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Grey Peacock Pheasant, *Polyplectron bicalcaratum*, as a probable candidate for Ecological Indicator in Tropical Montane Forest of Mizoram, Northeast India

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Abstract

We investigate the habitat selection of Grey Peacock Pheasant, *Polyplectron bicalcaratum* (Varihaw in Mizo) in Lengteng Wildlife Sanctuary (LWS), north eastern site of Mizoram, north east India. After preliminary field investigation the northern periphery of LWS, primary forest (PF) and its adjacent area comprising the fallow land (FL) and secondary forest (SF) were selected for intensive study area. The intensive study area PF was 10 Km^2 with evergreen broadleaved forest, deep gorges, and steep slopes. Transects were laid in the study area and are walked twice a month for 12 months. Different environmental variables, details of vegetations and sex, age and number of the birds were properly recorded. It was observed that *P. bicalcaratum* selects habitat with thick primary forest with dense canopy as well as good underground cover other than secondary forest. Thus, the presence of *P. bicalcaratum* served as an indicator of undisturbed thick canopy with dense shrubs forest. The detail habitat of *P. bicalcaratum* and its uses as ecological indicator are discussed.

Keywords: Grey Peacock Pheasant, Lengteng Wildlife Sanctuary, habitat, ecological indicator, Mizoram.

Introduction

Grey Peacock Pheasants are the most widely distributed of all peacock pheasants occurring over most of mainland south-east Asia. They are traditionally classified as belonging to the sub-family phasianinae of the family phasianidae. The sub-family includes the most charismatic members of the order galliformes, a diverse group of birds commonly referred to as game birds. The family Phasianidae is characterized by strong sexual dimorphism with the males being highly ornate with bright colours and adornments such as wattles and long tails and usually larger than females. The species is represented by four subspecies, *viz.* i) *Polyplectron bicalcaratum bakeri* (Lowe, 1925), a Bhutan Grey Pheasant more widely known as Himalayan Grey Peacock Pheasant, is the palest and greyest form; ii) *P. b. bailyi* (Rothschild, 1906), a Hainan Grey Peacock Pheasant is considered a separate species by Beebe (1918-1922); iii) *P. b. bicalcaratum* (Linnaeus, 1758), a Burmese Grey Peacock Pheasant is dark brown and buff coloured specimens; and iv) *P. b. ghigii* (Delacour and Jabouille, 1924), a Ghigi's Grey Peacock Pheasant, browner than *P.b. bicalcaratum* with buff coloured surrounds on the tail ocelli.

In India the species has been recorded as commonly distributed in the central and eastern Himalayas from Sikkim through Arunachal Pradesh and north-eastern states of Assam, Meghalaya, Manipur, Mizoram, Nagaland and Tripura. Generally the bird inhabits both evergreen and deciduous forests with thick undergrowth in the plains and foothills however its upper distribution is debated. They are fairly abundant in thick

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cover along banks of rivers. Even found in tangled scrub and secondary growth or mixed bamboo and thick scrub. Usually not seen near human land use forms like cultivations near forest and wooded tea gardens (Srivastav & Nigam 2010). Information on study of *P. bicalcaratum* from north east India is scanty, except Choudhury (2006), Choudhury et al (2007), Ghose et al (2007), Lachungpa and Bhutia (2007), Sathyakumar and Dohling (2009) and Selvan *et al.* (2013). There is no report of work done on the studies of the habitat selection of this bird from Mizoram except a preliminary works of Lalthanzara *et al.* (2011, 2013, and 2014). Therefore a study was taken with an objective to find out the habitat requirement of this magnificent ground bird and its role as an ecological indicator in tropical hilly areas of Mizoram.

Materials and methods

Study site

Mizoram (21087 sq. km, 21°58'N to 24°35'N latitude and 92°15 to 93°29'E longitude) is located in north-east India. It has a state boundary in the north with Manipur, Assam and Tripura and an international boundary with Bangladesh in the west and south (318 kms) and Myanmar in the east and south (404 kms)(MIRSAC, 2009). Mizoram, rich in wild flora and fauna, lies in the Indo-Myanmar biodiversity hotspot region.

Based on the preliminary survey within LWS, periphery of northern LWS was found to be the best site for studying *P.bicalcaratum*. The sanctuary lies close to the Indo-Myanmar border and is significant because of its richness in flora and fauna as well as its dense undisturbed forests. Three different intensive study sites were selected, *viz.* i) Primary forest (PF) of an area 10 Km^2 located at within LWS at 23˚52.05'N 93˚15.37'E to 23˚51.53'N 93˚16.03'E and the elevation ranges from 1660m-1818m, and ii) Secondary forest (SF) of an area 8 Km^2 located just adjacent to north-eastern periphery of LWS at 23˚51.43' N 93˚17.10'E to 23˚51.29'N 93˚16.34'E and the elevation ranges from 1333m- 1449m, and iii) Fallow land (FL) of an area 6.5 Km^2 located outside LWS at 23˚52.11'N 93˚15.42'E to 23˚51.08'N 93˚15.27'E and the elevation ranges from 1544m-1699m. The PF comprise of tropical evergreen and Sub-tropical Broad-leaf types which is fairly undisturbed, while that of SF is a disturbed comprise mainly of tall grasses mix with shrubs and young trees. The fallow land is a jhum land in 3 years back. Therefore the vegetation is also mainly shrubs and climbers, grasses and few trees of 4-7 m high.

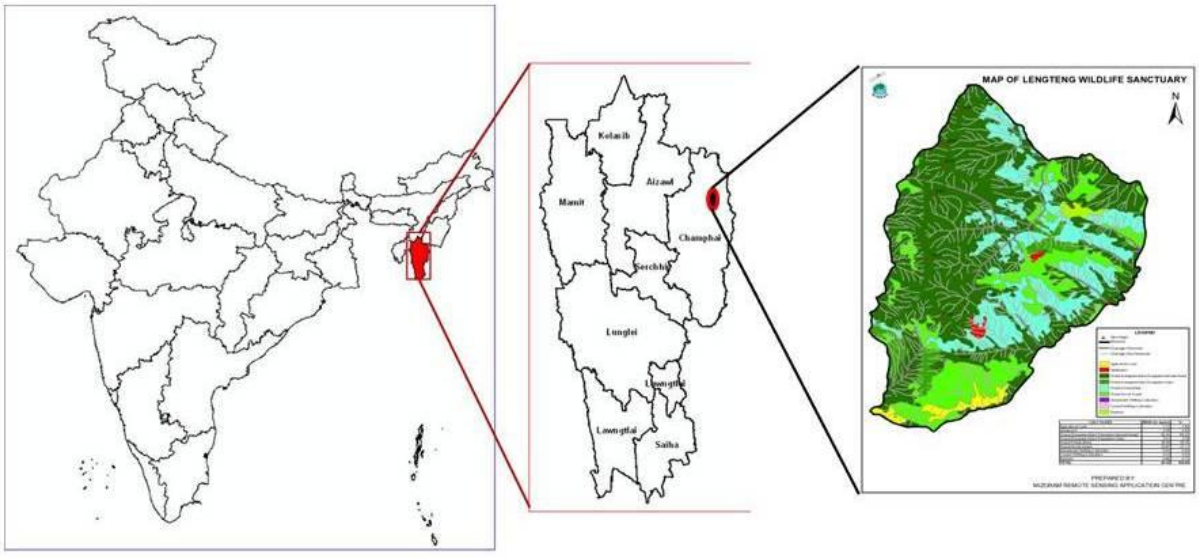

Fig. 1: Study site (PF @ LWS)

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Field Method

Firstly, the secondary information on distribution of *P.bicalcaratum* was collected from 245 villages covering the eight district of Mizoram mainly by interview with local people particularly hunters and identification from trophies. The pheasant species present in the village area was also confirmed by the hunters from coloured picture/photograph of the birds shown to them.

Four line transects (Burnham *et al*, 1981) were made at each sites with a length of 5.09 Km long at PF, 4.9 Km at SF and 4.75 Km long at FL. The transects of PF were named as Lengteng kawng (LTK) I - 1.15 Km, Lengteng kawng(LTK) II – 1.22 Km, Pharsih hnar (PSH) I - 1.4 Km and Pharsih hnar(PSH) II -1.32 Km. The transects of SF were SF I - 1.09 Km, SF II – 1.43 Km, SF III – 1.42 Km, and SF IV – 0.96 Km. The transects of FL are FL I – 1.21 Km, FL II – 0.97 Km, FL III – 1.15 Km and FL IV – 1.42 Km. Each transect was walk twice a month from March 2013 – March 2014.

In each study site, environmental variables were recorded for every transect like details of vegetation, temperature, wind velocity, relative humidity, atmospheric pressure, rain, cloud cover, sunlight, geographical coordinate, elevation, landscape, slope percentage, encounter – distance from water source, distance from transect path and mode of detection, whether direct sighting, call or scratch. When detected, number of birds, male and female, adult and chick were recorded as far as possible.

Data analysis

Relative abundance of *P. bicalcaratum* was calculated using encounter rate i.e. number of birds seen / Km walk or number of calling station / sampling plot (Rodgers 1991), i.e. ER = n / L, where as n = number of sightings or birds detected and L = distance involved.

Result and Discussion

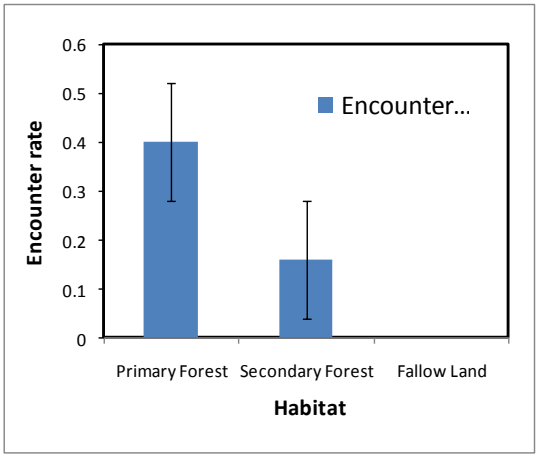

Fig. 2: Relative abundance of GPP in the study area.

Secondary information collated showed that *P. bicalcaratum* is present in 103 villages out of 245 (i.e., 42.04%) villages surveyed (Fig. 3). It was noticed that all the villages reporting the presence of *P. bicalcaratum* indicate that the bird was restricted to the evergreen broadleaved forest areas. Among the three intensive study sites, *P. bicalcaratum* is found in PF and SF only during those 13 months. FL sites did not show any signs of *P. bicalcaratum.* This may be attributed to the skulking behaviour of the bird since the FL is almost an open shrubs forest and thus not love by the bird. The SF site is disturbed by anthropogenic activities in addition to its less canopy cover; therefore it seems not safe for *P. bicalcaratum* and is vulnerable to its predator.

Intensive study at LWS showed that *P. bicalcaratum* selects an area with broadleaved evergreen forest with steep gorge and thick undergrowth (Table 1). The habitat area of *P.bicalcaratum* comprise of small steep hills with deep gorges and small streams, thick undergrowth of climbers, bamboo, and shrubs. All these lead to a very poor visibility even during the day and also the place cannot be access easily due to steepness of the slope. The temperature in the habitat area ranges from 6.4˚C-22.3˚C. Rainfall is experienced from the month of April and continues till October. Field investigation using Line transect was done twice a month for 13 months i.e., March

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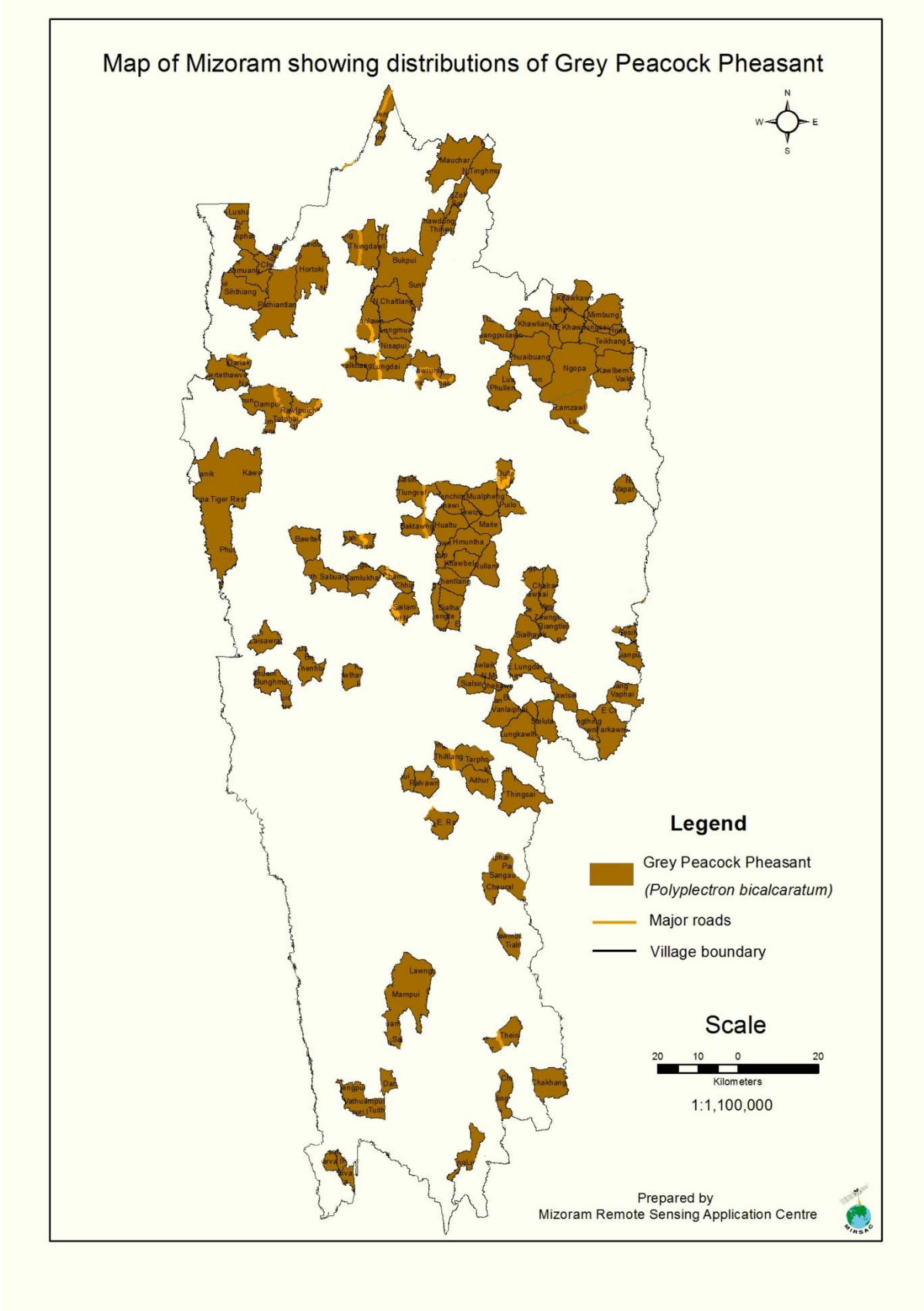

Fig. 3: Map of Mizoram showing the distribution of Grey Peacock Pheasant.

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Table 1: Presence / absence of *P. bicalcaratum* in the study area.

	PF			SF			FL		
Time	Detection	Altitude (m)	Canopy cover (%)	Detection	Altitude (m)	Canopy cover (%)	Detection	Altitude (m)	Canopy cover (%)
Mar. 2013	√	1691	70	√	1335	55	x	1556	30
Apr. 2013	√	1684& 1695	70	x	1423	55	x	1609	30
May 2013	√	1688	80	x	1367	60	x	1609	30
Jun. 2013	x	1688	80	x	1399	60	x	1546	30
Jul. 2013	√	1836& 1695	80	x	1337	60	x	1610	25
Aug. 2013	x	1836& 1695	80	x	1384	60	x	1610	20
Sept. 2013	√	1695& 1684	80	x	1371	55	x	1623	20
Oct. 2013	√	1692	80	√	1441	55	x	1623	20
Nov. 2013	√	1779	70	x	1345	55	x	1589	20
Dec. 2013	√	1779	70	x	1380	50	x	1565	20
Jan. 2014	√	1686	65	x	1435	60	x	1601	20
Feb. 2014	√	1688	70	x	1339	50	x	1456	30
Mar. 2014	√	1683	70	x	1423	55	x	1456	30

PF, primary forest; SF, secondary forest; FL, fallow land.

2013-March 2014. *P.bicalcaratum* was mostly detected in the site with evergreen vegetation (Table 1) dominated by *Quercus polystachya* (Ṭhil), *Lithocarpus dealbata* (Fah), *Quercus helferiana* (Hlai), *Engelhardtia spicata* (Hnûm) and *Castanopsis tribuloides* (Thingsia). The other vegetation comprise of *Alseodaphne petiolaris* (Bul), *Betula alnoides* (Hriang), *Castanopsis indica* (Se-hawr), *Macaranga indica* (Hnahkhar) with thick undergrowth of *Schizostachyum fushsianum* (Fam. Gramineae-Rawnghal) and small annual herbs. The irritating herb of *Girardinia diversifolia* (Kangṭhai) is prevalent in the dried and wet stream belt. The altitude where *P. bicalcaratum* was sighted ranges from 1684m-1836m above mean sea level. The habitat area of *P. bicalcaratum* was found to have a variety of Relative Humidity (RH) with different season of the year. The RH ranges from 50.3 in the month of March to 90.2 in the month of September. But the authors believe that the RH does not play important role in the habitat selection by *P. bicalcaratum* as they

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Table 2. Characteristics of sampling units.

Name of Transect	Length of Transect (Km)	Forest type	Altitudinal range (m)
FL-1	1.21	Tall grass	1544m-1699m
FL-2	0.97	Tall grass	
FL-3	1.15	Tall grass	
FL-4	1.42	Tall grass	
SF-1	1.09	Small trees &Grass	1333m- 1449m
SF-2	1.43	Small trees &Grass	
SF-3	1.42	Small trees &Grass	
SF-4	0.96	Small trees &Grass	
LTK-1	1.15	Virgin evergreen forest	1660m-1818m
LTK-2	1.22	Virgin evergreen forest	
PSH-1	1.40	Virgin evergreen forest	
PSH-2	1.32	Virgin evergreen forest	

PF, primary forest; SF, secondary forest; FL, fallow land

are encountered in various seasons where the RH varies greatly. The detection of *P. bicalcaratum* was always in the region with thick canopy cover and thick undergrowth of bamboo and other small shrubs and herbs. The presence of *P. bicalcaratum* in the thick undergrowth region may be attributed to the safety provided by the thick undergrowth to *P. bicalcaratum* from predators like eagles, small cats and other predatory animals. Also, *P. bicalcaratum* are encountered mostly in the area with good water source, steep slope and deep gorges. Cloud cover, temperature and velocity of wind are also believed to play less important role in the habitat selection by *P. bicalcaratum*. They are never encountered in the fallow lands near the thick forest (Table 1). The detection of *P. bicalcaratum* is always in the thick virgin forest area of the study site and also the secondary information collected refers the same type of forest. The encounter rates of *P. bicalcaratum* in the study area are 0.40±0.07 in the virgin forest, 0.16±0.12 in the secondary forest and no visual or audio record in the fallow land (Figure 2). As a result, a conclusion was drawn as the detection of *P. bicalcaratum* indicates that the site is a virgin forest, safe from human disturbances. So the presence of *P. bicalcaratum* can be used as an indicator for virgin forest free from human disturbances like fire-wood collection, poaching, jhuming, and collection of non-timber forest products.

Acknowledgement

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