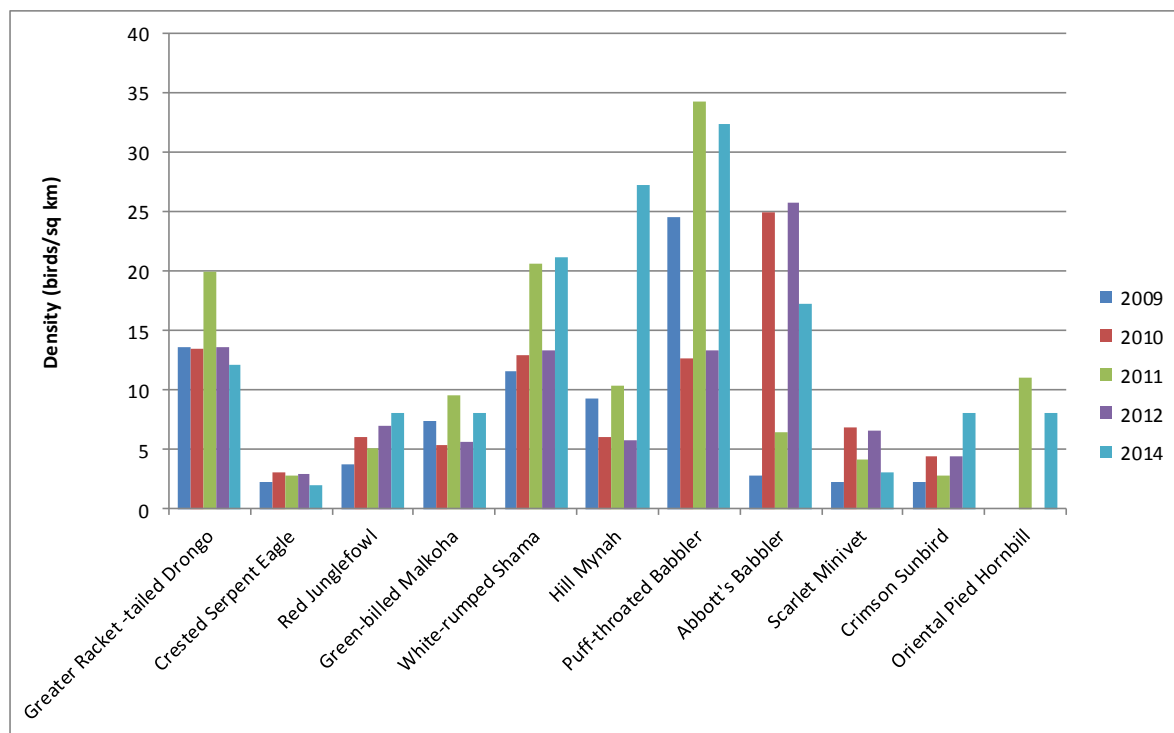
A total of 103 species were recorded including all the indicator species in 14 PAs between June and September 2014 (Annex 1-4). Although the same survey method, indicator birds (with some additions) and transects were applied in ten sites, some of the results show considerable differences from previous years of counts. Possible reasons could be: changes in bird populations associated with habitat changes or other factors (but changes between 2009 and 2012 were negligible); differences in bird identification and counting skills, differences in understanding of transects, and inconsistencies in actual method followed (but this is unlikely); or differences due to the 2014 survey covering a later period of year than the previous surveys (which generally covered April-July).

A comparison of indicator species density/km is presented below between this year's (June-September 2014) and NSP bird survey (2005-2008) results of Lawachara NP, Satchari NP, Rema-Kalenga WS, Chunati WS and Teknaf WS, and IPAC bird survey (2009-2011) namely Medakachapia NP, Fasiakhali WS, Kaptai NP, Modhupur NP and Khadimnagar NP, and IPAC impact survey of the ten PAs in 2012. In addition, the results are given of indicator bird survey at four new PAs comprising Dudpukuria-Dhopacharai Wildlife Sanctuary, Hazarikhil Wildlife Sanctuary, Himchari National Park and Inani Reserve Forest.

### Chittagong Region

#### *Kaptai National Park*

**Figure 3:** Density of indicator birds (birds/km<sup>2</sup>) in Kaptai National Park during June-September 2014 compared to 2009-2012.

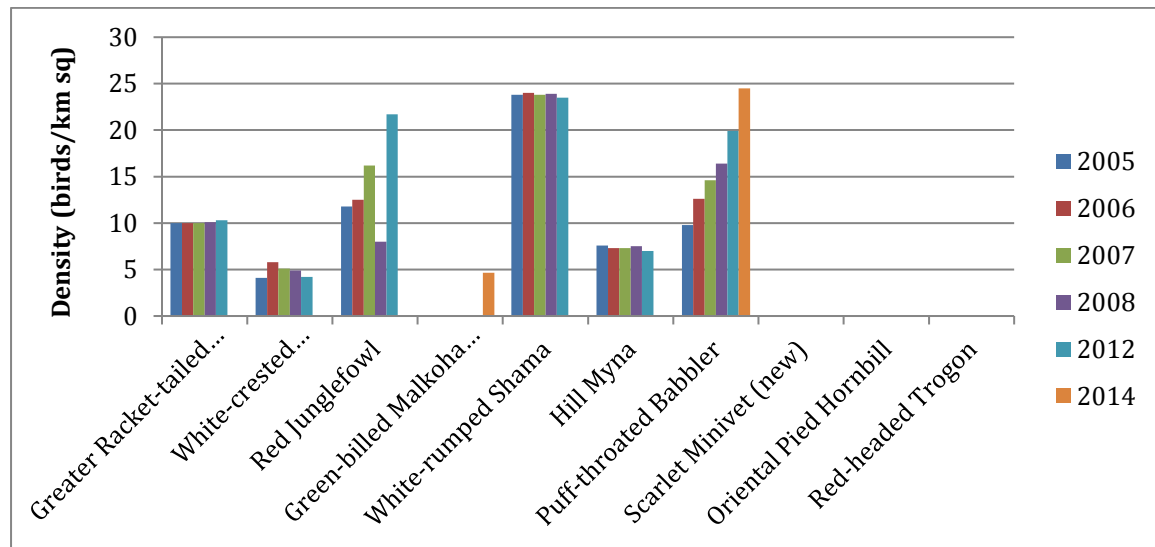


The density of most of the indicator species showed modest changes between years combined with some fluctuations. Upper canopy species trend is unclear: Hill Myna showed a large increase in 2014, but over time the populations of Crested Serpent-eagle and Scarlet Minivet are little changed, but Oriental Pied Hornbill (not counted in some past years) may have declined in 2014 (this frugivore may be considered a keystone species important in dispersal of fruiting trees). Among middle-lower canopy

species Greater Racket-tailed Drongo and Green-billed Malkoha showed little change, but White-rumped Shama and Crimson Sunbird appear to be increasing. The general trend for all three undergrowth and ground dwelling birds – Red Junglefowl, Puff-throated Babbler and Abbott’s Babbler - is for some increase in population (although estimated density of the two babblers has fluctuated between years) and this is presumed to indicate regrowth of undergrowth over this six year period. In addition, breeding evidence of globally Vulnerable Great Slaty Woodpecker *Mulleripicus pulverulentus* was found along Borochoa stream transect. A nationally rare resident Bay Woodpecker *Blythipicus pyrrhotis* was also observed in August and September along the same trail.

*Chunoti Wildlife Sanctuary*

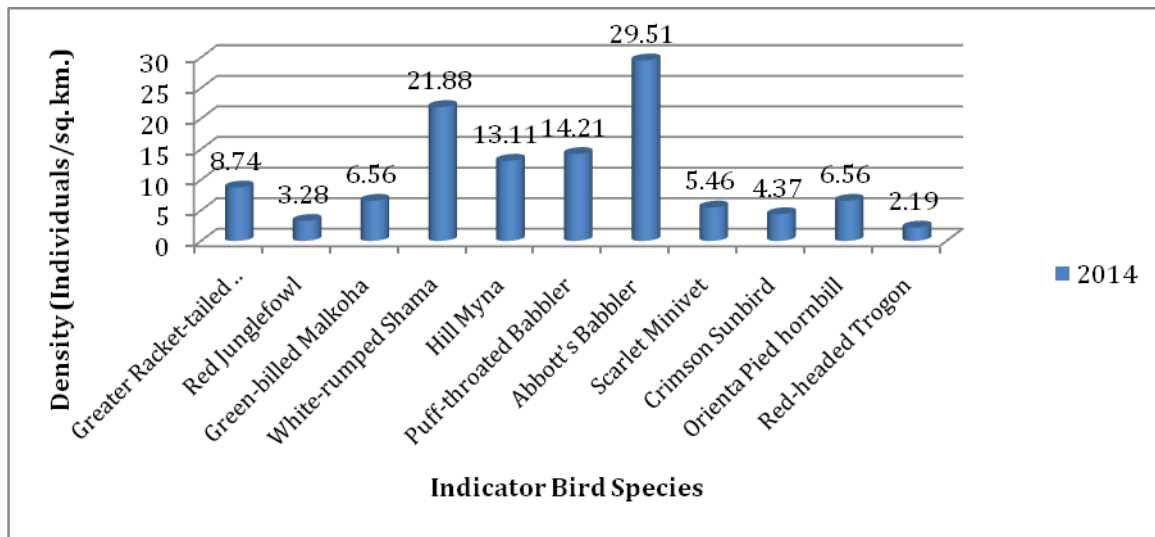
**Figure 4:** Density of Indication birds (birds/km<sup>2</sup>) in Chunoti Wildlife Sanctuary during June-September 2014 in compare to 2005-2008 and 2012.



Out of 11 indicator birds only Puff-throated Babbler and Green-billed Malkoha (new addition) were recoded. Higher density and increasing population trend of Puff-throated Babbler, representing the ground stratum indicates an increase in scrubby vegetation, although the absence of indicator species of all other stratum is alarming.

*Dudpukuria-Dhopacharai Wildlife Sanctuary (new site)*

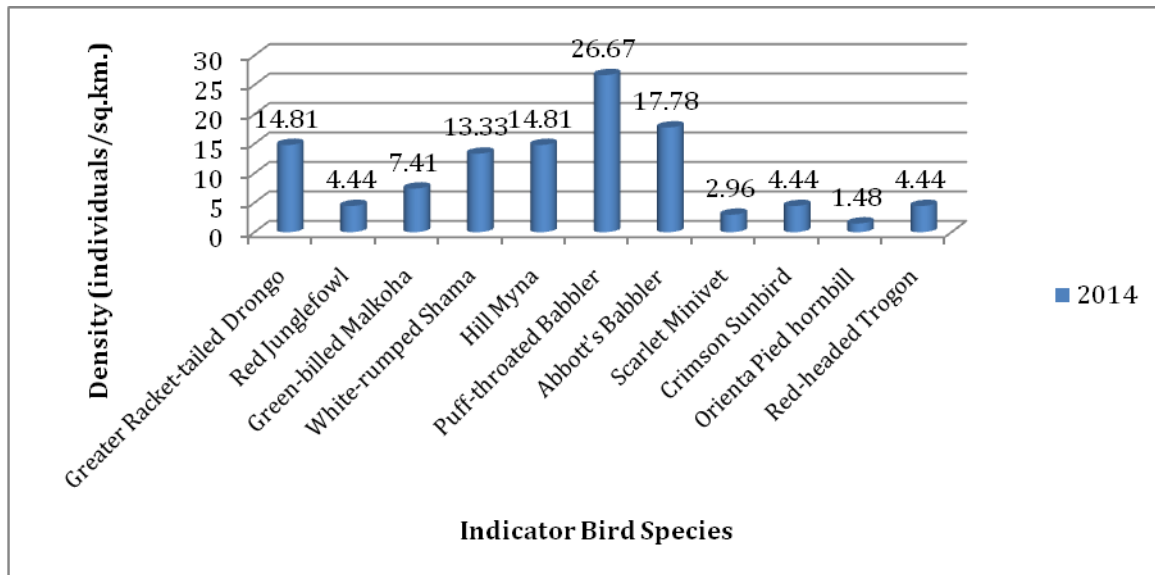
**Figure 5:** Density of Indication birds (birds/km<sup>2</sup>) in Dudpukuria-Dhopacharai Wildlife Sanctuary during June-September 2014.



Four transects were established (two in Dudpukuria and two in Dhopachari) in June 2014 covering 6.1 km (length). All indicator bird species were recorded, with high numbers of understory species such as White-rumped Shama and Abbott's Babbler. In addition, Large Scimitar Babbler *Pomatorhinus hypoleucos*, a rare resident was recorded in Dhopachari.

*Hazarikhil Wildlife Sanctuary (new site)*

**Figure 6:** Density of Indication birds (birds/km<sup>2</sup>) in Hazarikhil Wildlife Sanctuary during June-September 2014.



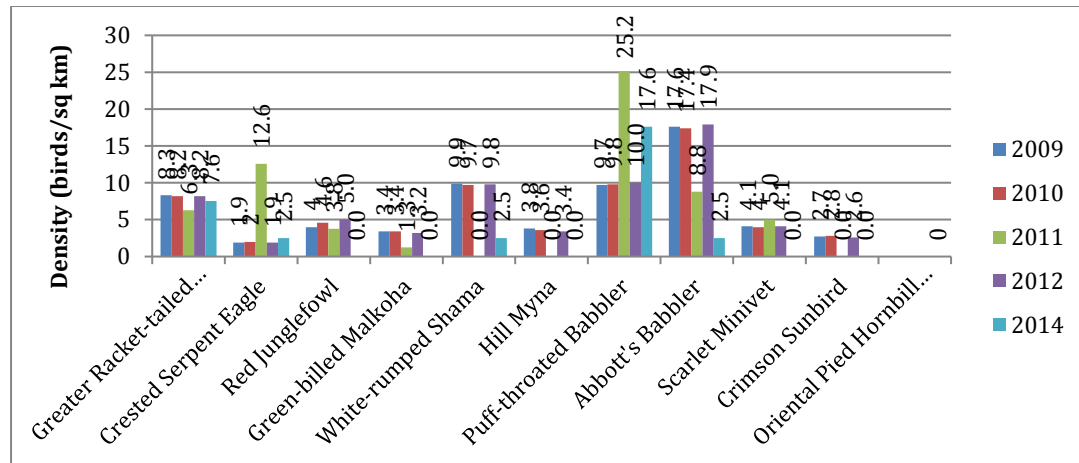
Hazarikhil Wildlife Sanctuary is a new site where forest bird monitoring scheme was introduced and four transects were established in June 2014 covering 4.5 km (length). High number of Puff-throated Babbler and Abbott's Babbler were recorded indicating healthy scrubby vegetation. The density of higher canopy species was lower such as Scarlet Minivet and Oriental Pied Hornbill than the other canopies. The mid strata species including White-rumped Shama and Greater Racket-tailed Drongo

were recorded regularly along the transects. The nationally rare resident Spot-bellied Eagle-owl *Bubo nipalensis* was also recorded in June 2014.

### Cox's Bazar Region

#### Fashiakhali Wildlife Sanctuary

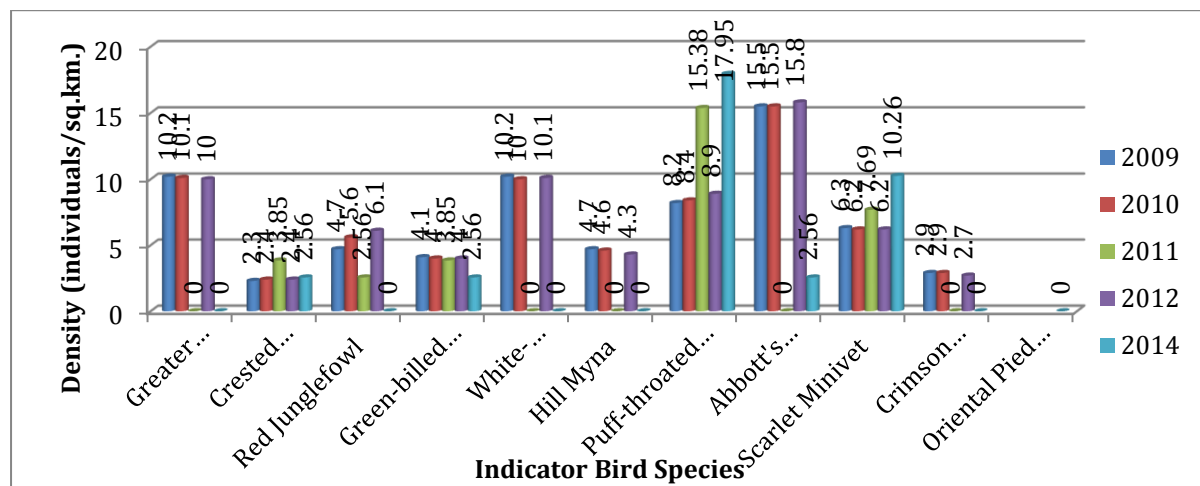
**Figure 7:** Density of Indication birds (birds/km<sup>2</sup>) in Fashiakhali National Park during June-September 2014 in compare to 2009-2012.



A decline in all indicator birds were observed with no record of Red Junglefowl, Green-billed Malkoha, Hill Myna, Scarlet Minivet, Crimson Sunbird and Oriental Pied Hornbill. The continuous presence of Puff-throated Babbler and Abbott's Babbler indicate that the area mostly offers thin and scrubby vegetation with little sign of improvement over the years.

#### Medhakacchapia National Park

**Figure 8:** Density of Indication birds (birds/km<sup>2</sup>) in Medhakacchapia National Park during June-September 2014 in compare to 2009-2012.

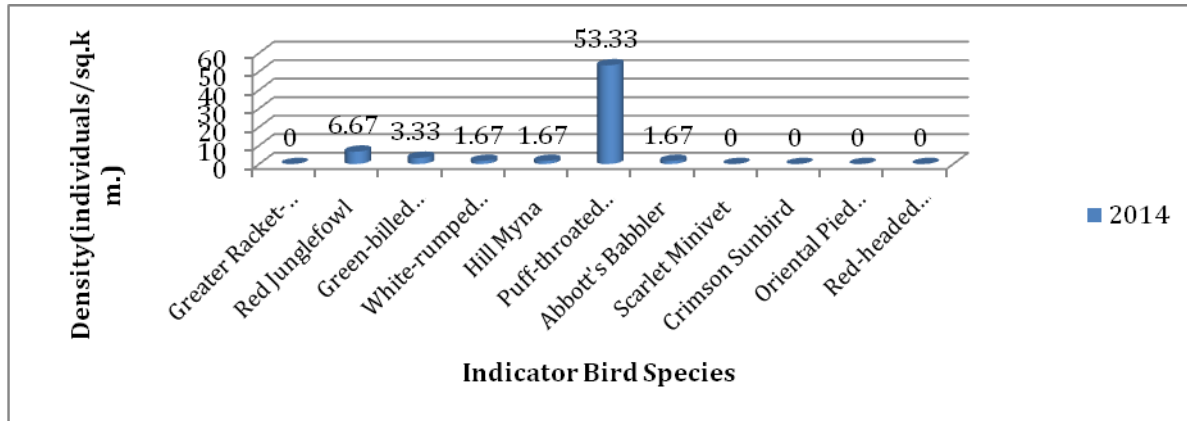


The population of Puff-throated babbler shows an increasing trend over the years while two other understory species appear to have disappeared or sharply reduced (White-rumped Shama and Abbott's Babbler), therefore it is difficult to speculate the health of forest undergrowth, although the Puff-throated Babbler can successfully survive in very thin vegetation than the two other species. The absence of Greater Racket-tailed Drongo and Crimson Sunbird suggest the quality of the middle strata

has been degraded although shows fluctuation between years. The increase of Scarlet Minivet and the decrease or disappearance of Hill Myna and no record of Oriental Pied Hornbill make it difficult to determine the status of the upper strata.

*Himchari National Park (new site)*

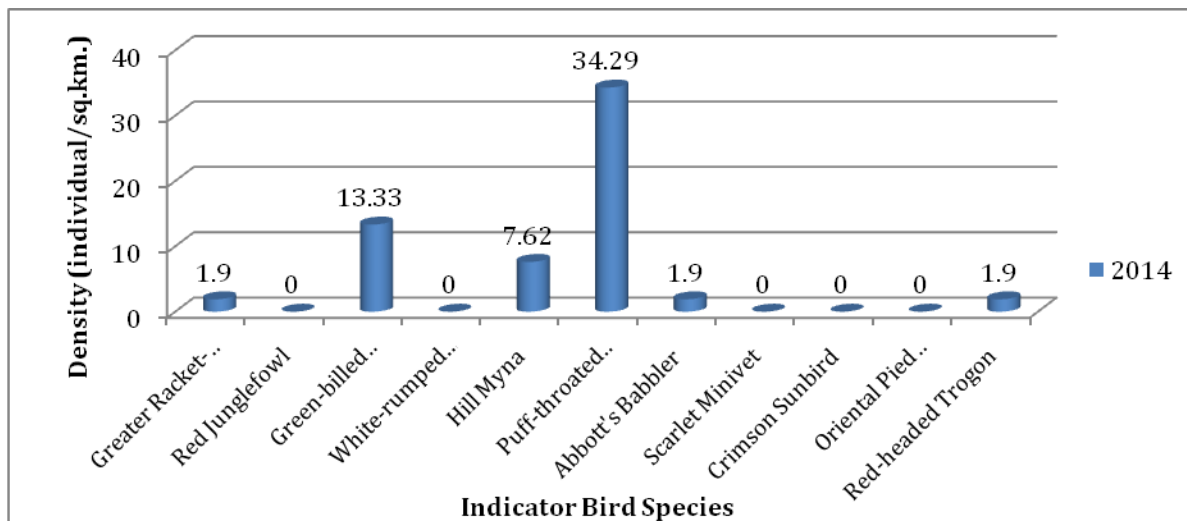
**Figure 9:** Density of Indication birds (birds/km<sup>2</sup>) in Himchari National Park during June-September 2014.



Himchari National Park is one of two new sites under bird monitoring scheme in Cox's Bazar region. Two transects were established in June 2014 covering 4.87 km (length). Six out of eleven indicator birds were recorded between June and September 2014. The high density of Puff-throated Babbler and low density of all other indicators suggest that the area primarily holds scrubby vegetation with very thin tree cover.

*Inani Reserve Forest (new site)*

**Figure 10:** Density of Indication birds (birds/km<sup>2</sup>) in Inani Reserve Forest during June-September 2014.



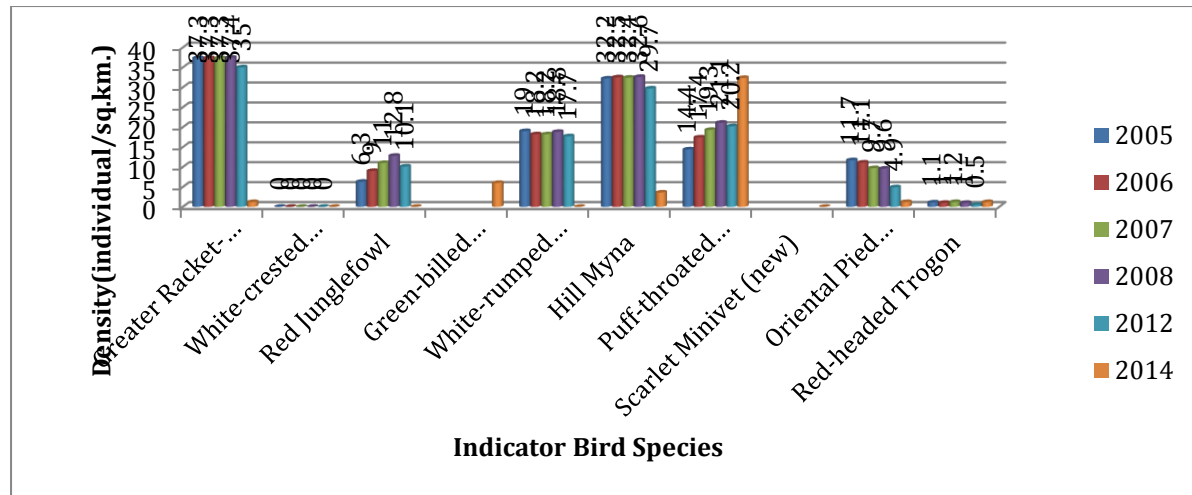
Two transects were established in this new site in Cox's Bazar region in June 2014 covering 4.87 km (length). Six out of eleven indicator birds were recorded between June and September 2014. Records of top and middle strata species such as Hill Myna, Green-billed Malkoha, Greater Racket-tailed Drongo and Red-headed Trogon indicate that the forest holds some high vegetation with moderate understory.



The high number of Puff-throated Babbler indicates rich scrubby vegetation although absence or low number of Red Junglefowl and Abbott’s Babbler imply uncertain status of the ground vegetation.

*Teknaf Wildlife Sanctuary*

**Figure 11:** Density of Indication birds (birds/km<sup>2</sup>) in Teknaf Wildlife Sanctuary during June-September 2014 in compare to 2005-2008 and 2012.

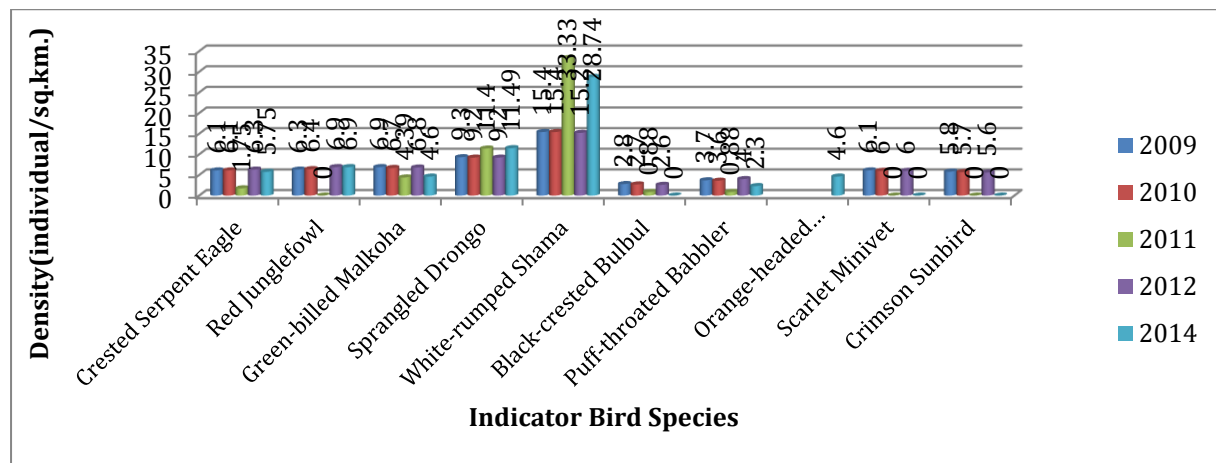


A sharp decline in all indicator species that were recorded during 2005-2008 and 2012 is observed with an increase in Puff-throated Babbler. The absence or high reduction in density of Greater Racket-tailed Drongo, White-rumped Shama; Hill Myna and Oriental Pied Hornbill indicate diminution of middle and higher strata. Moreover, the increase in Puff-throated Babbler number further demonstrates a reduction of forest cover and an expansion of bushy vegetation.

**Central Region**

*Modhupur National Park*

**Figure 12:** Density of Indication birds (birds/km<sup>2</sup>) in Modhupur National Park during June-September 2014 in compare to 2009-2011 and 2012.



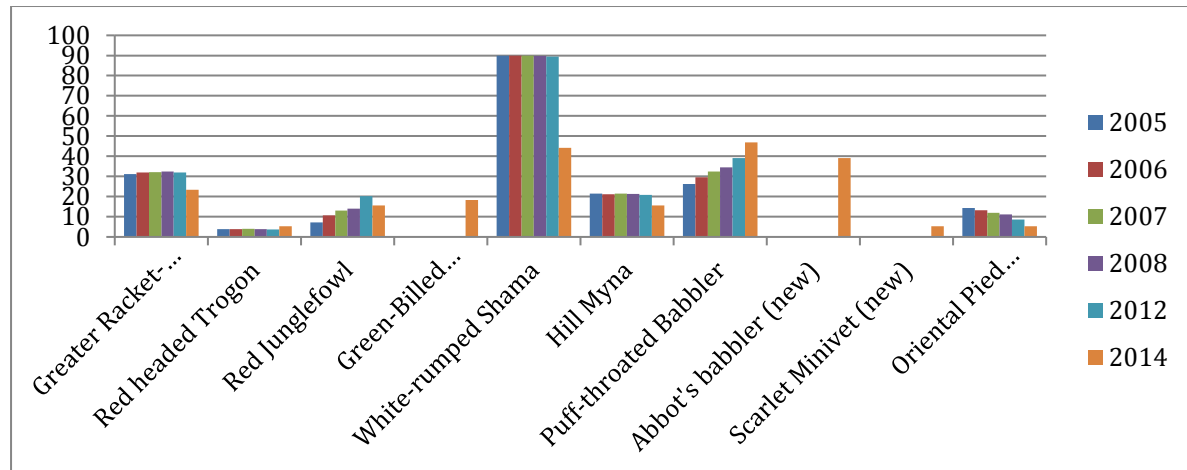
The higher density of middle and lower strata species like White-rumped Shama, Spangled Drongo and Abbott’s Babbler could indicate better health of the lower strata of the forest, but the decline in the nectar feeder (Crimson Sunbird), suggests a lack of flowering species. Continuous presence of ground dwellers such as Red Junglefowl and Orange-headed Thrush indicates a stable trend of the ground

vegetation. An absence or reduction in top strata species such as Scarlet Minivet and Black-crested Bulbul is observed over the years especially post 2012.

### Sylhet Region

#### Lawachara National Park

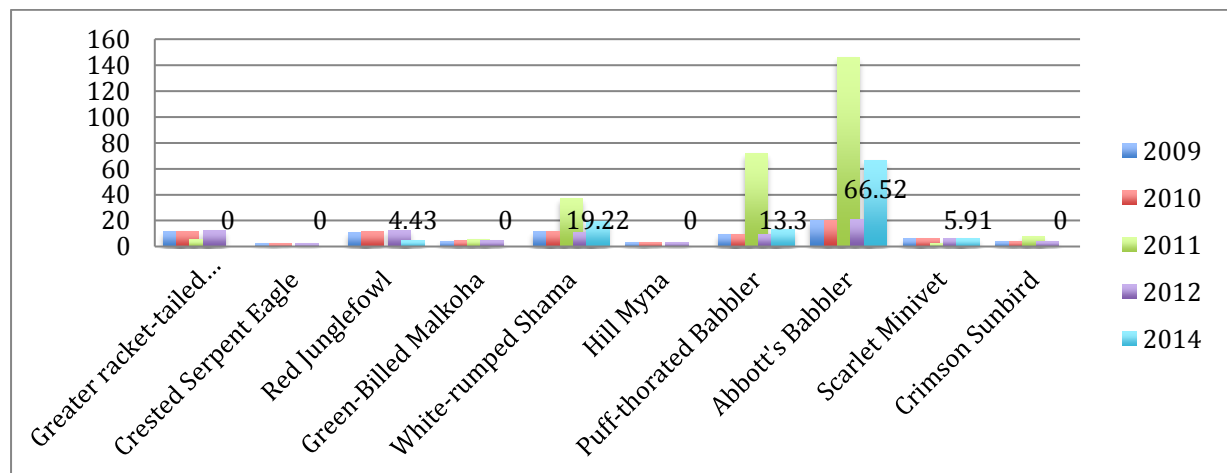
**Figure 13:** Density of Indication birds (birds/km<sup>2</sup>) in Lawachara National Park during June-September 2014 in compare to 2005-2008 and 2012.



All indicator species (four new) were recorded at Lawachara National Park. Overall, most of the indicator species either show negligible decline or a steady increase except for White-rumped Shama (less than half were recorded in 2014 than in 2005-2008). Since the survey in 2014 started later during the breeding season than previous years, the probability to record singing individuals might have also reduced. The Red Junglefowl still shows an increasing trend, indicating that the ground vegetation has improved. The health of upper strata is unclear based on the data on just one species (Hill Myna), which did not show significant change in its population density since 2008.

#### Khadim Nagar National Park

**Figure 14:** Density of Indication birds (birds/km<sup>2</sup>) in Khadim Nagar National Park during June-September 2014 in compare to 2009-2011 and 2012.



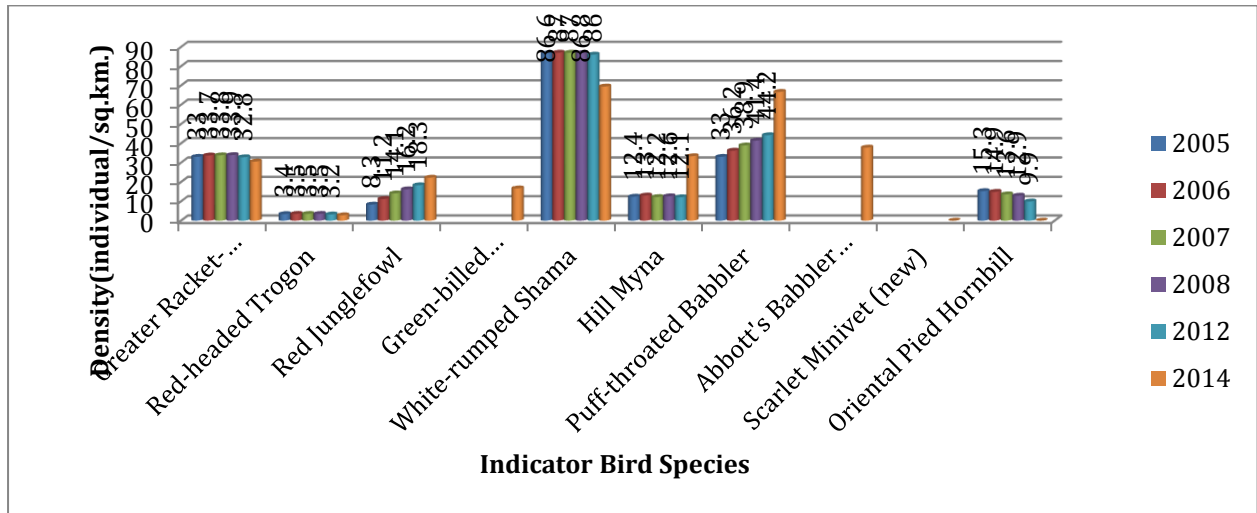
Findings from 2012 compared with the three previous years are uncertain. Very high counts of Puff-throated and Abbott's Babbler in 2011 seem implausible given the range of densities recorded in other



sites and years (maxima of 40/km<sup>2</sup> and 20/km<sup>2</sup> respectively). Inconsistencies in the method are possible, and number seems to be normal in 2014. But it may be that the scrubby and bushy habitats have improved resulting in rapid increases in their populations, while the overall health of the forest remained unchanged.

*Satchari National Park*

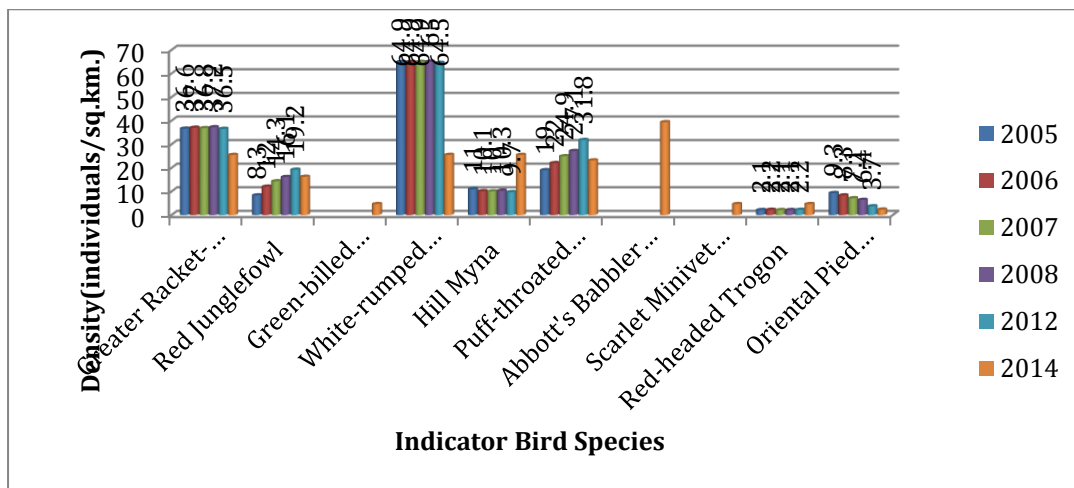
**Figure 15:** Density of Indication birds (birds/km<sup>2</sup>) in Satchari National Park during June-September 2014 in compare to 2005-2008 and 2012.



Overall, the populations of indicator species do not show substantial change with an increase in Hill Myna and a decrease in White-rumped Shama populations. The increasing densities of ground dwellers (Red Jungle fowl and Puff-throated Babbler) indicate possible regeneration and improved ground vegetation. The health of the understory or middle strata is uncertain given that different species representing this canopy show different densities. Although the population of Hill Myna shows an increasing trend, the other species of the higher or top strata such as Oriental Pied Hornbill were absent or show decline, therefore the status of the top canopy is unclear.

*Rema-Kalenga Wildlife Sanctuary*

**Figure 16:** Density of Indication birds (birds/km<sup>2</sup>) in Rema-Kalenga Wildlife Sanctuary during June-September 2014 in compare to 2005-2008 and 2012.



Minor decline is apparent on ground dweller's density such as the Puff-throated Babbler, which is negligible. Understory species such as White-rumped Shama and Greater Racket-tailed Drongo seem to be decreasing, although middle and top strata species like Red-headed Trogon and Hill Myna show a steady or increasing population.

### **CAPACITY BUILDING OF LOCAL SURVEYORS**

A total of 42 local surveyors (selected by CREL) were trained by Bbc experts. These individuals were trained (with orientation, hands-on orientation and resource materials) to identify the indicator species as well as other common forest birds and were introduced to the survey method. Their performances were assessed based on the following criteria: 1. Leadership; 2. Skill (bird identification); 3. Interest (birds, bird survey and wildlife in general); 4. Punctuality and 5. Communication. A bird champion for each PA will be selected based on the performance of the above mentioned criteria. Moreover, a CD with indicator bird calls and a guidebook were provided to the local participants.

### **CONCLUSION AND RECOMMENDATION**

Loss of habitat through illegal felling, collection of firewood and conversion of mature forest to monoculture is the primary threat to the birds and their habitats. Broadly, these threats were identified in 2011 and are still effective for all 14 PAs in all the five sites. It is important to note that illegal tree fellers are targeting many fruiting trees including Chapalish (*Artocarpus chaplasha*) and this poses a huge threat to frugivorous birds and mammals if it continues.







It would be useful to prepare a list of native fruiting and flowering trees for each of the PAs and their habitat types and organize replanting/restoration of these trees in the PAs and in forest and other lands around the protected areas.





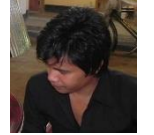
It appears that three or ideally four counts along each transect is sufficient to give reasonable annual population estimates this considerably reduces the task for volunteers whether from the bird club or from the local community. Further monitoring activities should be conducted in early period of the breeding season once each month ideally between March and June as the activity of the birds reduce during later months and surveys are interrupted by rain and some areas are inaccessible from June onward with the onset of monsoon.

Involving local community members in bird monitoring is a positive approach for birds and their habitat conservation. This year the CREL-Bbc provided an indicator bird identification guidebook and CD with bird calls to all local surveyors. These will assist the locals to carry out the surveys on their own without the support from Bbc volunteers. However, to make it sustainable, the local volunteers need further motivation to form their own bird watching group and carry out surveys on their own with limited resources. By involving them with local university and school students for joint field trips, where the locals volunteer will show their area and the birds will create further attachments to the monitoring. If further training takes place then separate sessions focused on birds and their importance for the forest and wetlands ecosystems should also be designed to keep them interested and involved. Two potential ways of strengthening this are: a) focusing on eco-guides so that they enhance their skills by showing visitors birds and can conduct transects as part of their time in the forest; b) developing links between Bbc and local nature clubs or CMOs directly.

## Appendix 1: Local surveyors profile and performance assessment.

PA	Name	Age	Institution	Cell	Performance					Photo
					Leadership	Skill	Interests	Punctuality	Communication	
Fasiakhal i WS	Rahim Uddin	30	Freelance	01811858617	High	High	High	High	High	
Medakachapia NP	Md. Nurul Afsar	32	Freelance	01811804142	Medium	Medium	High	High	Medium	
Himchari NP	Md. Mofidul Islam	27	Freelance	01819821684	High	High	High	High	High	
Himchari NP	Md. Rafiqul Islam	25	Freelance	01856504677	Medium	High	High	High	High	
Inani NP (proposed)	Md. Sona Mia	32	Freelance	01828408449	High	High	High	High	High	
Teknaf WS	Md. Idris Ali	25	Freelance	01829355671	High	High	High	High	High	
Teknaf WS	Md. Saiful Islam	25	Freelance	01811111468	High	High	High	High	High	
Chunoti WS	Md. Ziaul Haque	21	Freelance	01834731667	High	Medium	High	High	Medium	
Chunoti WS	Md. Sadik	21	Freelance	01838709470	Medium	High	High	High	Medium	
Chunoti WS	Md. Helal Uddin	23	Freelance	01815882367	Medium	Medium	Medium	Medium	Medium	

PA	Name	Age	Institution	Cell	Performance					Photo
					Leadership	Skill	Interests	Punctuality	Communication	
Hazarilki WS	Md. Sahabuddin Mannan	41	Freelance	01815382431	High	High	High	High	Medium	
Hazarilki WS	Shunil De	40	Freelance	01826533430	Medium	Medium	Medium	Medium	Medium	
Hazarilki WS	Noni Sharma	41	Freelance	01812800380	Low	Medium	Medium	Medium	Medium	
Kaptai NP	Sazzad Hossain Nizam	20	Freelance	01850565710	High	High	High	High	High	
Kaptai NP	Md. Kamrujjaman	35	FD – Kaptai	01828804475	Medium	Medium	Medium	Medium	Medium	
Kaptai NP	Md. Nazim Uddin	22	Freelance	01828435821	High	High	High	High	High	
DDWS-Dudpukuria	Md. Khorsed Alom	28	– Dudh pukuria	01819365602	Medium	Medium	Medium	Medium	Medium	
DDWS-Dudpukuria	Md. Abu Zafar	65	Dudh pukuria	-----	Medium	Medium	Medium	Medium	Medium	
DDWS-Dudpukuria	Md. Babul Khan	35	Dudh pukuria	01834468904	Medium	Medium	Medium	Medium	Medium	
DDWS-Dhopachari	Md. Mahabub	45	Freelance	01850889286	High	High	High	High	High	
DDWS-Dhopachari	Md. Touhidul Islam Taher	18	Freelance	01832712019	Medium	Medium	Medium	Medium	Medium	

PA	Name	Age	Institution	Cell	Performance					Photo
					Leadership	Skill	Interests	Punctuality	Communication	
DDWS-Dhopachari	Forkan Ahmed	42	Freelance	01821455337	Medium	Medium	Medium	Medium	Medium	
Khadimnagar NP	Suel Das	19	Eco Tour Guide (new)	01768137203	Newly Joined	Medium	High	High	High	
Khadimnagar NP	Mr. Bilash Banarjee	27	Eco Tour Guide	01728968279	High	Medium	High	High	High	
Khadimnagar NP	Mr. Shipon Goala	25	Forest Department	01733607750	Low	Medium	High	Medium	High	
Lawachara	Mr. Santosh Kol	38	Eco Tour Guide LNP	01199366121	Medium	Medium	High	High	High	
Lawachara	Mr. Syamol Devbarma	34	Eco Tour Guide LNP	01727298921	High	High	High	High	High	
Satchari NP	Bashir Ahmed	31	Freelance	01748957625	High	Medium	High	Medium	High	
Satchari NP	Masuk Mia	27	Freelance	01722318426	High	High	High	High	High	
Satchari NP	Rasel Deb Barma	25	Freelance	01190751879	High	High	High	Medium	High	

PA	Name	Age	Institution	Cell	Performance					Photo
					Leadership	Skill	Interests	Punctuality	Communication	
Rema-Kalenga WS	Monirul Islam Sujon	25	Freelance	01719190436	High	Medium	High	High	High	
Rema-Kalenga WS	Abdur Rahim	32	Freelance	01741144174	High	High	High	Medium	High	
Rema-Kalenga WS	Tajul Islam Shopon	34	Freelance	017156914460	Medium	Medium	High	Medium	High	
Modhupur NP	Md. Abul Kalam Azad	28	Freelance	01740550356	High	High	High	Medium	High	
Modhupur NP	Lojesh Mree	29	Freelance	01780581763	Medium	High	High	High	High	
Modhupur NP	Md. Julhash Mia	47	Forest Guard	01710696557	Medium	Medium	High	Medium	High	

Appendix 2: Indicator resident bird survey data sheet 2014.

## Data sheet for bird survey 2014

**Climate-Resilient Ecosystems and Livelihoods (CREL) Project**

**Participatory Forest Resident Bird Survey 2014**  
to Assess the Protected Area Management Impacts

Name of the Site: .....

Name of the Transect: .....

GPS Coordinates of Two Ends: .....

Visible Landmarks of Two Ends: .....

Length of the Transect: .....km

Width of the Transect: ..... km

Date: .....

Time – Start: ....., End: .....

Name of Surveyors: .....

.....

Name of Supervisor(s): .....

Indicator Bird Species Count			Total Bird Species (Including indicator species)  (Names)	Miscellaneous Notes  (Any important information recorded at any time while in the field)
Sl. No.	Name	Tally Count		
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

**Appendix 3: List of birds recorded in four forest PA sites of Chittagong region during June-September 2014.**

SI No.	English and Scientific name	Kaptai NP				DDWS				Chunoti WS				Hazarikhil WS			
		10-11 June	July	11-12 Aug	10-11 Sept	12-13 June	July	13-14 Aug	12-13 Sept	14-15 June	July	15-16 Aug	14-15 Sept	16-17 June	July	17-18 Aug	15-16 Sept
	Months/2014																
1.	Red Junglefowl <i>Gallus gallus</i>	√															
2.	Speckled Piculet <i>Picumnus innominatus</i>								√								
3.	Bay Woodpecker			√	√												
4.	Great Slaty Woodpecker <i>Mulleripicus pulverulentus</i>	√			√												
5.	Fulvous-breasted Woodpecker <i>Dendrocopos macei</i>							√		√	√	√	√		√	√	√
6.	Greater Yellownape <i>Picus flavinucha</i>	√	√	√		√	√							√		√	√
7.	Black-rumped Flameback <i>Dinopium benghalense</i>											√	√				√
8.	Greater Flameback <i>Chrysocolaptes lucidus</i>				√				√			√	√	√	√		√
9.	Hooded Pitta <i>Pitta sordida</i>	√				√				√				√	√		√
10.	Lineated Barbet <i>Megalaima lineata</i>	√	√	√		√	√							√			
11.	Blue-throated Barbet <i>Megalaima asiatica</i>	√	√					√	√					√			
12.	Blue-eared Barbet <i>Megalaima australis</i>	√		√		√		√	√					√			√
13.	Coppersmith Barbet <i>Megalaima haemacephala</i>	√															
14.	Oriental Pied Hornbill <i>Anthracoceros albirostris</i>	√		√		√		√						√			
15.	Red-headed Trogon <i>Harpactes erythrocephalus</i>	√				√					√		√				√
16.	Indian Roller <i>Coracias benghalensis</i>	√	√			√	√	√	√			√			√		



SI No.	English and Scientific name	Kaptai NP				DDWS				Chunoti WS				Hazarikhil WS			
		10-11 June	July	11-12 Aug	10-11 Sept	12-13 June	July	13-14 Aug	12-13 Sept	14-15 June	July	15-16 Aug	14-15 Sept	16-17 June	July	17-18 Aug	15-16 Sept
	Months/2014																
17.	Common Kingfisher <i>Alcedo atthis</i>	√			√	√	√			√	√	√	√	√			
18.	Blue-eared Kingfisher <i>Alcedo meninting</i>	√		√	√												
19.	White-throated Kingfisher <i>Halcyon smyrnensis</i>	√	√	√		√	√	√			√			√	√		
20.	Oriental Dwarf Kingfisher <i>Ceyx erithaca</i>	√															
21.	Stork-billed Kingfisher <i>Pelargopsis capensis</i>	√				√	√				√	√	√	√	√		
22.	Pied Kingfisher <i>Ceryle rudis</i>										√						
23.	Green Bee-eater <i>Merops orientalis</i>	√	√	√	√	√	√	√	√		√		√				√
24.	Chestnut-headed Bee-eater <i>Merops leschenaulti</i>	√	√	√	√	√	√	√		√	√		√	√			
25.	Drongo Cuckoo <i>Surmiculus lugubris</i>	√			√	√								√			√
26.	Asian Koel <i>Eudynamis scolopacea</i>	√			√			√	√			√	√		√		√
27.	Green-billed Malkoha <i>Phaenicophaeus tristis</i>	√	√	√	√	√	√	√	√		√						
28.	Greater Coucal <i>Centropus sinensis</i>	√	√			√					√		√	√			√
29.	Lesser Coucal <i>Centropus bengalensis</i>	√	√	√	√			√	√		√			√	√	√	√
30.	Red-breasted Parakeet <i>Psittacula alexandri</i>	√		√		√		√			√		√	√	√		
31.	Asian Palm Swift <i>Cypsiurus balasiensis</i>	√	√	√	√	√	√			√	√			√			
32.	Mountain Scops Owl <i>Otus spilocephalus</i>													√	√	√	√
33.	Asian Barred Owlet <i>Glaucidium cuculoides</i>	√			√												
34.	Spot-bellied Eagle Owl <i>Bubo nepalensis</i>													√			

SI No.	English and Scientific name	Kaptai NP				DDWS				Chunoti WS				Hazarikhil WS			
		10-11 June	July	11-12 Aug	10-11 Sept	12-13 June	July	13-14 Aug	12-13 Sept	14-15 June	July	15-16 Aug	14-15 Sept	16-17 June	July	17-18 Aug	15-16 Sept
	Months/2014																
35.	Green Imperial Pigeon <i>Ducula aenea</i>	√		√	√												
36.	Spotted Dove <i>Streptopelia chinensis</i>	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
37.	Red Collared Dove <i>Streptopelia tranquebarica</i>							√						√			
38.	Emerald Dove <i>Chalcophaps indica</i>	√			√	√		√								√	√
39.	Pompadour Green Pigeon <i>Treron pompadora</i>													√			√
40.	Pin-tailed Green Pigeon <i>Treron apicauda</i>			√	√												
41.	Red-wattled Lapwing <i>Vanellus indicus</i>									√	√		√	√			
42.	Black Baza <i>Aviceda leuphotes</i>	√															
43.	Crested Serpent Eagle <i>Spilornis cheela</i>					√	√		√						√		
44.	Shikra <i>Accipiter badius</i>	√		√	√	√		√		√				√			√
45.	Black Bittern <i>Dupetor flavicollis</i>													√			
46.	Asian Fairy Bluebird <i>Irena puella</i>	√		√		√		√						√			√
47.	Rufous Treepie <i>Dendrocitta vagabunda</i>	√	√	√				√				√	√	√	√		
48.	Grey Treepie <i>Dendrocitta formosae</i>								√			√		√			√
49.	House Crow <i>Corvus splendens</i>	√	√	√	√	√	√	√	√	√	√	√	√	√	√		
50.	Large-billed Crow <i>Corvus macrorhynchos</i>	√	√	√		√	√					√		√	√		√
51.	Ashy Woodswallow <i>Artamus fuscus</i>	√	√		√			√		√	√			√	√		
52.	Black-hooded Oriole <i>Oriolus xanthornus</i>	√	√	√	√	√		√		√	√			√	√		



SI No.	English and Scientific name	Kaptai NP				DDWS				Chunoti WS				Hazarikhil WS			
		10-11 June	July	11-12 Aug	10-11 Sept	12-13 June	July	13-14 Aug	12-13 Sept	14-15 June	July	15-16 Aug	14-15 Sept	16-17 June	July	17-18 Aug	15-16 Sept
	Months/2014																
72.	Red-whiskered Bulbul <i>Pycnonotus jocosus</i>	√	√	√	√	√	√	√	√					√	√		√
73.	Red-vented Bulbul <i>Pycnonotus cafer</i>	√	√	√	√	√	√	√	√	√	√		√	√	√	√	√
74.	Olive Bulbul <i>Iole virescens</i>	√				√	√		√								
75.	Grey-breasted Prinia <i>Prinia hodgsonii</i>	√				√		√						√			
76.	Oriental White-eye <i>Zosterops palpebrosus</i>	√	√	√		√								√			
77.	Common Tailorbird <i>Orthotomus sutorius</i>	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
78.	Dark-necked Tailorbird <i>Orthotomus atrogularis</i>	√		√		√		√			√			√	√	√	√
79.	Lesser Necklaced Laughingthrush <i>Garrulax moniliger</i>	√			√	√					√			√	√		
80.	Greater Necklaced Laughingthrush <i>Garrulax pectoralis</i>	√									√				√		
81.	Rufous-necked Laughingthrush <i>Garrulax ruficollis</i>									√	√				√		
82.	Abbott's Babbler <i>Malacocincla abbotti</i>	√	√	√	√	√	√		√	√	√	√	√	√	√	√	√
83.	Puff-throated Babbler <i>Pellorneum ruficeps</i>	√	√	√		√	√	√		√	√	√	√	√	√	√	√
84.	Striped Tit Babbler <i>Macronous gularis</i>	√	√		√	√		√	√					√	√	√	√
85.	Chestnut-capped Babbler <i>Timalia pileata</i>	√			√												
86.	Rufous-fronted Babbler <i>Stachyridopsis rufifrons</i>	√		√		√								√			
87.	Grey-throated Babbler <i>Stachyris nigriceps</i>	√			√	√											
88.	Large Scimitar Babbler <i>Pomatorhinus hypoleucos</i>					√					√						

SI No.	English and Scientific name	Kaptai NP				DDWS				Chunoti WS				Hazarikhil WS			
		10-11 June	July	11-12 Aug	10-11 Sept	12-13 June	July	13-14 Aug	12-13 Sept	14-15 June	July	15-16 Aug	14-15 Sept	16-17 June	July	17-18 Aug	15-16 Sept
	Months/2014																
89.	White-browed Scimitar Babbler <i>Pomatorhinus schisticeps</i>			√										√	√		
90.	Striated Babbler <i>Turdoides earlei</i>			√						√							
91.	Nepal Fulvetta <i>Alcippe nipalensis</i>	√				√											
92.	Scarlet-backed Flowerpecker <i>Dicaeum cruentatum</i>	√	√	√	√	√	√	√	√					√	√	√	√
93.	Ruby-cheeked Sunbird <i>Anthreptes singalensis</i>	√			√				√								
94.	Purple-throated Sunbird <i>Leptocoma sperata</i>	√															
95.	Crimson Sunbird <i>Aethopyga siparaja</i>	√	√		√												√
96.	Little Spiderhunter <i>Arachnothera longirostra</i>	√	√	√	√	√	√	√	√					√	√	√	√
97.	Streaked Spiderhunter <i>Arachnothera magna</i>					√		√						√			
98.	House Sparrow <i>Passer domesticus</i>	√	√	√		√	√	√		√						√	
99.	Baya Weaver <i>Ploceus philippinus</i>	√			√			√									
100.	White-rumped Munia <i>Lonchura striata</i>					√		√									
101.	Black-headed Munia <i>Lonchura malacca</i>									√							
102.	Indian Cuckoo <i>Cuculus micropterus</i>								√								
103.	Common Hawk-Cuckoo <i>Hierococyx varius</i>	√				√								√			

**Appendix 4:** List of birds recorded in four forest PA sites of Cox's Bazar region during June-September 2014.

SI No.	English and Scientific name	Himchari				Inani				Fashiakhali				Medhakaccapia				Teknaf			
		June	July	August	Septem	June	July	August	Septem	June	July	August	Septem	June	July	August	Septem	June	July	August	Septem
	Months/2014																				
1.	Barred Buttonquail <i>Turnix suscitator</i>	√										√									
2.	Greater Yellownape <i>Picus flavinucha</i>	√																			
3.	Black-rumped Flameback <i>Dinopium benghalense</i>	√										√								√	
4.	Greater Flameback <i>Chrysocolaptes lucidus</i>	√					√		√												
5.	Coppersmith Barbet <i>Megalaima haemacephala</i>			√		√				√											
6.	Indian Roller <i>Coracias benghalensis</i>					√								√					√		
7.	Common Kingfisher <i>Alcedo atthis</i>	√				√	√	√	√										√		
8.	White-throated Kingfisher <i>Halcyon smyrnensis</i>	√				√				√				√							
9.	Stork-billed Kingfisher <i>Pelargopsis capensis</i>									√											
10.	Pied Kingfisher <i>Ceryle rudis</i>	√			√	√															
11.	Blue-tailed Bee-eater <i>Merops philippinus</i>	√	√	√	√	√	√	√	√	√	√	√	√	√		√	√		√	√	
12.	Chestnut-headed Bee-eater	√			√	√		√	√		√		√							√	

SI No.	English and Scientific name	Himchari				Inani				Fashiakhali				Medhakaccapia				Teknaf			
		June	July	August	Septem	June	July	August	Septem	June	July	August	Septem	June	July	August	Septem	June	July	August	Septem
	Months/2014																				
	<i>Merops leschenaulti</i>																				
13.	Drongo Cuckoo <i>Surniculus lugubris</i>					√															
14.	Green-billed Malkoha <i>Phaenicophaeus tristis</i>	√	√	√	√	√	√	√	√					√					√	√	
15.	Greater Coucal <i>Centropus sinensis</i>	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
16.	Lesser Coucal <i>Centropus bengalensis</i>	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
17.	Red-breasted Parakeet <i>Psittacula alexandri</i>					√			√	√				√							
18.	Asian Barred Owlet <i>Glaucidium cuculoides</i>													√					√	√	
19.	Spotted Dove <i>Streptopelia chinensis</i>	√	√	√	√	√	√	√	√	√	√	√	√	√		√					
20.	Red Collared Dove <i>Streptopelia tranquebarica</i>					√															
21.	Ashy-headed Green Pigeon <i>Treron pompadora</i>					√															
22.	Crested Serpent Eagle <i>Spilornis cheela</i>	√							√		√	√	√		√	√	√		√		
23.	Shikra <i>Accipiter badius</i>	√								√											
24.	Golden-fronted Leafbird <i>Chloropsis aurifrons</i>		√	√		√		√	√												

SI No.	English and Scientific name	Himchari				Inani				Fashiakhali				Medhakaccapia				Teknaf			
		June	July	August	Septem	June	July	August	Septem	June	July	August	Septem	June	July	August	Septem	June	July	August	Septem
	Months/2014																				
25.	Rufous Treepie <i>Dendrocitta vagabunda</i>	√	√	√	√	√	√		√		√	√	√			√	√		√	√	
26.	Large-billed Crow <i>Corvus macrorhynchos</i>	√	√	√		√		√						√							
27.	Ashy Woodswallow <i>Artamus fuscus</i>	√	√	√	√	√	√	√	√		√	√	√	√	√	√	√			√	
28.	Black-hooded Oriole <i>Oriolus xanthornus</i>		√	√		√				√											
29.	Ashy Minivet <i>Pericrocotus divaricatus</i>					√															
30.	Small Minivet <i>Pericrocotus cinnamomeus</i>		√	√	√		√	√	√	√		√	√	√		√			√	√	
31.	Black Drongo <i>Dicrurus macrocercus</i>	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√		√	√	
32.	Bronzed Drongo <i>Dicrurus aeneus</i>	√								√				√							
33.	Greater Racket-tailed Drongo <i>Dicrurus paradiseus</i>						√		√	√											
34.	Black-naped Monarch <i>Hypothymis azurea</i>		√		√		√		√	√		√	√		√	√	√				
35.	Common Iora <i>Aegithina tiphia</i>	√	√	√	√	√	√	√	√	√	√	√	√	√		√	√		√	√	
36.	Oriental Magpie Robin <i>Copsychus saularis</i>	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√		√	√	
37.	Black-backed Forktail <i>Enicurus immaculatus</i>	√																			
38.	Pied Bushchat <i>Saxicola caprata</i>	√	√											√							







SI No.	English and Scientific name	Himchari				Inani				Fashiakhali				Medhakaccapia				Teknaf			
		June	July	August	Septem	June	July	August	Septem	June	July	August	Septem	June	July	August	Septem	June	July	August	Septem
	Months/2014																				
	<i>Amaurornis phoenicurus</i>																				
64.	Striated Grassbird <i>Megalurus palustris</i>	√		√						√											
65. B	Blue Whistling Thrush <i>Myophonus caeruleus</i>	√																			
66.	Purple Sunbird <i>Cinnyris asiaticus</i>	√	√	√	√		√	√	√	√		√				√					
67.	Thick-billed Green Pigeon <i>Treron curvirostra</i>					√															
68.	Red-collared Dove <i>Streptopelia tranquebarica</i>					√															
69.	Oriental Turtle Dove <i>Streptopelia orientalis</i>					√															
70.	Black-headed Ibis <i>Threskiornis melanocephalus</i>					√															
71.	White-throated Bulbul <i>Alophoixus flaveolus</i>					√															
72. P	Plaintive Cuckoo <i>Cacomantis merulinus</i>									√											
73.	Oriental Honey Buzzard <i>Pernis ptilorhynchus</i>									√											
74.	Indian Cuckoo <i>Cuculus micropterus</i>									√											

Sl No.	English and Scientific name	Himchari				Inani				Fashiakhali				Medhakaccapia				Teknaf			
		June	July	August	Septem	June	July	August	Septem	June	July	August	Septem	June	July	August	Septem	June	July	August	Septem
	Months/2014																				
75.	Large Cuckoshrike <i>Coracina macei</i>									√											
76.	Lesser Whistling Duck <i>Dendrocygna javanicus</i>			√						√											
77.	Red-breasted Parakeet <i>Psittacula krameri</i>			√					√	√				√							
78.	Indian Pond Heron <i>Ardeola grayii</i>		√	√			√	√	√	√	√	√	√		√				√	√	

**Appendix 5:** List of birds recorded in four forest PA sites of Sylhet region during June-September 2014.

SI No.	English and Scientific name	Khadimnagar NP				Lawachara NP				Satchari NP				Rema-Kalenga WS			
		June	July	Augu	Septe	June	July	Augu	Septe	June	July	Augu	Septe	June	July	Augu	Septe
	Months/2014																
	White-cheeked Partridge <i>Arborophila atrogularis</i>											√	√				√
	Red Junglefowl <i>Gallus gallus</i>	√	√	√		√				√	√	√	√	√	√		√
	Kalij Pheasant <i>Lophura leucomelanos</i>						√				√		√				
	Rufous Woodpecker <i>Celeus brachyurus</i>									√	√			√		√	
	Fulvous-breasted Woodpecker <i>Dendrocopos macei</i>														√		
	Greater Yellownape <i>Picus flavinucha</i>						√	√					√	√	√	√	√
	Grey-headed Woodpecker <i>Picus canus</i>						√										
	Black-rumped Flameback <i>Dinopium benghalense</i>				√								√	√	√		
	Greater Flameback <i>Chrysocolaptes lucidus</i>									√			√	√			
	Hooded Pitta <i>Pitta sordida</i>									√							
	Lineated Barbet <i>Megalaima lineata</i>						√	√		√	√	√	√	√	√	√	√
	Blue-throated Barbet <i>Megalaima asiatica</i>					√	√					√					
	Blue-eared Barbet <i>Megalaima australis</i>												√				
	Oriental Pied Hornbill <i>Anthracoceros albirostris</i>							√				√		√			
	Red-headed Trogon <i>Harpactes erythrocephalus</i>					√					√			√		√	

SI No.	English and Scientific name	Khadimnagar NP				Lawachara NP				Satchari NP				Rema-Kalenga WS			
		June	July	Augu	Septe	June	July	Augu	Septe	June	July	Augu	Septe	June	July	Augu	Septe
	Months/2014																
	White-throated Kingfisher <i>Halcyon smyrnensis</i>	✓													✓		
	Stork-billed Kingfisher <i>Pelargopsis capensis</i>													✓		✓	
	Green Bee-eater <i>Merops orientalis</i>	✓															
	Chestnut-headed Bee-eater <i>Merops leschenaulti</i>					✓	✓			✓	✓	✓	✓	✓	✓	✓	✓
	Asian Koel <i>Eudynamys scolopacea</i>																✓
	Green-billed Malkoha <i>Phaenicophaeus tristis</i>					✓				✓							✓
	Greater Coucal <i>Centropus sinensis</i>													✓	✓		✓
	Lesser Coucal <i>Centropus bengalensis</i>														✓		
	Red-breasted Parakeet <i>Psittacula alexandri</i>												✓	✓	✓	✓	✓
	Asian Palm Swift <i>Cypsiurus balasiensis</i>															✓	
	Asian Barred Owlet <i>Glaucidium cuculoides</i>													✓			✓
	Green Imperial Pigeon <i>Ducula aenea</i>		✓														
	Spotted Dove <i>Streptopelia chinensis</i>	✓									✓	✓	✓	✓	✓	✓	✓
	Red Collared Dove <i>Streptopelia tranquebarica</i>																
	Emerald Dove <i>Chalcophaps indica</i>	✓				✓	✓						✓			✓	✓
	Pin-tailed Green Pigeon <i>Treron apicauda</i>																
	Pompadour Green Pigeon <i>Treron pompadora</i>										✓		✓	✓	✓	✓	✓
	Black Baza <i>Aviceda leuphotes</i>													✓			

SI No.	English and Scientific name	Khadimnagar NP				Lawachara NP				Satchari NP				Rema-Kalenga WS			
		June	July	Augu	Septe	June	July	Augu	Septe	June	July	Augu	Septe	June	July	Augu	Septe
	Months/2014																
	Crested Serpent Eagle <i>Spilornis cheela</i>	✓			✓						✓						
	Little Egret <i>Egretta garzetta</i>														✓	✓	
	Intermediate Egret <i>Mesophoyx intermedia</i>				✓												
	Cinnamon Bittern <i>Ixobrychus cinnamomeus</i>	✓													✓	✓	
	Asian Fairy Bluebird <i>Irena puella</i>					✓	✓	✓			✓						
	Golden-fronted Leafbird <i>Chloropsis aurifrons</i>									✓				✓	✓	✓	✓
	Rufous Treepie <i>Dendrocitta vagabunda</i>													✓	✓	✓	✓
	Large-billed Crow <i>Corvus macrorhynchos</i>	✓															
	Ashy Woodswallow <i>Artamus fuscus</i>														✓		
	Black-hooded Oriole <i>Oriolus xanthornus</i>									✓	✓	✓	✓	✓	✓	✓	✓
	Small Minivet <i>Pericrocotus cinnamomeus</i>										✓						
	Scarlet Minivet <i>Pericrocotus flammeus</i>	✓	✓														✓
	Black Drongo <i>Dicrurus macrocercus</i>	✓			✓									✓	✓	✓	✓
	Bronzed Drongo <i>Dicrurus aeneus</i>									✓		✓	✓				✓
	Lesser Racket-tailed Drongo <i>Dicrurus remifer</i>														✓		
	Greater Racket-tailed Drongo <i>Dicrurus paradiseus</i>					✓		✓		✓		✓		✓	✓	✓	✓
	Spangled Drongo <i>Dicrurus hottentottus</i>				✓					✓				✓	✓	✓	✓

Sl No.	English and Scientific name	Khadimnagar NP				Lawachara NP				Satchari NP				Rema-Kalenga WS			
		June	July	Augu	Septe	June	July	Augu	Septe	June	July	Augu	Septe	June	July	Augu	Septe
	Months/2014																
	Black-naped Monarch <i>Hypothymis azurea</i>	✓	✓	✓				✓						✓			
	Common Iora <i>Aegithina tiphia</i>	✓	✓	✓		✓	✓			✓		✓				✓	
	Common Woodshrike <i>Tephrodornis pondicerianus</i>															✓	
	Oriental Magpie Robin <i>Copsychus saularis</i>														✓	✓	
	White-rumped Shama <i>Copsychus malabaricus</i>	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	
	Chestnut-tailed Starling <i>Sturnus malabaricus</i>				✓												
	Asian Pied Starling <i>Sturnus contra</i>	✓															
	Common Myna <i>Acridotheres tristis</i>													✓	✓		
	Jungle Myna <i>Acridotheres fuscus</i>														✓		
	Hill Myna <i>Gracula religiosa</i>					✓	✓	✓		✓	✓		✓	✓	✓	✓	✓
	Black-crested Bulbul <i>Pycnonotus melanicterus</i>		✓			✓	✓	✓		✓	✓			✓	✓		✓
	Red-whiskered Bulbul <i>Pycnonotus jocosus</i>	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓		✓	✓	✓
	Red-vented Bulbul <i>Pycnonotus cafer</i>	✓				✓				✓	✓	✓	✓	✓	✓	✓	✓
	Olive Bulbul <i>Iole virescens</i>									✓				✓			
	Oriental White-eye <i>Zosterops palpebrosus</i>			✓			✓			✓		✓					
	Common Tailorbird <i>Orthotomus sutorius</i>		✓	✓	✓							✓			✓	✓	✓
	Dark-necked Tailorbird <i>Orthotomus atrogularis</i>					✓	✓						✓				
	Greater Necklaced Laughingthrush <i>Garrulax pectoralis</i>					✓		✓		✓	✓			✓			



Sl No.	English and Scientific name	Khadimnagar NP				Lawachara NP				Satchari NP				Rema-Kalenga WS			
		June	July	Augu	Septe	June	July	Augu	Septe	June	July	Augu	Septe	June	July	Augu	Septe
	Months/2014																
	Abbott's Babbler <i>Malacocincla abbotti</i>	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
	Puff-throated Babbler <i>Pellorneum ruficeps</i>	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
	Striped Tit Babbler <i>Macronous gularis</i>	✓	✓	✓	✓						✓						
	White-browed Scimitar Babbler <i>Pomatorhinus schisticeps</i>		✓														
	Scarlet-backed Flowerpecker <i>Dicaeum cruentatum</i>	✓		✓		✓	✓			✓				✓	✓		✓
	Ruby-cheeked Sunbird <i>Anthreptes singalensis</i>																✓
	Purple-rumped Sunbird <i>Nectarinia zeylonica</i>	✓	✓											✓			
	Little Spiderhunter <i>Arachnothera longirostra</i>	✓				✓	✓	✓		✓	✓	✓	✓			✓	✓

#### Appendix 6: List of birds recorded in Madhupur NP during June-September 2014.

Sl No.	English and Scientific name	Madhupur NP			
		June	July	August	September
	Months/2014				
79.	White-cheeked Partridge <i>Arborophilaatrogularis</i>				
80.	Red Junglefowl <i>Gallus gallus</i>	✓	✓ ✓	✓ ✓	
81.	Kalij Pheasant <i>Lophuraleucomelanos</i>				
82.	Grey Peacock-Pheasant <i>Polyplectronbicalcaratum</i>				
83.	Barred Buttonquail <i>Turnixsuscitator</i>				
84.	White-browed Piculet <i>Sasiaochracea</i>				
85.	Rufous Woodpecker <i>Celeusbrachyurus</i>		✓ ✓	✓ ✓	✓ ✓

Sl No.	English and Scientific name	Madhupur NP			
		June	July	August	September
	<b>Months/2014</b>				
86.	Great Slaty Woodpecker <i>Mulleripicuspulverulentus</i>				
87.	Speckled Piculet <i>Picumnusinnominatus</i>				
88.	Fulvous-breasted Woodpecker <i>Dendrocoposmacei</i>				✓ ✓
89.	Greater Yellownape <i>Picusflavinucha</i>				
90.	Grey-headed Woodpecker <i>Picuscanus</i>				
91.	Black-rumped Flameback <i>Dinopiumbenghalense</i>				
92.	Greater Flameback <i>Chrysocolapteslucidus</i>		✓ ✓		
93.	Hooded Pitta <i>Pittasordida</i>				
94.	Lineated Barbet <i>Megalaimalineata</i>	✓	✓ ✓	✓ ✓	✓ ✓
95.	Blue-throated Barbet <i>Megalaimaasiatica</i>			✓ ✓	
96.	Blue-eared Barbet <i>Megalaimaaustralis</i>				
97.	Coppersmith Barbet <i>Megalaimahaemacephala</i>				✓ ✓
98.	Oriental Pied Hornbill <i>Anthracocerosalbirostris</i>				
99.	Red-headed Trogon <i>Harpacteserythrocephalus</i>				
100.	Indian Roller <i>Coraciasbenghalensis</i>		✓ ✓		✓ ✓
101.	White-throated Kingfisher <i>Halcyon smyrnensis</i>		✓ ✓	✓ ✓	✓ ✓
102.	Oriental Dwarf Kingfisher <i>Ceyxerithaca</i>				
103.	Stork-billed Kingfisher <i>Pelargopsisicapensis</i>	✓	✓ ✓	✓ ✓	✓ ✓
104.	Asian Koel <i>Eudynamysscolopacea</i>	✓		✓ ✓	
105.	Green-billed Malkoha <i>Phaenicophaeustris</i>	✓	✓ ✓		✓ ✓
106.	Greater Coucal <i>Centropussinensis</i>		✓ ✓	✓ ✓	
107.	Red-breasted Parakeet <i>Psittaculaalexandri</i>	✓			
108.	Asian Palm Swift <i>Cypsiurusbalasiensis</i>			✓ ✓	
109.	Spotted Dove <i>Streptopeliachinensis</i>	✓	✓	✓ ✓	✓ ✓

Sl No.	English and Scientific name	Madhupur NP			
		June	July	August	September
	<b>Months/2014</b>				
110.	Emerald Dove <i>Chalcophapsindica</i>	✓			
111.	Red-wattled Lapwing <i>Vanellusindicus</i>	✓ ✓			
112.	Crested Serpent Eagle <i>Spilornischeela</i>	✓ ✓			✓ ✓
113.	Changeable Hawk Eagle <i>Spizaetuscirrhatus</i>	✓ ✓			
114.	Long-tailed Shrike <i>Laniusschach</i>			✓ ✓	✓ ✓
115.	Rufous Treepie <i>Dendrocittavagabunda</i>	✓	✓ ✓	✓ ✓	✓ ✓
116.	Large-billed Crow <i>Corvusmacrorhynchos</i>	✓			✓ ✓
117.	Ashy Woodswallow <i>Artamusfuscus</i>	✓	✓	✓ ✓	✓ ✓
118.	Black-hooded Oriole <i>Oriolusxanthornus</i>	✓	✓	✓ ✓	✓ ✓
119.	Large Cuckooshrike <i>Coracinamacei</i>	✓ ✓	✓ ✓		✓ ✓
120.	Small Minivet <i>Pericrocotuscinnamomeus</i>		✓ ✓		
121.	Black Drongo <i>Dicrurusmacrocerus</i>		✓	✓ ✓	✓ ✓
122.	Bronzed Drongo <i>Dicrurusaeneus</i>	✓	✓ ✓	✓ ✓	✓ ✓
123.	Spangled Drongo <i>Dicrurushottentottus</i>	✓	✓	✓ ✓	✓ ✓
124.	Black-naped Monarch <i>Hypothymisazurea</i>	✓	✓ ✓	✓ ✓	✓ ✓
125.	Common Iora <i>Aegithinatiphia</i>	✓	✓	✓ ✓	✓ ✓
126.	Common Woodshrike <i>Tephrodornispondicerianus</i>	✓ ✓	✓ ✓	✓ ✓	✓ ✓
127.	Orange-headed Thrush <i>Zootheracitrina</i>	✓ ✓	✓ ✓		✓ ✓
128.	Oriental Magpie Robin <i>Copsychussaularis</i>	✓	✓	✓ ✓	✓ ✓
129.	White-rumped Shama <i>Copsychusmalabaricus</i>	✓	✓ ✓	✓ ✓	✓ ✓
130.	Chestnut-tailed Starling <i>Sturnusmalabaricus</i>	✓			✓ ✓
131.	Asian Pied Starling <i>Sturnus contra</i>	✓		✓	✓ ✓
132.	Common Myna <i>Acridotherestrictis</i>		✓	✓	✓ ✓
133.	Bank Myna <i>Acridotheresginginianus</i>				✓ ✓
134.	Jungle Myna <i>Acridotheresfuscus</i>	✓	✓		✓ ✓

Sl No.	English and Scientific name	Madhupur NP			
		June	July	August	September
	<b>Months/2014</b>				
135.	Great Tit <i>Parus major</i>			✓ ✓	
136.	Red-whiskered Bulbul <i>Pycnonotusjocosus</i>	✓	✓ ✓		✓ ✓
137.	Red-vented Bulbul <i>Pycnonotuscafer</i>	✓	✓	✓ ✓	✓ ✓
138.	Oriental White-eye <i>Zosterospalpebrosus</i>		✓ ✓		✓ ✓
139.	Common Tailorbird <i>Orthotomussutorius</i>			✓ ✓	✓ ✓
140.	Greenish Warbler <i>Phylloscopustrochiloides</i>				
141.	Rufous-necked Laughingthrush <i>Garrulaxruficollis</i>	✓ ✓			
142.	Abbott's Babbler <i>Malacocinclaabbotti</i>	✓ ✓	✓ ✓	✓ ✓	✓ ✓
143.	Puff-throated Babbler <i>Pellorneumruficeps</i>	✓ ✓			
144.	Striped Tit Babbler <i>Macronousgularis</i>			✓ ✓	✓ ✓
145.	Jungle Babbler <i>Turdoidesstriata</i>	✓ ✓	✓ ✓	✓ ✓	✓ ✓
146.	Baya Weaver <i>Ploceusphilippinus</i>			✓ ✓	
147.	Indian Pitta <i>Pitta brachyuran</i>	✓ ✓			
148.	Common Hawk Cuckoo <i>Hierococcyx varius</i>	✓ ✓			
149.	Indian Cuckoo <i>Cuculus micropterus</i>	✓ ✓	✓ ✓		
150.	Rock Pigeon <i>Columba livia</i>		✓ ✓		✓ ✓
151.	White-eyed Buzzard <i>Butastur teesa</i>		✓ ✓		
152.	Oriental Honey Buzzard <i>Pernis ptilorhynchus</i>		✓ ✓		
153.	Pied Cuckoo <i>Clamator jacobinus</i>		✓ ✓		
154.	Velvet Fronted Nuthatch <i>Sitta frontalis</i>			✓ ✓	✓ ✓
155.	Black-headed Cuckooshrike <i>Coracina melanoptera</i>			✓ ✓	
156.	Little Cormorant <i>Phalacrocorax niger</i>			✓ ✓	
157.	Eurasian Collared Dove <i>Streptopelia decaocta</i>			✓ ✓	
158.	House Swift <i>Apus affinis</i>			✓ ✓	

Sl No.	English and Scientific name	Madhupur NP			
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	<b>Months/2014</b>				
159.	White-browed Wagtail <i>Motacilla madaraspatensis</i>				✓ ✓
160.	Indian Pond Heron <i>Ardeola grayii</i>				✓ ✓
161.	Bengal Bush Lark <i>Mirafra assamica</i>				✓ ✓
162.	Common Kestrel <i>Falco tinnunculus</i>				✓ ✓

Appendix 7: Photos taken during CREL-Bbc forest bird monitoring 2014.



Figure 17. Local surveyors with CREL-Bbc indicator bird identification guidebook at Inani Reserve Forest, Sept 2014



Figure 18. Lecture session at Chunoti, June 2014.





Figure 19. Training at Khamidnagar NP, June 2014



Figure 20. Lecture session at Khamidnagar NP, June 2014.





Figure 21. Lecture session at Satchari National Park.



Figure 22. Lecture session at Lawachara NP, June 2014.





Figure 23. Knowledge sharing and CD distribution at Madhupur NP, September 2014.



Figure 24. Field survey at Madhupur NP, August 2014.





Figure 25. Field survey at Inani RF, June 2014.



Figure 26. Field survey at Rema-Kalenga WS, August 2014.