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Distribution Mapping of Grey Peacock Pheasant *Polyplectron bicalcaratum* (Linn. 1758) in Mizoram: A Potential Indicator of Climate Change

Lalawmawia Sailo, G. S. Solanki, S. N. Ramanujam and H. Lalthanzara

INTRODUCTION

Grey Peacock Pheasant, *Polyplectron bicalcaratum* (Linn. 1758) also known as Varihaw in Mizo is the most widely distributed of all peacock pheasants occurring over most of mainland south-east Asia. They belong to the sub-family phasianinae of the family phasianidae under order galliformes. 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.

Of the 17 species of Pheasants present in India, 13 species occurs in the north east India (Sathyakumar and Kaul, 2007) and 6 species are reported from Mizoram (Lalthanzara et al., 2011). The Grey Peacock Pheasant *P. bicalcaratum* is one amongst the six species of pheasants found in Mizoram. The species is represented by four subspecies, *viz.* i) *P. b. 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; 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. *P. bicalcaratum* is a lesser known species due to its elusiveness and stealthy behaviour. This species occurs in Bhutan, Bangladesh, Myanmar, South China, Thailand, South Laos and Central Vietnam with its western limit being Sikkim of India (Madge and

McGowan, 2002). In India, this species is found throughout the north east states viz., Sikkim, Arunachal Pradesh, Assam, Meghalaya, Manipur, Mizoram, Nagaland and Tripura (Srivastav and Nigam, 2010).

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 forest cover along banks of rivers (Madge and McGowan, 2002). Even found in tangled scrub and secondary growth or mixed bamboo and thick scrub (Lalthanzara et al., 2014). Usually not seen near human land use forms like cultivations near forest and tea gardens.

Climate is known to exert both direct and indirect effects on bird populations (Rodenhouse et al., 2007). In the North American continent, various studies and reviews highlighted the relation of climate change and birds distribution (Rodenhouse et al., 2007). Root (1988) discussed the relationships between bird distributions and climate; the effects of changes in precipitation on breeding productivity is studied by Rodenhouse (1992); phonological changes in the timing of migration and arrival was documented by Bradley et al. (1999) and the onset of breeding (Brown *et al.* 1999); the relationship of global climate patterns to food supplies, breeding productivity and survival of migratory birds was well illustrated by Sillett et al. (2000); Matthews et al. (2004) describe the potential effects of climate change on bird species distributions as habitats shift northward and upward in elevation ; and also Lambert and McFarland (2004) describe the extent to which high-elevation habitat and its associated avifauna may be lost due to climate warming. Apart from the highlighted text, numbers of studies on ecological effects of climate change on birds had been conducted in the past viz, Jarvinen, 1994; Crick et al., 1997; Winkel and Hudde, 1997; Forchhammer et al., 1998; McCleery and Perrins, 1998; Visser et al., 1998; Crick and Sparks, 1999; Saether et al., 2000; Dunn and Winkler, 1999; McCarty, 2001; Moss et al., 2001; Walther et al., 2002; Crick, 2004; Nussey et al., 2005; Bradshaw and Holzapfel, 2006; Anders and Post, 2006; Sokolov, 2006). In Mizoram, distribution mapping of *P. bicalcaratum* was solely done by Lalthanzara et al,. (2014) and this studies being the first of its kind in Mizoram can be utilised to determine the change in habitat range of particular species as a result of climate change if compared with future studies.

Materials and Methods

Study site

Mizoram (21087 sq. km, 21°58' 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 share 404 kms long border with Myanmar in the east and south (MIRSAC, 2009). Mizoram is rich in wild flora and fauna being a part of the Indo-Myanmar biodiversity hotspot.

Methodology

Collection of secondary data about *P. bicalcaratum* was carried out at village level and 245 villages of Mizoram covering all the eight district of the state was surveyed by interview of local hunters, village elders and field staff of the then Dept. of Environment and Forest and Climate Change followed by extensive fieldwork to confirm the secondary data collected. Presence-absence data was collected from all the surveyed sites and distribution map was prepared in collaboration with scientists from MIRSAC.

Results and Discussion

Out of 235 villages surveyed, 103 village areas are found to be home for *P. bicalcaratum*. The distribution map of *P. bicalcaratum* (Fig.1) shows that the species is more or less uniformly distributed in the state with slight decrease in the southern side. The fewer distribution pattern showed by the southern side may be attributed to the high disturbance and forest degradation due to various anthropogenic activity. The encounter rate at different forest types were calculated and found to be highest in primary forest (0.40±0.07) followed by Secondary forest (0.16±0.12) and no encounter in degraded forest or fallow land. This finding makes clear that *P. bicalcaratum* is strictly relying on the undisturbed natural forest with thick cover. The degradation in the habitat in any form will be detrimental to the survival of this habitat specific species.

The findings of this study will be useful in determining the shift in vegetation types due to prolonged change in climatic conditions as Lalthanzara et al. (2015) depicted the habitat of *P. bicalcaratum* to be confined only in the virgin forest of the state. As previously mentioned the distribution mapping work is first of its kind for the state and will provide baseline data for the distribution pattern of *P. bicalcaratum*. Therefore, future studies on this particular bird distribution patterns may help in depicting the change in habitat patterns as climate change is known to effect distribution and abundance of birds (Green, 2010). Janice and Mallon (2006) also opined that climate change directly affects the birds by means of habitat shrinking and shifting their habitat. The change in distribution of birds due to climate change may be due to the change in distribution and availability of their preferred food (Wander and Marlin, 2010) or may be just a spatial response (Huntley et al., 2006). The change in distribution pattern of birds may be triggered by the long term effects of change in their growing season and temperature that triggers change in their life

cycle induced by the persisting and gradually increasing pressure of climate change. Humphrey (2004) also mentions that altitudinal shifts in distribution is also likely to occur with change in climate overtime. Pounds et al. (1999) also shows how lower altitude species occupy the previously cloud forest habitat of Costa Rica. Shi et al (2006) mentioned that birds are useful indicator of global climate change, therefore intensive monitoring of the distribution of *P. bicalcaratum* in Mizoram will yield a very useful data to detect the climate change and its effect on the vegetation and diversity of the area as a whole.

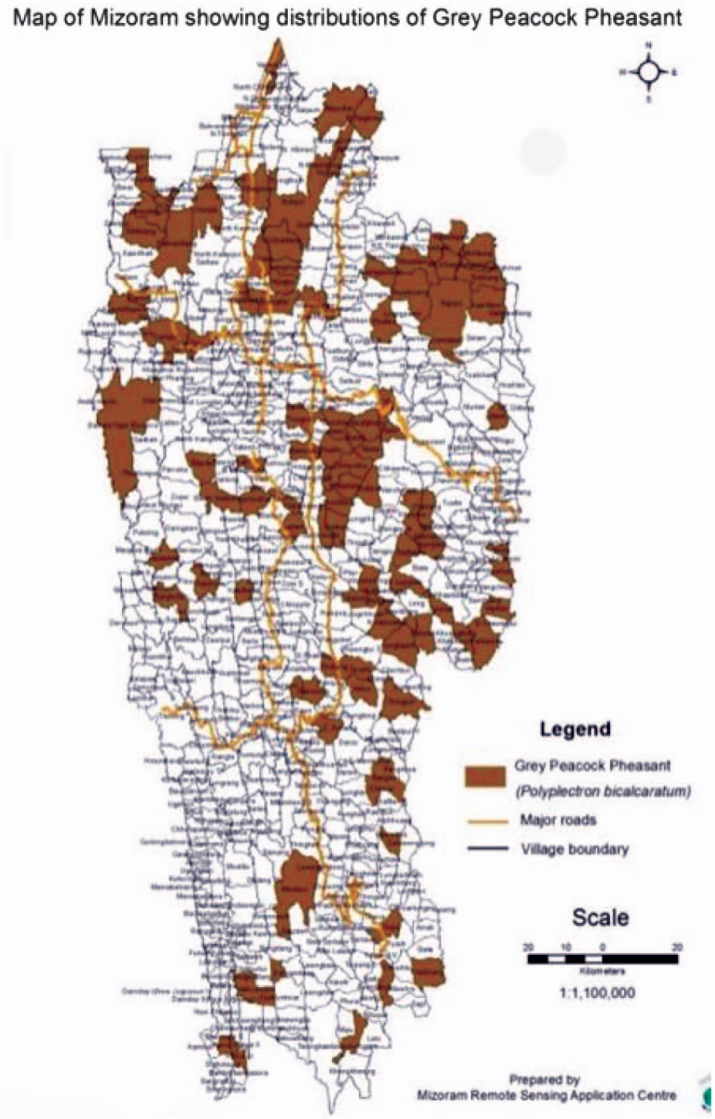

Fig 1: Map of Mizoram showing distribution of *P. bicalcaratum*

Summary

Grey Peacock Pheasant *Polyplectron bicalcaratum* (Linn.1758) is the most widely distributed peacock pheasant species belonging to the family phasianidae under order galliformes. Four sub-species of *P. bicalcaratum* are so far identified, all of them showing great sexual dimorphism. *P. bicalcaratum* served as a good ecological indicator, therefore investigation about its distribution map was carried out in the hilly state of Mizoram, northeast India, where 235 villages were covered by interview with local hunters and field staffs of the state Environment and Forest department followed by intensive field investigation. A total of 103 village areas are found to be home for *P. bicalcaratum,* inhabiting the virgin evergreen forest of the state. The bird encounter rate was highest in primary forest (0.40±0.07) followed by Secondary forest (0.16±0.12) and no encounter in a degraded or open forest and fallow land. The potential use of distribution mapping of *P. bicalcaratum* to monitor the climate change and its implications in the hilly state of Mizoram is discussed in detail.

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References

Anders, AD., and Post, E.(2006). Distribution wide effects of climate change on population densities of a declining migratory land bird. *J Anim Ecol*, 75:221-227.

Bradshaw, WE., and Holzapfel, CM.(2006). Evolutionary response to rapid climate change. *Science*, 312:1477-1478.

Crick, H Q P., Dudley, C., Glue, DE., and Thomson, DL. (1997). UK birds are laying eggs earlier. *Nature*, 388:526.

Crick, HQP (2004). The impact of climate change on birds. *Ibis* (2004), 146 (Suppl.1), 48–56

Crick, HQP. and Sparks Th. (1999). Climate change to egg laying trends. *Nature*, 399:423-424.

Crick, HQP. (2004). The impact of climate change on birds. *Ibis*, 146 (Suppl.1):48-56.

Dunn, PO. and Wilker DW. (1999). Climate change has affected the breeding date of Tree Swallows throughout North America. *Proc R Soc London B*, 266:2487-2490.

Forchhammer, MC., Post, E., and Stenseth NC. (1998). Breeding phenology and climate. *Nature*, 391:29-30.

Green, R. (2010). An overview of the effects of climate change on birds. *BOU Proceedings – Climate Change and Birds*. http://www.bou.org.uk/bouproc-net/ccb/green.pdf

Huntley, B., Collingham Y.C., Green R.E., Hilton G.M., Rahbek C. and Willis S. (2006). Potential impacts of climate change upon geographical distributions of birds. Ibis 148: 8. in the northeastern United States. VINS Technical Report 04-2.

Huntley, B., Collingham, Y C., Green, R E., Geoffrey, MH., Carsten, R., and Stephen, GW. (2006). Potential impacts of climate change upon geographical distributions of birds. *Ibis* (2006), 148 , 8–28

Janice, W., and K, Mallon (2006). Bird Species and Climate Change. A Climate Risk Report The Global Status Report: A synthesis of current scientific understanding of anthropogenic climate change impacts on global bird species now, and projected future effects. www.climaterisk.net

Janice, W., and Mallon, K. (2006). Bird Species and Climate Change: The Global Status Report version 1.0. Downloaded from : https://www.wwf.or.jp/activities/lib/pdf_climate/environment/birdsFullReport.pdf on the 14th September 2016.

Jarniven, A.(1994). Global warming and egg size of birds. Ecography, 17:108-110.

Lalthanzara, H., Sailo, L., Solanki, G.S. and Ramanujam, S.N. (2014).Galliformes and Their Conservation Issues in Mizoram, North East India. *Cibtech Journal of Zoology*, 3(1):42-48.

Lalthanzara, H., Vanramliana and Lalramliana.(2011). Pheasants of Mizoram (India): Present status of diversity and distribution. *Science Vision*, 11(4):218-223.

Madge, S. and McGowan, P. (2002). Pheasants, Partridge and Grouse.Princeton University Press.

Matthews S, O'Connor RJ, Iverson LR et al (2004) Atlas of climate change effects in 150 birds.

McCarty, JP. (2001). Ecological consequences of recent climate change. *Conserv Biol*, 15:320-331.

McCleery, RH. and Perrins, CM (1998). Temperature and egg laying trends. *Nature*, 391:30-31.

Mizoram Remote Sensing Application Centre (2009).*Natural Resources Atlas of Mizoram.* Potential impacts of climatic change upon geographical Pounds A.J., Fogden M.P.L. & Campbell J.H. (1999) Biological response to climate change on a tropical mountain. *Nature* 398, 611.

Moss, R., Oswald, J. and Baines, D.(2001). Climate change and breeding success: Decline of the capercaille in Scotland. *J. Anim Ecol*, 70:47-61.

Nursey, DH., Postma, E., Gienapp, P., and Visser, ME.(2005). Selection of heritable phenotypic plasticity in a wild bird population. *Science*, 310:304-306.

Rodenhouse, N. L., Matthews, S. N., M cFarland, K. P., Lambert, J. D., Iverson, L. R., Prasad, A., Sillett, T. S. and Holmes, R. T. (2007). Potential effects of climate change on birds of the northeast. In press for the journal Mitigation and Adaptation Strategies for Global Change, as part of the special issue entitled: "Northeast United States Climate Impact Assessment"

Root, T.L. (1988). Environmental factors associated with avian distributional boundaries. Journal of Biogeography 15: 489. Science, Woodstock, Vermont.species of the Eastern United States. GTR-NE-318.

Saether, BE., Tufto, J., Engen, S., Jerstaad, K., Rostad, ON., and Skatan, JE.(2000). Population dynamical consequences of climate change for a small temperate songbird. *Science*, 287:854-856.

Sokolov, LV. (2006). The influence of global warming on timing of migration and breeding of passerine bird in the twentieth century. *Zoologichesky Zhurnal*, 85:317-341.

Srivastav, A. and Nigam, P. (2010). Indian National Studbook of Grey Peacock Pheasant (*Polyplectron bicalcaratum*). Wildlife Institute of India, Dehradun and Central Zoo Authority, New Delhi.

Visser, ME., Noordwijk, AJV., Tinbergen, JM., and Lessels, CM. (1998). Warmer springs lead to mistimed reproduction in Great Tits (*Parus major*). *Proc R Soc London B*, 256:1867-1870.

Walther, GR., Post, E., Convey, P., Menzel, A., Parmesan, c., Beebee, TJC., Fromentin, JM., Hoeghuldberg, O., and Barlein, F. (2002). Ecological responses to recent climate change. *Nature*, 416:389-395.

Wander, M. and Marlin, J. E. (2010). How Will Climate Change Affect Birds? Change and the Heartland: Big issues, bite-sized lessons. University of Illinois Board of Trustees. "Change and the Heartland" Downloaded from: https://www.ideals.illinois.edu/bitstream/handle/2142/16441/How% 20will% 20Climate% 20Change% 20Affect% 20 Birds.pdf?sequence=3 on the 14th September 2016.

Winkel, W. and Hudde, H. (1997). Long-term trends in reproductive traits of tits (*Parus major, P. caeruleus*) and Pied Flycatcher *Ficedula hypoleuca*. *J Avian Biol* 28:187-190.