RESEARCH ARTICLE
NEST SITE SELECTION OF EURASIAN MAGPIE (PICA PICA) IN PHRUMSENGLA NATIONAL PARK

Jangchuk Gyeltshen
Phrumsengla National Park, Department of Forests & Park Services, Royal Government of Bhutan
Email: jangyel_mangdip@yahoo.com

ABSTRACT

A total of ninety two nests of Eurasian Magpie (Pica pica) were recorded from the four study sites within elevation range of 2897m to 3411m. Ura Dozhi has the highest frequency of nest recorded (75%, n=69) followed by Tangsibee (12%, n=11), Shingneer (8.7%, n=8) and Shingkhar (4.3%, n=4). Nests were observed between the maximum distance of 1000meters and minimum of 5 meters from the nests to the nearest houses (M=218.24m, SD=180.121m). The most preferred tree species for nesting were Spruce (Picea spinulosa) and Blue pine (Pinus wallichiana) followed by Weeping Willow (Salix babylonica) and Cotoneaster bacillaria. The most preferred diameters were 60cm (7.6% of 92 nests) followed by 50cm (6.5% of 92nests) and 100cm (5.4% of 92 nests). The most preferred height for nesting were 30m (21.7%, n=20) followed by 40m (20.7%, n=19), 20m (17.4%, n=16), 50m (13%, n=12), 60m (7.6%, n=7) 70m (2.2%, n=2). However, the least preferred heights were 15m, 80m and 90m with 1.1% each. Statistical test (χ) was performed to assess the association of correlation between nests sighting and distance, slope and aspect, height of trees and age of nests, tree type and tree species. The result showed that there was strong correlation of association between nest sighting and distance (p<0.036, df=24), slope and aspect (p<0.001, df=144), tree type and species (p<0.001, df= 6). However, there was negative association of correlation to height of trees and age of nests (p<0.634, df=20).

KEYWORDS: Eurasian Magpie, nest site selection, Phrumsengla National Park.

Introduction

Nest site selection is important for the birds to successfully breed and nurture offspring. The quality of nest site has direct impact on the breeding activities and fledging success and subsequently affects the population dynamics and community constitution (Baeyens 1981; Badayocv 1994; Clark & Nudds 1991).

Eurasian Magpie (Pica pica) is a resident and territorial bird that is found throughout Europe, Asia, and Northern Africa (Jerzak 2001 as cited in Kirazli et al. 2017). It is urban adapted species in the Palearctic Region (Kirazli et al., 2017). Eurasian Magpie belongs to Crow family (Corvidae) and considered most intelligent among the corvids. It is listed as Least Concern in the IUCN Red List of Threatened Species (IUCN, 2017). The literatures stated that the Eurasian Magpie is believed not only to be among the most intelligent of birds but among the most intelligent of all non-human beings. The bird has associated stories of traditions and symbolism in many countries. Jokimoki et al., (2017) reported that Eurasian Magpie is a suitable species for monitoring the state of and changes taking place in the urban environment. In Bhutan, the
local people call this bird as Chaa-Cowolee or Weng-Cowolee and have the mythical stories embedded in the society.

In Bhutan, Inskipp & Grimmett (2007) reported that this bird can be seen in open, cultivated upland valleys and grassland within elevation range between 2600m to 3600m. Several authors in other countries like China, Japan, Bulgaria and Poland have studied on nest site selection and nest site characteristics of Eurasian Magpie (Pica pica) in the urban cities and areas (Wang et al., 2010; Nakahara et al., 2015; Antonov & Atanasova, 2015). However, these studies are lacking in Bhutan and in particular in PNP. There is an immediate need to study in rural areas where there is not much disturbances and urbanization taking place. Therefore, an attempt was made to study on nest site selection by Eurasian Magpie with the objectives to determine how this bird selects its nest and other influencing factors which would provide insightful information to monitor the population trend over the years with the change of climate, farming and living style of the rural people in the habitats of this bird.

Study area
The study was conducted from 24 May 2018 to 9 August 2018 in Ura Geog under Bumthang Dzongkhag within four villages. These are Ura Dozhi, Shingkhar, Tangsibee and Shingneer. It has a total area of 265.671 km² with a total household of 116 and population of 581 (RGoB, 2018). The study area lies between the elevation range of 2897m to 3411m in a mixed conifer forest dominated by tree species of Blue pine (Pinus wallichiana) and Spruce (Picea spinulosa). Other prominent plant species recorded are Salix babylonica, Rhododendron arboreum, Rhododendron barbatum, Rhododendron thomsonii, Rhododendron lepidotum, Taxus baccata, Larix griffithiana, Piptanthus nepalensis, Rosa microphylla, Rubus biflorus, Prunus sp., Populus ciliata, Daphne bhou and Sarcococca hookeriana. In this study, Site-1 is referred as Ura Dozhi, Site-2 as Tangsibee, Site-3 as Shingkhar & Site-4 as Shingneer.

Agricultural farming and livestock rearing are the main source of income for the people living within the study area. The study area has 3 schools, 1 Grade-1 Basic Health Unit, 3 Outreach Clinics, 1 Renewal Natural Resources Office (RNR Center), 1 Geog Administration Office, 1 Park Office and 1 Department of Road Branch Office. Bumthang-Mongar highway passes through this study area.

Methods and Materials
In this study, total count method was used. All nests were searched, scanned and counted in all the habitats of Eurasian Magpie (Pica pica). From the far off distance, Binocular (8x42 Bushnell) was used to scan and locate nests on the trees. 5m nylon measuring tape was used to measure diameter of nesting trees at breast height (Dbh). Suunto compass was used for recording aspects at the sighted nests. Slope was measured using Suunto clinometers. Height of nesting trees and distances from nearest houses and roads were measured by eyeballing. Eyeballing was adopted after repeated practiced done before starting actual survey. Statistical software program Statistical Package for Social Science (SPSS16.0) was used for data analysis and performing of statistical tests.

Results
Nest condition status and density
A total of ninety two nests were recorded from four survey sites within the elevation range from 2897m to 3411m (Figure 2, 3, 4 & 5). Ura Dozhi has the highest frequency of nest recorded (75%, n=69) followed by Tangsibee (12%, n=11), Shingneer (8.7%, n=8) and Shingkhar (4.3%, n=4). Out of ninety two nests only eight nests were confirmed as half built and abandoned by the birds. The height of these eight nesting trees was noted between 20m to 40m located within distance of 50m to 350m from the nearest houses. However, the causes of nests abandoned were not known. It was assumed that height of trees and high degree of disturbances occurred during or after nest building may be the reasons for abandoning nests.

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All the ninety nests were recorded within a distance of 5m to 1000m from the nearest houses (M=218.24, SD=180.121). No nests were sighted beyond these distances even though there

Figure 1. Google earth map of Ura Geog showing the four study sites.

Figure 2. Google earth map showing study site-1 (Ura Dozhi) with location of nests.
were potential nesting trees with preferred slopes and aspects. Overall, twenty nine nests were observed as Fresh (31.5% of 92 nests), twenty seven as Fresh and old combined (29.3% of 92 nests) and thirty six as old nest (39.1% of 92 nests). Nest density for the study area is estimated based on the total study area. It was estimated that the density of Eurasian Magpie nest is 3 nests/km².

Nesting tree species preference

A total of ninety two nesting trees which consist of seven species of trees were recorded during the study. Out which 71.7%, n=66, was Spruce (Picea spinulosa), 14.1%, n=13, was Weeping willow (Salix babylonica), 7.6%, n=7 was Blue pine (Pinus wallichiana), 3.3%, n=3 was Cotoneaster bacillaris followed by 1% each for Larch (Larix griffithii), Peach (Prunus sp.), and Poplar (Populas ciliate). The result showed that Picea spinulosa and Salix babylonica were the most preferred tree species among other species available in the vicinity of the nesting sites. The study further showed that conifer tree species (79.3%, n=73) were most preferred over deciduous species (20.7%, n=19). This finding agrees with the study conducted by Jokimaki et al., (2017) in Finnish cities of Japan. On contrary, the study conducted by Nakhara et al.,(2015) in Hokkaido in Japan reported that most nesting trees were deciduous broadleaf with only one nest built on a coniferous tree. This suggests that Maggie has no especial preference for selection of tree species for nesting. It is assumed that the magpie may build nest on any tree species available in their habitats but with taller height and less density of canopy cover. If there is both conifer and broadleaf tree species in their habitats, then Magpie would definitely prefer conifer tree species. This is due to the fact that conifer tree provide permanent cover and easy access for the birds during collection of nest building materials. Other tree species listed in the study areas are Abies densa, Juniperus sp., Xanthozylum sp., Elaeagnus parvifolia, Lyonia ovalifolia, Juglan regia and Sorbus sp, Rhodendron sp. However, these trees were not used by the birds for nesting. Statistical test was performed to examine the association of relationship between tree type and species. It has shown that there is strong association of relationship between tree type and species (p<0.001, df= 6). This indicates that magpies have especial preferences of tree types and species for selecting nest site in their habitats depending on the risk of predation and human disturbance.

Nesting tree height preference

Heights for a total of ninety nesting tree species were measured. Maximum height was recorded at 90m and minimum at 15m. The result shows that the most preferred height for nesting were 30meters (21.7%, n=20) followed by 40m (20.7%, n=19), 20m (17.4%, n=16), 50m (13%, n=12), 60m (7.6%, n=7) 70m (2.2%, n=2) with 1.1% each for 15m, 80m, 90m irrespective of tree species. These indicate that a range between 30meters to 40m tree height would be ideal for the Magpies to carry nesting materials and building their nests and also to avoid predators. Study conducted by some authors observed that there was lower breeding success in the lower nest sites (Eguchi &Takeishi, 1997; Gorski, 1997; Jerzak, 1995). Therefore, Magpie prefers tall trees for nesting. This suggests that tree height is one of the main influencing factors in selecting nest by the Eurasian Magpie. This was even reported in Poland by Jerzak et al., (1997). Prokop (2004) also noted that the nest height above the ground was the main predictor of nest usurpation.
Nest Site Selection of Eurasian Magpie (*Pica pica*) in Phrumsengla National Park

Figure 6. Graph showing tree species preference by Eurasian Magpie in four study sites.

Figure 7. SPSS generated graph showing frequency of diameter occurrence in the study sites.

**Nesting tree species**

<table>
<thead>
<tr>
<th>Tree Species</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Larix griffithiana</td>
<td>20</td>
</tr>
<tr>
<td>Picea spinulosa</td>
<td>15</td>
</tr>
<tr>
<td>Pinus wallichiana</td>
<td>10</td>
</tr>
<tr>
<td>Salix babylonica</td>
<td>5</td>
</tr>
<tr>
<td>Cotoneaster bacillaria</td>
<td>3</td>
</tr>
<tr>
<td>Prunus Sp.</td>
<td>2</td>
</tr>
<tr>
<td>Populas ciliata</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure 8. Slope preference by Eurasian Magpie in the study sites.

**Nesting tree diameter preference**

Diameters of ninety two nesting trees were measured at the breast height (Dbh). The maximum diameter recorded was 200cm and minimum was 15cm (Figure 7). The result shows that diameter of 60cm (7.6%, *n=7*) were the most preferred diameter followed by 50cm (6.5%, *n=6*) and 100cm (5.4%, *n=5*). However, bigger diameter of trees were observed but not used by the birds. The reason for this is still not known.

**Slope & aspect preference**

Slopes for ninety two nesting trees were recorded during the survey. It has shown that 45° slope was the most preferred slope (21.7%, *n=20*) followed by 30° (13%, *n=12*) and 0° (12%, *n=11*). The result indicated that more inclined slope is favourable for the birds for carrying nesting materials with less energy being spent during nest building (Figure 8). Similarly, aspects were recorded for ninety two nesting trees (Figure 9). It was found out that South-West aspect was the most preferred aspects by the Magpies (31.5%, *n=29*) followed by North-West (22.8%, *n=21*) and South-East (16.3%, *n=15*).
The statistical test was performed to assess the association of correlation between slope and aspect preference by the bird. The result showed that there is strong relationship of association between slope and aspect for nest selection by the Magpie (p<0.001, df=144). The least preferred aspect was North and North-South.

Location of nests from the human settlement and roads
A total of ninety two nests were recorded between the distances of 5m to 1000m from the nearest houses to the nests (Figure 9). A distance of 150m (15.2%, n=14) from the nearest houses was the most preferred distance followed by 500m (13.0%, n=12) and 200m (9.8%, n=9).

Nest position and distance between tree top and nests
Out of ninety two nests counted, forty nine nests (53.3% of 92 nests) were found placed on side branch and forty three nests (46.7% of 92 nests) were found placed on main branch. This indicated that the most preferred nest position is on side branch. Similarly, distance between nest and tree top were measured. The maximum distance measured between tree top and nest was 10m and minimum was 1m (M=3.62, SE= 0.253). Further, it was observed that the most preferred distance of placing nests on the trees were 3m (25.0%, n=23), followed by 2m (19.6%, n=18) and 5m (18.5%, n=17). The least preferred was at 1m and 8m.

Figure 9. Aspect preference by Eurasian Magpie in the study sites.
It is surprising to note that there has been no record of Eurasian Magpies building nests on the man-made structures during the study even though it was reported in other countries. The reason for this is still not known. We believed that availability of nesting trees around its habitat could be the reason for not preferring man-made structures. Nest site selections by Eurasian magpie were thoroughly studied in Poland, Bulgaria, Japan and China. The Wang et al., (2010) from China and Jerzak (1997) from Poland reported that the most chosen tree species for nesting is Populas Sp. Whereas, in our study the most preferred/chosen trees were Picea spinulosa and Pinus wallichiana even though we have plenty of Populas ciliata in the conifer forest. The reason may be these trees were not found within human settlements. Study site 1, 3 & 4 has highest tree density of Spruce (Picea spinulosa) and Weeping willow (Salix babylonica) located within human settlement. Accordingly, the birds have chosen to build their nests on these trees. Whilst, in study site 2 has the highest density of Pinus wallichiana and one Poplar (Populas ciliata). Seemingly, this bird had selected these trees to build their nests. The study reveals that the selection of nesting tree species depends on five main influencing factors: 1) Availability of tree species nearby human settlement, 2) Availability of nesting materials, 3) Low risk of predators, 4) Availability of foods alongside roads and in the agricultural fields and 5) Minimal or no disturbances in their nesting sites. Eurasian Magpies may be ready to choose any type of tree species for nesting except hedges and bushes. In this study, conifer trees (79.3% of 92 nests) were chosen more than deciduous trees (20.7% of 92 nests) for nesting. The reason is that conifer tree doesn’t shed leaves thereby providing concealment from the predators throughout the year and for deciduous trees is just an opposite. Logically, this reason sounds fine but during the study, I observed birds building their nests on Salix babylonica and Cotoneaster bacillaria, which is deciduous in nature. Therefore, nest concealment does not seem to apply in this context. Moreover, it was observed that some nests were totally exposed to predators during nest building and felling. Even then, we have not observed any destruction or abandoning of nests by the birds. In general, Kirazli et al.(2017) reported that high quality habitat is accepted for minimizing cost of reproduction effort of parents and maximizing survival chance of parents and fledging success.

Based on the results of the study, the following recommendations were proposed to sustain the population of these birds in PNP:

- Support wide spacing plantation of deciduous and conifer trees nearby houses or in the agricultural lands.
- Encourage to maintain existing deciduous and conifer trees in the used and abandoned agricultural lands.
- Restrict practice of de-branching of conifer trees by the local people in the Magpie habitats.
- Minimize disturbance to the birds while building its nest.
- Availability of nesting materials may be one of the influencing factors for determining the nest site selection by the magpie. Therefore, there is a need to carryout study on selection of nesting materials by the Magpie.
- Conduct study on the myth of killing of Magpie’s parents by their young one.

Discussion & recommendations

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As per views expressed by the local communities residing within the study sites stated that the populations of birds are found to be stable. This as they said is that they maintain stable population by younger birds killing their parents once they reached at maturity stage. During the study, we have seen 5-7 birds flocked together and started to fight each other at Site 4. This may be the scene what local communities said to kill their parents. However, we agree with Wang et al.,(2010) that the pair birds have to maintain their territorial defense from the intruders. Further study is needed to test this hypothesis under strict surveillance. Otherwise, there is a high risk that any outbreak of avian diseases or predators would wipe away the whole population of Eurasian Magpie in the park. Other emerging threats we observed during the study were de-branching of nesting trees, electrocution and felling of nesting trees.

Based on the results of the study, the following recommendations were proposed to sustain the population of these birds in PNP:

- Support wide spacing plantation of deciduous and conifer trees nearby houses or in the agricultural lands.
- Encourage to maintain existing deciduous and conifer trees in the used and abandoned agricultural lands.
- Restrict practice of de-branching of conifer trees by the local people in the Magpie habitats.
- Minimize disturbance to the birds while building its nest.
- Availability of nesting materials may be one of the influencing factors for determining the nest site selection by the magpie. Therefore, there is a need to carryout study on selection of nesting materials by the Magpie.
- Conduct study on the myth of killing of Magpie’s parents by their young one.

References


Gyeltshen » Nest Site Selection of Eurasian Magpie (Pica pica) in Phrumsengla National Park

Annexure 1: Photographs depicting field works.

Figure 11. Author with his helpers for locating the nests (A), Measuring DBH of nesting trees (B)

Figure 12. Climbing on nesting tree to check the age of nest (A), Author in the field with field equipments (B)

Annexure 2: Eurasian Magpie (Pica pica) nests on a deciduous and conifer trees.

Figure 13. Nest on Cotoneaster bacillaria (A), Nest on Spruce Picea spinulosa (B).

Figure 14. Nest visibility before and after on a deciduous tree (Cotoneaster bacillaria).

Annexure 3: Threats to Eurasian Magpie (Pica pica) observed in the study area.

Figure 15. Eurasian Magpie (Pica pica) perched on electricity post (A), Eurasian Magpie electrocuted on Transmission box (B).

Figure 16. Electrocuted Eurasian Magpie (A), De-branched tree (B).


characteristics in Eurasian Magpie (\textit{Pica pica} L.) - an assessment with the classification methods. \textit{Applied ecology and environmental research} 15(3): 1293–1308.


