



**Oriental  
BIRD CLUB**



**Population assessment of the globally endangered Giant Nuthatch in Loi Mai  
Mountain Range in Southern Shan State of Myanmar**



**Final report**

**by**

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## Abstract

The Giant Nuthatch *Sitta magna* is a globally endangered species restricted to lower montane forests with altitudinal records ranging between 1,192 m and 3,400 m. Its global geographic range covers southern China, eastern Myanmar (primarily Shan State), and northern Thailand (BirdLife International 2021). In Myanmar, it can be only located in two locations while recent surveys are lack in its historical locations. Point count sampling were conducted in fourteen locations in Mt. Lwe Mai, Hopong Township from December 2022 to February 2023. Each point was visited at least five times to count the number of individuals. N-Mixture models were applied to estimate the population. The density estimate for Giant Nuthatch per sampling point (0.79 km<sup>2</sup>) is 1.34 individuals (0.71 – 12.55 at 95% CI) and the detection probability is 0.35 (0.19 -0.55 at 95% CI). The estimated total abundance for the study area of 10 km<sup>2</sup> is 44 individuals (18 -106 at 95% CI). So, the density estimate per km<sup>2</sup> is about 4 individuals. Regarding the breeding ecology, we could locate and monitor two nests of Giant Nuthatch. One nest is success and the other is failed. We also conducted CEPA(Communication, Education, Participation and Awareness) activities in Mt. Lwe Mai and the villages around it. We have installed eight vinyl billboards along the hiking trail to Mt. Lwe Mai and in villages, each vinyl describing the brief ecology of Giant Nuthatch and key bird species of Mt. Lwe Mai. Educative talks were conducted in six villages near Mt. Lwe Mai and a total of 176 indigenous people joined our talks. The objectives of organizing these events are to aware the local community that the threatened and rare species are present in their forests and good opportunities to conserve them by cooperating with relevant stakeholders. So, educational topics were comprised with the basic knowledge about biodiversity conservation, current project aims and activities, Giant Nuthatch and its brief ecology. This project was generously funded by the Oriental Bird Club(OBC) and WWF-Myanmar. We would like to thanks our local field assistants and Pa O' ethnic people who are taking part in our bird surveys and project activities.

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## Introduction

The Giant Nuthatch (Aves: Sittidae: *Sitta magna*) is a globally endangered species restricted to lower montane forests with altitudinal records ranging between 1,192 m and 3,400 m. Its global geographic range covers southern China, eastern Myanmar (especially Shan State), and northern Thailand (BirdLife International 2021). Although landscape-level surveys throughout the whole country range could only be conducted in Thailand in few recent years, especially focusing on the historical and potential areas of occurrence, to assess the presence and estimate the population of the Giant Nuthatch (Techachochert et al. 2018, Kamcha et al. 2021), there is no landscape-level survey in Myanmar and China. Although nearly 30% of the global habitat range of the Giant Nuthatch locates within in Myanmar, the assessment of the occurrence and population status at the national level is still needed while the only one recent study could confirm an area with the presence of this species (Htike et al. 2021). Currently, there are 13 locations with historical records of the Giant Nuthatch in the Shan State and its surrounding areas (BirdLife International 2001). Most of the sites are near or around Kalaw and Taunggyi due to their easily accessibilities if compared with key border areas and more remote areas. Only three post-1950 records have been discovered for Myanmar (BirdLife International 2001), while recent surveys in Shan State were unsuccessful in locating the species (BirdLife International 2016). The historical locations of the Giant Nuthatch need to be confirmed for the existence of this species, and further potential locations should be identified and assessed to understand the current distribution status and the extent of occurrence of the Giant Nuthatch.

The global population of the Giant Nuthatch was very roughly estimated at 1,500–3,800 individuals (BirdLife International 2021) while its population in China was estimated at 800–2,000 individuals (Deng et al. 2012, BirdLife International 2016) and in Thailand was estimated about 578 individuals (Khamcha et al. 2021). In contrast, its population status in Myanmar has not been assessed due to a lack of both recent verified records and habitat surveys, caused by low observer coverage, poor accessibility, and ongoing sporadic insurgent activity within its range.

Total of four studies were published on the density estimate of Giant Nuthatch while their surveys were conducted during their courtship season for its increased detectability. The density is estimated 1.96 individuals/km<sup>2</sup> based on a survey of 12 localities in northern Thailand's upland mosaic landscape (Techachochert et al. 2018), while the estimate of single-site survey in Chiang Dao Wildlife Sanctuary in northern Thailand is 3.94 individuals/km<sup>2</sup> (Techachochert et al. 2021) and the most updated estimate for the whole range of Giant Nuthatch in Thailand based on a survey eight localities was 3.7 individuals/km<sup>2</sup> (Khamcha 2021). The density estimate of single-site survey in Myanmar is 17.23 individuals/km<sup>2</sup> and it might be an overestimate while its lower limit of confidence interval (7.69 birds /km<sup>2</sup>) is quite closer to the estimates of the previous two studies in Thailand (Htike et al. 2021, Techachochert et al. 2021 and Kamcha et al. 2021). So the plausible estimate of Giant Nuthatch by a very few limited studies could be 2 pairs/km<sup>2</sup>.

Identifying the potential conservation sites for this species requires significant population estimate and baseline data about the distribution over the site. The project area, Mt. Lwe Mai, is the recent known site of this species by local bird watchers, and has not been studied on this species

especially population estimate and distribution pattern. With these challenges, the project was implemented to assess the population status of Giant Nuthatch and to observe their breeding behaviors at Mt. Lwe Mai. As education activities, a series of educative talks and trainings for youth community were conducted in the villages near Mt. Lwe Mai. Awareness raising vinyl signboards were also installed at the main entrances to each village around the remaining habitat area of the Giant Nuthatch. And the project was implemented by the method of community-based so that the community can understand their roles in the conservation of their forests in the sustainable way.

## Objectives

- (1) To evaluate the population status of the globally endangered Giant Nuthatch at the western site of Mt. Lwe Mai
- (2) To observe the breeding ecology of the Giant Nuthatch
- (3) To raise awareness about the conservation significance of the Giant Nuthatch and other prominent bird species in the region, thereby fostering a sense of responsibility and appreciation for biodiversity conservation.

## Methodology

### Study Area

The Mae Nae Mountain Range represents unique embroidery of cultural richness and ecological significance and the area is surrounded by the fourteen Pa O' villages to the west and by nine Shan villages to the east. Each complicatedly connected to the vital water resources provided by the Mt. Lwe Mai's watershed forests. The residents of these villages cultivate a diverse range of crops, including Assyrian plum (*Cordia myxa*), tea leaves (*Camellia sinensis*), opium poppy (*Papaver somniferum*), and the aromatic coffee bean (*Coffea arabica*). In a concerted effort to address the opium poppy dependency, the United Nations Office on Drugs and Crime (UNODC) initiated a project aimed at transitioning to alternative cash crops and agroforestry tree species such as avocado and coffee. However, there is a pressing need to expand these endeavors to encompass all villages in the region to effectively curtail opium poppy cultivation. Moreover, the bare land that left behind by opium poppy cultivation is common along the mountain range and causes a significant erosion threat to the primary forest soil. Link to the principal threat to this ecosystem, especially for the globally endangered Giant Nuthatch (*Sitta magna*), is habitat loss. Unlike the rapid clear-cutting and burning witnessed in some parts of Myanmar, the Mt. Lwe Mai retains its large and majestic pine trees, which constitute the primary food source for the Giant Nuthatch. However, the main natural regeneration of pine forests is threatened by forest fire and the forest is lack of small pine trees. Locals also stated that there are few people who make the fire intentionally with as many as five fires occurring during each dry season. Reforestation will reduce the erosion threat and will also serve as a wildlife corridor for species traversing the area and simultaneously contributing to conserve the Endangered Giant Nuthatch by means of restoring their habitat as pine forests.

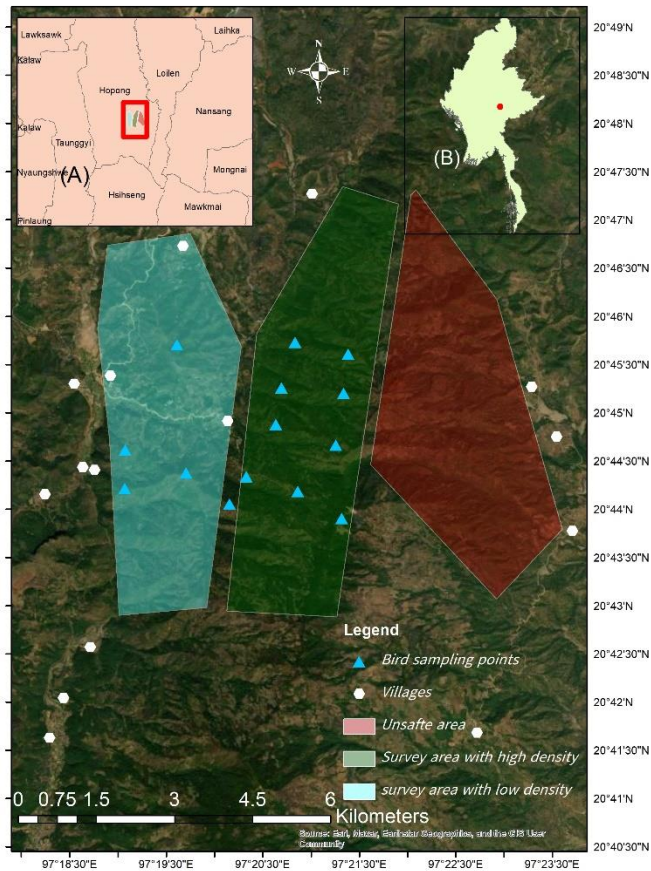


Figure 1: Map of showing the survey areas(Green and blue color) in Mt. Lwe Mai on the Mae Nae Taung mountain range with white triangles(sampling points) while the polygon in red color represents the potential habitat site but our survey could not cover due to security concern.

### Bird surveys team

Table 1 : Lists of bird surveys team

| Sr. | Name                | Position              |
|-----|---------------------|-----------------------|
| 1   | Thura Soe Min Htike | Field Team leader     |
| 2   | Than Kyaw Moe       | Field Assistant       |
| 3   | Khun Than Nyunt     | Local Field Assistant |
| 4   | Khun Saw Yan Naing  | Local Field Assistant |

### Bird Surveys

To assess the population of Giant Nuthatch, fourteen randomly selected sampling point were set up with a radius of 500 meters along the mountain ridges and trails around Mt. Lwe Mai(see figure 1). Each point was visited at least five times to count the number of individuals and

surveys were conducted between December 2022 and February 2023 which is the courtship season when the birds is highly active and best opportunity for a high chance of detection. During each visit, songs or calls of the Giant Nuthatch were played by using Bluetooth box and wait for five minutes to get the response by the bird. This process is repeated for two times. During these visits, sampling covariates such as the time and date of the survey, and prevailing weather conditions such as sunlight, wind, and rainfall were recorded. For a more comprehensive understanding of the habitat, vegetative characteristics such as the proportions of pine and oak trees, canopy coverage, and the diameter at breast height (DBH) of trees were measured and recorded. To enhance the effectiveness of our surveys, we applied playback techniques, transmitting the calls and songs of the Giant Nuthatch, that could increase the chances of detections during the surveys on the songbirds.

### Nest surveys

Breeding surveys were started on in early March 2023 in order to locate/trace pairs of Giant Nuthatch and identify their nesting sites. Due to the mountainous topography and low density of Giant Nuthatch populations, only two nest holes were successfully located. Both nests were found within the Fagaceae trees, nestled within natural fissures and holes on the tree trunks. One nest, with four eggs, successfully saw fledglings emerge on April 30th, 2023. Unfortunately, the second nest was failed; as it was discovered empty on March 11<sup>th</sup>, 2023, with a deceased female and broken eggs. Subsequent checks on April 25th, 2023, discovered that the nest had been occupied by the Common Hoopoe (*Upupa epops*), which was raising its own two fledglings.

### Data Analysis

N-mixture models were employed to estimate both the abundance and detection probability of the giant nuthatch, as outlined by Kery and Royle in 2015. Our analysis assumed that the population was closed geographically and demographically within replicates during our brief survey periods at each specific site. Sampling covariates encompassed factors such as the time of day, survey date, and prevailing weather conditions, including cloud cover, rain, and wind. Forest structure covariates consisted of metrics such as the average tree diameter at breast height (DBH), the number of trees, canopy cover, the proportion of pines and oaks based on total basal area, and the combined proportion of both pines and oaks at each sample plot. Additionally, topographic covariates such as slope, aspect, and elevation were incorporated as site-specific covariates. Prior to model fitting, both site and sampling covariates underwent centering to achieve a zero mean and scaling to a unit variance (two standard deviations) by subtracting the mean and dividing by two standard deviations in the R programming environment (Crawley, 2005). To mitigate multicollinearity among covariates, pairwise correlation matrices (Spearman rho,  $\rho$ ) were utilized to identify variables with correlation coefficients exceeding 0.6. Any variable within a correlated pair was excluded from the same model. The correlation analysis was visualized using the 'corrplot' library in R (refer to Figure 2).

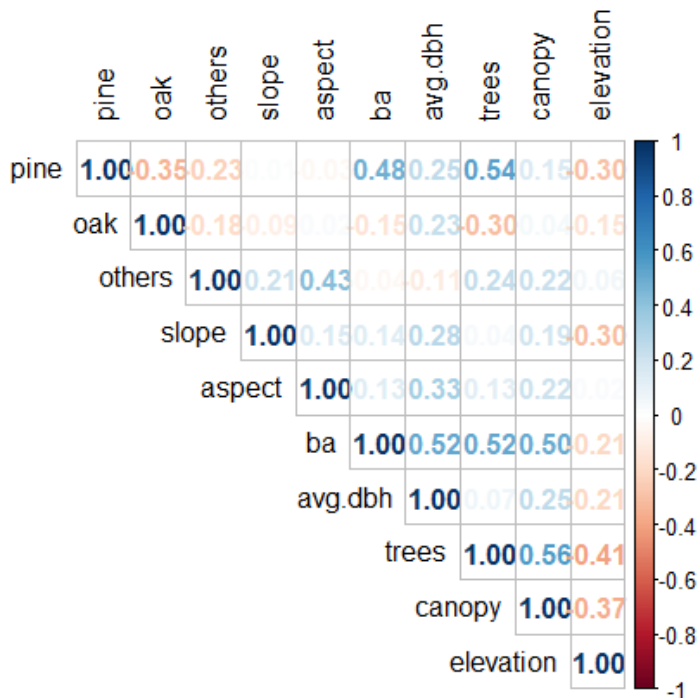


Figure 2: Graph illustrating the correlation coefficients between the predictors variables by using Spearman's correlation coefficient.

The upper limit, denoted as  $K$  and employed in approximating an infinite summation within  $N$ -mixture likelihood models, was established at 100 (with tests conducted at 100, 200, and 300); this choice exhibited acceptable bias, having no discernible impact on the model outcomes (Couturier et al., 2013). To assess the goodness of fit for the global model, we employed Pearson's  $\chi^2$  test (MacKenzie & Bailey, 2004). A parametric bootstrap approach was then employed to generate 1,000 bootstrap samples for evaluating the model fit. The bootstrap probability for the global model stood at 0.81(0.302), indicating a satisfactory fit to the data. The value of  $\hat{c}$ , representing the measure of over-dispersion, was determined to be 0.72(1.32). Consequently, we proceeded to model abundance using a Poisson distribution.

For modelling point count data, we first compared the constant model and three candidate models with sampling covariates as time, date of survey, wind and rain. We didn't include any sampling covariates as they didn't show any significant affects on the detection probability. We generated six models for preliminary analysis and then, with selected variables that were expected to influence habitat preference of the giant nuthatch, we generated a final set of 12 models (Table 2). We assessed this model set to examine variables associated with giant nuthatch abundance ( $\lambda$ ) and detection probability ( $p$ ). For model selection, we used the differences in the Akaike information criteria ( $\Delta AIC$ ) and AIC weight ( $w_i$ ; Burnham & Anderson, 2002). We selected the best model with the lowest AIC ( $\Delta AIC < 2$ ). We performed the  $N$ -mixture analysis using the unmarked package (Fiske & Chandler, 2011) and model averaging using the AICcmodavg package (Mazerolle, 2013), both in R.



Table 2: the abundance and detection probability of the Giant Nuthatch (*Sitta magna*) in association with site, sampling, and landscape variables. In this context, 'K' denotes the count of estimated parameters, ' $\Delta$ AIC' signifies the disparity between the AIC values of two models, and Akaike weights ('wi') indicate the strength of evidence supporting a particular model as the most plausible.

| Model  | K | AIC    | $\Delta$ AIC | wi      |
|--|---|--------|--------------|---------|
| $\lambda(\text{AVG.DBH} + \text{Tree}) p()$      | 4 | 108.64 | 0            | 0.65    |
| $\lambda(\text{AVG.DBH} + \text{Pine}) p()$      | 4 | 112.46 | 3.83         | 0.097   |
| $\lambda(\text{AVG.DBH} + \text{Canopy}) p()$    | 4 | 113.1  | 4.46         | 0.07    |
| $\lambda(\text{AVG.DBH} + \text{Elevation}) p()$ | 4 | 113.46 | 4.82         | 0.059   |
| $\lambda(\text{AVG.DBH}) p()$                    | 3 | 114.57 | 5.93         | 0.034   |
| $\lambda(\text{Canopy}) p()$                     | 3 | 115.12 | 6.48         | 0.026   |
| $\lambda(\text{Elevation}) p()$                  | 3 | 115.53 | 6.89         | 0.021   |
| $\lambda(\text{Tree}) p()$                       | 3 | 116.25 | 7.61         | 0.015   |
| $\lambda(\text{Basal.Area}) p()$                 | 3 | 116.42 | 7.78         | 0.013   |
| $\lambda(\text{Aspect}) p()$                     | 3 | 117.58 | 8.94         | 0.0075  |
| $\lambda() p()$                                  | 2 | 119.74 | 11.1         | 0.0025  |
| $\lambda(\text{Slope}) p()$                      | 3 | 121.63 | 12.99        | 0.00099 |

## Result and discussion

Our analysis, utilizing N-Mixture models, yielded valuable insights. The estimated density of Giant Nuthatch individuals per sampling point (covering an area of 0.79 km<sup>2</sup>) is approximately 1.34 individuals (with a 95% confidence interval of 0.71 to 2.55), and the detection probability is 0.35 (with a 95% confidence interval of 0.19 to 0.55). The projected total abundance for the entire study area of 10 km<sup>2</sup> is 44 individuals (with a 95% confidence interval of 18 to 106). Consequently, the estimated density per km<sup>2</sup> stands at around 4 individuals, aligning closely with the density estimate from a comparable study conducted in Thailand. The total population estimate of Giant Nuthatch in Mt. Lwe Mai could be estimated to occupy the significant portion of the global population (approximately 1-3%), similarly as the Mt. Asahae Myim Anauk Myim's population in Myanmar (Htike et al. 2021). In Myanmar, this is the second systematic survey on the second known site of this species, and would need to identify more potential strongholds in Myanmar to estimate the population at the landscape level because Myanmar occupies about 30% of the global distribution range of Giant Nuthatch and lacks occupancy surveys in the remaining potential habitat areas.

From a final set of 12 models, our analysis revealed that the model incorporating the average Diameter at Breast Height (DBH) and the number of trees emerged as the top-ranked model. The abundance of the nuthatch was associated with increasing average DBH ( $\beta = 1.87$ ) and number of trees ( $\beta = 1.74$ ) (Figure 3). Positive associating with large diameter trees is consistent with previous studies on the habitat preferences of Giant Nuthatch in Thailand and Myanmar (Htike et al. 2021, Techachoochert et al. 2021 and Kamcha et al. 2021). The result of positive association with the number of trees is not significant in other studies, it might be because of our study area Mt. Lwe Mai is rich with large trees and the average number of trees is 10 (5 -15). The another explanation

for this association might be this is the reasonable number of large trees within 10 m radius of vegetation sample plot.

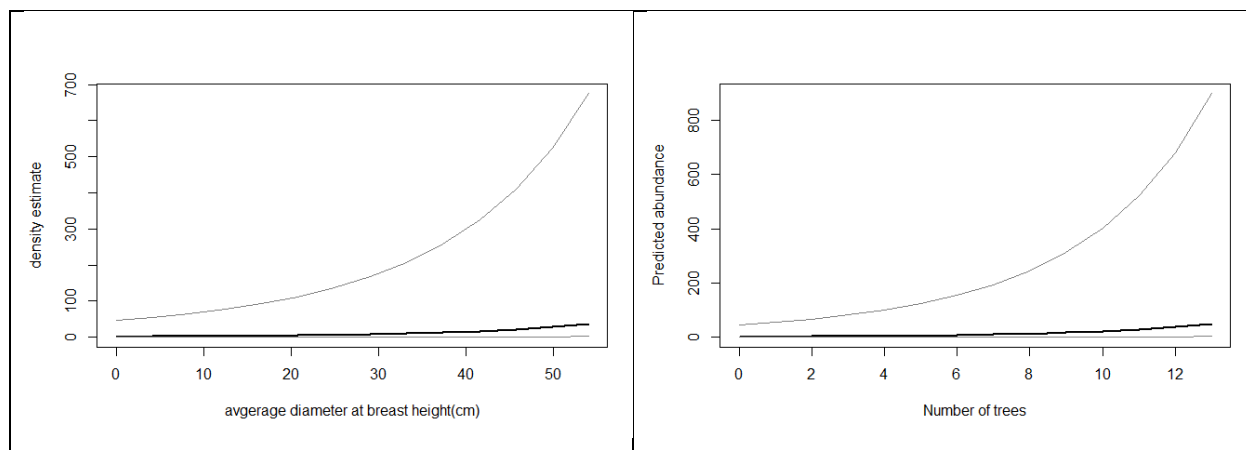


Figure 3: Relationship between mean abundance and average DBH(left) and number of trees(right)

One of two nests were found to be successful with fledglings on 30 April 2023. Detailed characteristics of the nests were described in the table 3. The other nest were occupied by the Common Hoopoe species after the female Giant Nuthatch was dead. Both of the nesting trees are Fagaceae species with large diameter and the type of nests are natural hole and large and deep fissure on the trunks.

Table 3: Characteristics of nesting trees by Giant Nuthatch in Mt. Lwe Mai in 2023.

|                             |   |  |
|-----------------------------|---|--|
| Tree spp                    | Fagaceae  | Fagaceae   |
| GBH(cm)                     | 152   | 188  |
| Altitude above sea level(m) | 1563  | 1680   |
| Nest Height above ground(m) | 1.25  | 3.35   |
| Nest depth(cm)              | 30  | 40   |
| Nest entrance(cm)           | 20 x 20   | 10 x 40  |
| Nest type                   | Natural hole  | Natural fissure  |
| Nest finding date           | 7 March 2023  | 3 March 2023   |
| Notes on nests              | <ul style="list-style-type: none"> <li>• Found dead female on the ground and broken eggs on 11 March 2023</li> <li>• Nest occupied by Common Hoopoe with fledglings on 25 April 2023</li> </ul> | <ul style="list-style-type: none"> <li>• Found five eggs on 24 March 2023</li> <li>• Fledglings came out on 30 April 2023</li> </ul> |

## Communication, capacity building, education, participation and awareness (CEPA) activities

### Education Awareness Team

Table 4: Lists of education awareness team

| Sr. | Name                | Discussion Topic  |
|-----|---------------------|---|
| 1   | Thura Soe Min Htike | Bird Watching, Giant Nuthatch and key bird species of Mt. Lwe Mai |
| 2   | Than Kyaw Moe       | Deforestation and community-based forest restoration practices    |
| 3   | Hein Htet Aung      | Community-based ecotourism practices                              |
| 4   | Nang Phyu Phwe      | Social and Environmental Justice                                  |

### Empowering Indigenous Youth through Capacity Building Trainings

Total of five successfully capacity building trainings were conducted in Dong Kong, Sa On, Kyauk Ka Char, Bant Kon and Ta Hla Noe villages, and total of 55 local youths joined to the trainings(Figure 4). The training sessions were thoughtfully structured into four distinct sections, each led by experienced resource persons and the sections covered included: (1) Biodiversity and its importance of conservation: understanding the significance of biodiversity preservation, (2) Ecotourism and its business: exploring the potential of ecotourism as a sustainable initiative, (3) Deforestation and forest restoration: addressing the critical issue of deforestation and the methods for restoration, and (4) Environmental and Social Justice: encouraging for reasonable environmental practices.

Each training was comprised with PowerPoint slides, songs, and educational movies which were acquired from the respected social channels of Conservation Organizations like WWF-Myanmar, FFI, WCS-Myanmar and NCS-Myanmar. Our participants represented a diverse educational background from basic education levels to graduates and the gender ratio among the participants stood at 21 males to 34 females, showcasing a balanced representation. To assess the effectiveness of training, both pre-test before the training, and post-test after the training were conducted. The pre-test consisted of ten questions about the environmental conservation aimed to evaluate the participants' general knowledge. The remarkable average score of 8.25 indicated that most participants already had awareness about ecosystem services, climate change, and biodiversity conservation. Following the training, a post-test was conducted to examine the understanding of each participant on three sections; biodiversity conservation, ecotourism and deforestation. Each section was comprised with 10 objective questions and one essay-type question. Impressively, participants achieved average scores of 8.25, 8.25, for both biodiversity conservation and ecotourism, and 7.34 for deforestation, with all essays receiving satisfactory marks. Moreover, during the training program, assessments were conducted to evaluate the satisfaction of the trainees with the trainers. As a part of the training, a bird-watching excursion was organized to nearby forests, allowing participants to observe local bird species personally and strengthening the practical application of their newfound knowledge. Therefore, it was concluded

that our capacity-building trainings were contributed to fill the basic knowledge gaps of local community in environmental conservation.

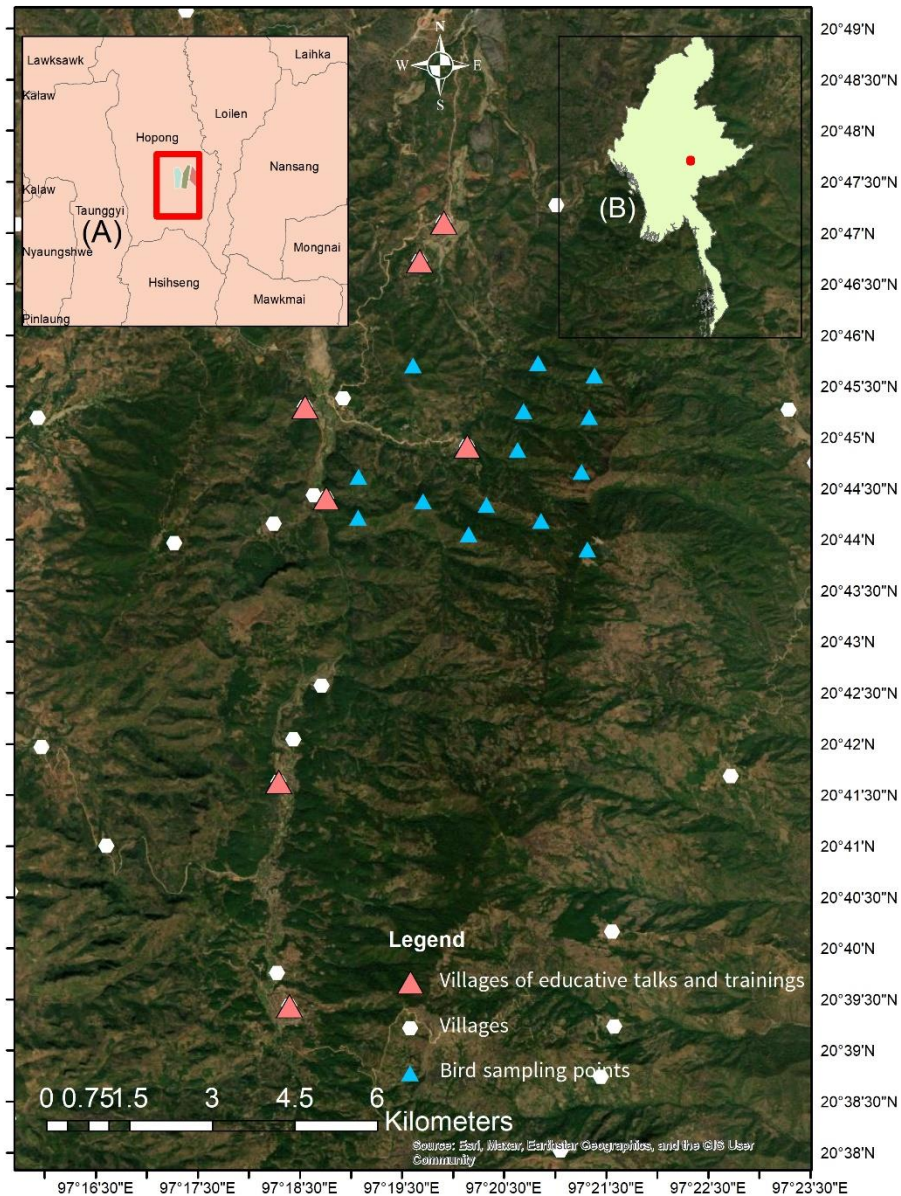


Figure 4: Map of villages where trainings, educative talks were conducted; pink triangles are the villages where Educational Talks and Consultation Meetings were held, white dots indicating the villages around Mt. Lwe Mai and blue triangles are the bird sampling points on Mt. Lwe Mai

### Promoting Conservation Awareness through Educational Talks and Consultation Meetings

As part of conservation initiatives for the Giant Nuthatch (*Sitta magna*) and its natural habitat in the Mt. Lwe Mai region of Southern Shan State, Myanmar, educational awareness

sessions and consultation meetings were organized. The objectives of these activities were to engage connections with the local community, raise their awareness regarding the presence of endangered and rare species within their forests, and fostering collaboration with relevant stakeholders involved in conservation efforts. Educational talks were carried out in six villages situated near Mt. Lwe Mai with a total of 176 indigenous people (refer to the map in Appendix-1). These talks covered with the basic knowledge related to biodiversity conservation, aimed at informing the community about the objectives and activities of the current conservation project, and educate them about the Giant Nuthatch and its brief ecology.

Subsequently, follow-up consultation meetings were organized in four of these villages, where village leaders and proactive youths were invited. The purpose of these meetings was to gain a deeper understanding of the challenges and challenges and opportunities to conserve Mt. Lwe Mai biodiversity by the local community themselves and to discuss the future conservation management plan. Key points discussed during these meetings included:

- (1) **Forest Fire Prevention:** Local participants highlighted the recurrent forest fires (up to 5 times per dry season) as a significant threat to natural regeneration of pine trees. It was proposed to establish a Forest Fire Prevention Committee, foster agreements among neighbouring villages, and enforce fire prevention regulations. The influential role of Pin Lyam Monastery's Monk in the area was acknowledged, suggesting their involvement in this effort. Installation of warning vinyl for fire prevention in the mountain area was also recommended.
- (2) **Pine Resin Extraction:** Concerns were raised regarding the extraction of pine resin in certain areas, which can lead to the depletion of large pine trees that serve as the main food source for the Giant Nuthatch. Participants recommended considering alternative approaches to regulate or prohibit pine resin extraction to protect both the pine trees and the species relying on them.
- (3) **Reforestation:** Participants discussed the gradual decrease in forest areas due to unsustainable firewood collection and encroachment of forest lands for agriculture. To restore deforested areas, most of the participants suggested that planting coffee, Khar Daw Mee, and avocado trees near villages as alternative way for income business. For the mountainous areas, it was proposed to provide households with 10 plants each for cultivation when they visit. But it is important to replant trees in the areas where deforestation has occurred, using local species that are more likely to grow successfully and rapidly growth.

### Conservation Challenges and Community Engagement in the Mt. Lwe Mai Region

Although Mt. Lwe Mai is well known for its scenic view at above 8000 ft elevation and unique Rhododendron ecosystem, recent challenges have occurred. These two years, the number of tourists from nearby villages and towns visiting Mt. Lwe Mai was limited due to political instability and travel restrictions or constraints with the region. In response, we have distributed

our information and CEPA (Conservation, Education, Participation and Awareness) promoting materials (T-shirts, mugs and keychains) during the capacity-building workshops and educational talks, instead of the reward program for the tourists.

Arranging events, meetings, and training sessions are not always going well due to various situations. Avoiding scheduling conflicts with local religious events and navigating negotiations with village authorities were crucial considerations. To ensure effective participation, some educational talks were even scheduled during nighttime hours in order to avoid time constraints with the local people. Before the consultation's meetings, all stakeholders and participants were informed the purpose of the meeting so that they could make the effective discussions and decisions. Moreover, one significant outcome was observed as expected as the east part of the mountain range could not be surveyed due to security concerns. Hence, it was concluded that we could extend the surveys in the coming breeding season after discussing and consulting with local residents from these eastern parts.

Additionally, the journey towards conservation is not without its challenges. The increase of opium poppy cultivation poses a tangible threat, potentially limiting fieldwork surveys due to security concerns and misunderstandings. Currently, the ongoing trend of migration to neighboring countries could affect the long-term sustainability of capacity-building initiatives for local youth communities. The committed observance to traditional cooking practices within the local communities, despite their significant consumption of solid fuelwood, makes worse deforestation and respiratory health issues to them. Furthermore, the traditional practice of drying Thanaphe (*Cordia dichotoma*), a primary livelihood for numerous households, requires a substantial huge amount of firewood, increasing environmental pressures. However, it was also observed that the local community, especially the youth and women, showed remarkable interest to participate in the conservation activities of the project. Additionally, the unity observed among local communities in charitable activities played a critical role in the successful implementation of conservation initiatives. Importantly, the Mae Nei Taung Mountain range, including Mt. Lwe Mai, emerged as a stronghold protecting a substantial population of the Giant Nuthatch in Myanmar. Designation as a Protected Area/Public Protected Forest and Community Conservation Area categories are need to be discussed and consulted with among the stakeholders in long-term process, however can create an opportunity or income generation for local communities such as community-based ecotourism would be an initial credit for long-term commitment of community participation not only for Giant Nuthatch but also for its habitats and other biodiversity.

### Photos Recorded



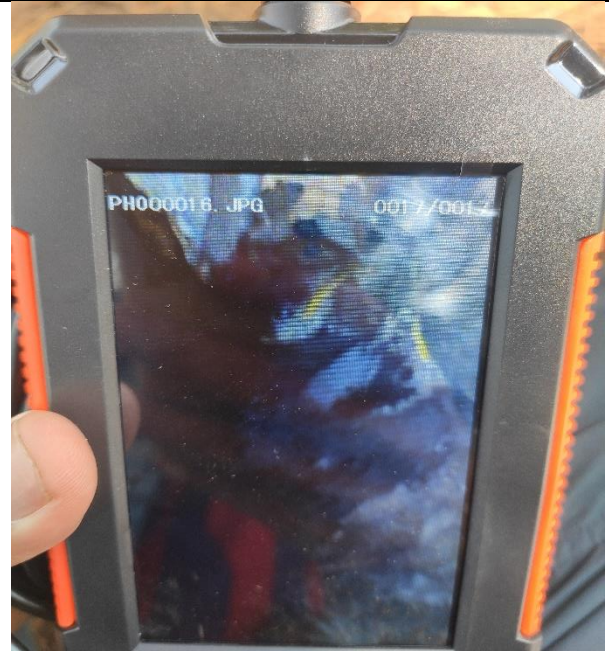
Endangered Giant Nuthatch



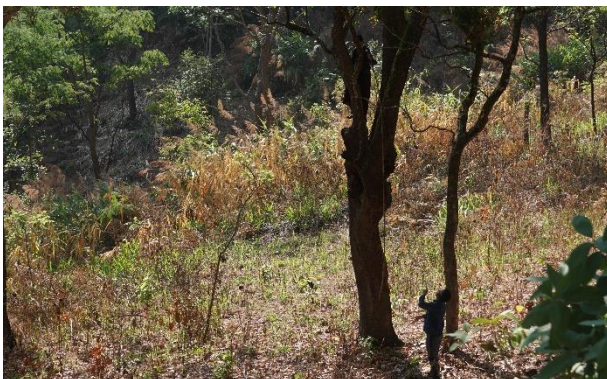
Endangered Giant Nuthatch



Nest hole and eggs of Giant Nuthatch



Photos of Giant Nuthatch fledglings on the screen of endoscope



Checking nest by using the endoscope



Checking nest by using the endoscope



Educative talk in Sa On village



Educative talk in Dong Kong village





Educative talk in Bant Kon village



Educative talk in Bant Kon village



Educative talk in Nan Hu village



Educative talk in Nan Hu village



Educative talk in Dong Maukkalan village



Educative talk in Dong Maukkalan village



Capacity building training in Sa On village



Group photo of participants in Capacity building training in Sa On village



Participants taking the test in the Capacity building training in Sa On village



A resource person making presentation in the Capacity building training in Sa On village



A resource person making presentation  
Capacity building training in Kyauk Ka Char  
village



A resource person making presentation  
Capacity building training in Kyauk Ka Char  
village



Awarding the outstanding participant during  
the training



Group photo of participants in the Capacity  
building training in Kyauk Ka Char village

Giving souvenir to the village head



Participants taking the test in the Capacity  
building training in Kyauk Ka Char village



Bird watching trip in Kyauk Ka Char village



Bird watching trip in Kyauk Ka Char village



Consultation meeting in Don Maukkalan village



Consultation meeting in Yauk Pay village



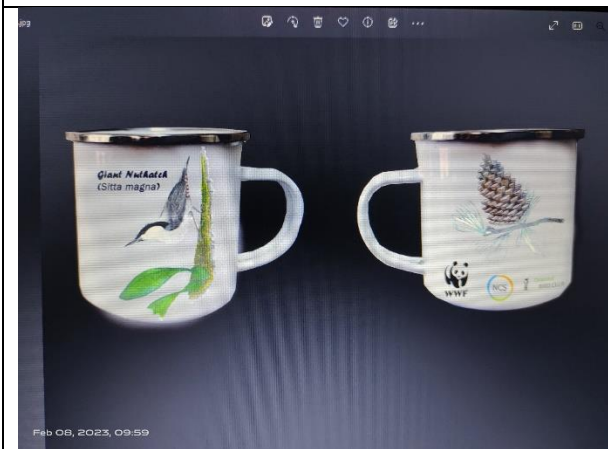
Awareness raising signboard in Youk Pay village



Awareness raising signboard in Nan Hu village



Awareness raising signboard in Dong Maukka village



Design of Enamel mug



Design of T-shirts

## References

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