

## **Georeferencing and characterization of nesting trees of commonly traded wild birds (Blue-naped Parrot *Tanygnathus lucionensis* and Hill Myna *Gracula religiosa*) in Talakaigan Watershed Aborlan, Palawan, Philippines**

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<https://doi.org/10.69721/TPS.J.2016.8.1.02>

### **ABSTRACT**

Forest degradation endangers the survival of nesting trees in the wild. Despite this threat, the nesting trees that support the commonly traded birds in Talakaigan Forest are not well documented. Hence, the study was conducted to provide information on the characteristics, species composition and geographical distribution of nesting trees. The study was participated by the indigenous Tagbanua bird poachers in the area. Preliminary information was obtained using key informant interview and focused group discussion. Appropriate parabiology training was conducted to equip the participants with practical skills needed in the data gathering. The study unfolded that there were only two species of birds commonly poached in the watershed, the *Tanygnathus lucionensis* and *Gracula religiosa*. These birds nest only on four species of trees which typically towers above the canopy layer. Remarkably, more than 60% of the recorded nesting trees belong to a single species of tree, the *Koompassia excelsa*. The GIS analysis unveiled that most nesting trees were located in the interior part of the forest. The skill needed to venture into the jungle highlights the role of Tagbanua Tribesmen in the poaching activity in the area. The study recommends an education campaign, enforcement of relevant environmental laws as well as conservation activities focusing on both the nest trees and the poached bird species to be implemented in the area.

**Keywords:** georeferencing, avifauna, poaching, nesting tree

### **INTRODUCTION**

The Philippines is one of the countries in Asia that is gifted with plenty of natural resources. The country supports more than 552,177 described species, of which more than half are considered endemic (Ong et al. 2002). Among its component islands, Palawan is one with remaining

pristine terrestrial and marine ecosystem. Because of the vast tracts of verdant vegetation with remarkable remaining old growth forest, the province was commonly called the “last biodiversity frontier”. Talakaigan Watershed is one of the remaining unspoiled forests in the municipality of Aborlan. It is part of the Victoria –Anipahan Mountain Range, a vast tract of forest that is considered as one of the 11 important bird areas in Palawan with Important Bird Area (IBA) Code PH053 (Mallari et al. 2001). This place is endowed with luxuriant forest that supports diversity of wildlife species. Its massive trees and thick understory vegetation harbor unique assemblage of resident and endemic birds such as the Palawan Peacock-pheasant, Palawan Hornbill, Blue-headed Raquet-tail, Palawan Tit and others. The bountiful foods in the forest also attract some forest dwelling migratory birds like the Chestnut-winged Cuckoo and the Grey-streaked Flycatcher that pass along this region, making it as one of their staging areas.

The towering trees in the emergent layer of the forest provide great nesting places for canopy and trunk cavity nesting bird species. Some of these birds like the Hill Myna, Blue-naped Parrot and Palawan Hornbill are highly priced species and are commonly collected by poachers and sold in the local, national and international pet markets (Cruz et al. 2007).

In the midst of the flourishing biodiversity, human activities in the area are also getting intense. Tagbanua, a cultural minority group that lives within and along the forest edges of the watershed are the major users of the forest resources in the area. According to Sopsop and Buot (2011), this indigenous group together with other settled migrants cultivate the fertile soil in the foot hills and also gather timber and non-timber forest products in Aborlan forest system. They also mentioned that other than rattan, wild fruits, resin, orchids, honey and plants with medicinal properties, Tagbanuas also collect and hunt for wildlife such as mynah, parrot, jungle fowl, hornbill and wild pig.

Like in other municipalities, harvesting forest resources in Aborlan is an emerging problem which threatens the sustainability of these resources. The demand for lumber, fuels the proliferation of small scale logging operations. Widmann (1998) supported this by mentioning that albeit logging was banned since 1989, illegal logging is still practiced in Palawan. Moreover, some of the economically important trees cut by the lumberjacks are known as nesting trees of birds.

Considering the vital function of these birds as primary agent of seed dispersal in the forest and the potential impacts of poaching, habitat degradation and loss of nesting trees due to logging merits an immediate conservation efforts that are not only focused on the commonly poached bird species but on the conservation of nesting trees as well. One of the

important information needed in making strategies to control and stop the poaching activities in Talakaigan Watershed and at the same time conserve the nesting trees of the commonly marketed bird species is establishing a baseline data on the geographical distribution of the nesting trees. Moreover, documenting the attributes of nesting trees is also of utmost importance. These pieces of information might help us understand further the nesting preferences and nest site selection behavior of commonly poached birds. The information derived from this study is a useful tool that can be used by the Local Government Unit (LGU) and Department of Environment and Natural Resources (DENR) in intensifying their efforts in conserving the commonly traded wild birds and their nesting trees as well.

This study aimed to identify and characterize the nesting trees of commonly traded wild birds in Talakaigan Watershed Aborlan, Palawan. Specifically, the nesting trees were characterized in terms of average canopy spread, height and girth. It also aimed to determine the location of the nesting trees by getting the coordinates using Global Positioning System (GPS) and georeferencing it in a digital map of the watershed using the Geographic Information System (GIS) interface.

## **MATERIALS AND METHODS**

The study was conducted in Talakaigan Watershed from June to August 2014. The researcher used Key Informant Interview (KII) method in identifying the actively operating poachers and traders in the area. While Focused Group Discussion (FGD) with local poachers was conducted to obtain preliminary information on poaching activity such as number of poachers, number of buyers, price of birds, breeding season, commonly poached bird species and commonly used nesting tree species. The participants were also tasked to draw the detailed map of the Talakaigan Watershed (Figure 1) which includes the relative locations of the landmarks such as river, tributary streams, ridges, foothills, trails, reforestation areas, campsites, dam, community water intake, and all known nesting trees in the area.

The drawn map with marked locations of nest trees in the watershed was used as a guide in selecting starting points, routes, location of base camps and period of time needed in the survey.

A hands-on training on data collection was also conducted to equip the local poachers who agreed to participate in the nesting trees survey with appropriate data gathering skills. To ensure the reliability of the data, each trainee took a practical examination prior to the actual data collection.



Figure 1. Group of local poachers drawing the detailed map of the Talakaigan Watershed and marking the location of the nesting trees occupied by commonly traded wild birds.

The survey prioritized the nesting trees identified by the local poachers. However, exhaustive searching of other nesting trees in the area was also done. When finding a nesting tree, attributes of the nest trees (tree height, trunk diameter, average canopy spread), digital photographs and coordinates were recorded.

The trunk diameter of each nesting tree was measured according to the guidelines set by College of Forestry, University of the Philippines (Carandang 1996). The nest tree height was calculated using the angle of elevation and the horizontal distance of the tree from the observer, while the average canopy spread was determined using the suggested method defined by Maryland Department of Natural Resources (MDNR 2013).

Descriptive statistics including frequency counts and percentages were used to describe the relative abundances of nesting tree species and species of commonly poached birds that use the specific nesting trees. The selected attributes of the different nesting trees were described using the mean and range. Meanwhile, the GPS coordinates of nesting tree species and bird species using it, were georeferenced in the digital map of Talakaigan Watershed using the GIS interface. The collection of data was

limited within the slopes where most of the poaching activities were concentrated based on the information revealed by the participating poachers.

## RESULTS AND DISCUSSION

### Status of Poaching Activity in Talakaigan Watershed Area

The eight actively operating poachers were identified by the informants, all were residents of the community and members of the indigenous Tagbanua Tribe. This information uncovers the role of Tagbanua Tribesmen in the poaching activity in the area. These people are highly experienced hunters and forest product gatherers. Equipped with indigenous knowledge from their ancestors and skills honed by experience of living almost entirely in the forest, they can easily locate nests of Blue-naped Parrot and Hill Mynah even in the deepest part of the forest. Moreover, they are also good and agile tree climbers; they can easily climb the tall nesting trees using only few indigenous tools.

The key informants disclosed that the poaching activity in the area was rampant and trading of wild bird nestlings was openly done in the community. The presence of abandoned temporary shelters and carved footholds (Figure 2) in most of the tall *Koompassia excelsa* (Becc.) Taub trees were noticed during the initial visit to Talakaigan watershed and confirmed the poaching activity in the area.

The poaching activity in Talakaigan Forest begins from January and lasts until August every year. It coincides with the breeding season of Blue-naped Parrot (*Tanygnathus lucionensis*) and Hill Myna (*Gracula religiosa*), two important commonly poached bird species sought after by the local buyers in the area. The poachers divulged that the breeding activities of the Hill Myna starts as early as January and lasts until August, while breeding of Blue-naped Parrot begins from March and lasts until July. The breeding season of Blue-naped Parrot in Watershed as disclosed by poachers is two months longer than those mentioned by other researchers who claimed to last from April to June (Kennedy et al. 2000; Birdlife International 2012). Moreover, Kennedy et al. (2000) also reported a nest of the Hill Myna with two chicks in Culion, Palawan during the month of September. This observation indicates a much longer breeding period compared to the data provided by the local poachers. These findings indicate that the breeding period observed in Talakaigan Watershed might not be the same in other places within the geographical range of these bird species. Thus, the actual extent of the breeding period in a much wider scale is still inconclusive and remains to be investigated.



Figure 2. One of the temporary shelters used by poachers in guarding the nest trees of commonly traded birds in Talakaigan Watershed Aborlan, Palawan (Left); carved footholds on the trunk of one of the *Koompassia excelsa* trees locally known as “Manggis” (right).

Similar to the information given by the key informants, all of the FGD participants agreed that there were eight poachers actively operating in the area and all of them are members of the indigenous Tagbanua Tribe. They also disclosed that there were three known buyers and all of them are lowlanders who belong to other ethno-linguistic groups. It was also unfolded that the buyers were funding the poaching operation by giving advanced payments in terms of cash or goods to Tagbanua poachers.

The local bird poachers also divulged that they have verbal ownership claim on every nesting trees they climbed, once the nesting tree was claimed by one poacher it is respected by most of them. However, some poachers coming from other communities occasionally steal the nestlings. Because of this occasional stealing in claimed nests, most poachers guard the nests after the hatching of eggs until the nestlings were collected. This activity was confirmed by the presence of makeshift shelters near the nesting trees (Figure 2).

Both the key informants and FGD participants agreed that the price of Blue-naped Parrot and Hill Myna nestlings was pegged at 500 pesos each and it was dictated by the buyers. According to their estimates, there were

about 50-90 nestlings sold every season and most of them was Hill Myna. The participants also believed that RA 9147 or the Wildlife Resources Conservation and Protection Act of the Philippines was weakly enforced or not enforced at all in the area.

### Commonly Poached Bird Species in Talakaigan Watershed

The Talakaigan Watershed is a home to variety of attractive bird species that could be potential targets of poachers. However, only the Blue-naped Parrot and Hill Myna nestlings were sought after by the local buyers in the area (Figure 3).



Figure 3. Commonly traded birds in Talakaigan Watershed. Hill Myna (left) and Blue-naped Parrot (right).

The Hill Myna has wider geographical distribution and is listed as Least Concern in the IUCN Red List of Globally Threatened Wildlife (Birdlife International 2012). On the contrary, Blue-Naped Parrot is classified as a near threatened species in the IUCN Red List of Globally Threatened Wildlife (Birdlife International 2012). Under the Philippines Wildlife Conservation and Protection Act (RA 9147), both species were classified as threatened species. Moreover, both Hill Myna and Blue-naped Parrot were listed in appendix II of Convention on International Trade of Endangered Species of Wild Flora and Fauna (CITES 2013). However, the Philippines/Palawan population of Blue-naped Parrot is put into danger by the growing demand for pet trade. This bird has a much smaller geographical range because of its near endemic status (it is once considered as Philippine endemic, but populations were now found in Borneo and Indonesia – mostly due to per trade where birds were either deliberately or accidentally released in the wild and had established their population).

The consistent pressure of poaching in the area and the continuously receding forest cover might have a significant impact on the population of this near threatened and endemic species. If not given full conservation effort, Blue-naped Parrot might as well become locally extinct in the watershed similar to the Red-vented Cockatoo (*Cacatua haematuropygia*). The Red-vented Cockatoo once abound in the forest of Talakaigan, but excessive poaching resulted in a localized extinction of this species in the watershed. At present, the Red Vented Cockatoo is protected and conserved in Rasa Island, Narra, Palawan.

### Composition of Nesting Trees

In the present study, a total of 38 nesting trees were recorded, georeferenced and characterized. There were four species of nesting trees represented by four families (Table 1). The species with the highest number (25) was *Koompassia excelsa* or locally known as “Manggis” (65.8% of the total nesting trees) followed by “Bagtik” or “Palawan Almaciga” *Agathis celebica* (Koord.) Warb. of the Araucariaceae family represented by eight individual nesting trees (21.1% of the total number of the nesting trees). “Lomarau” *Swintonia foxworthyi* Elmer of the Anacardiaceae family was represented by only four individuals (10.5% of the total nesting trees recorded). Finally, the species with the least number of individual is the *Macaranga ovatifolia* Merr. or locally known as “Indang” of the Euphorbiaceae family, it is represented by only one individual nesting tree.

Table 1. Nesting trees used by commonly poached birds in Talakaigan Watershed

Family	Scientific Name	Local Name	Frequency (f)	Percentage (%)
Caesalpiniaceae	<i>Koompassia excelsa</i> (Becc.) Taub.	“Manggis”	25	65.8
Araucariaceae	<i>Agathis celebica</i> (Koord.) Warb.	“Bagtik”	8	21.1
Anacardiaceae	<i>Swintonia foxworthyi</i> Elmer	“Lomarau”	4	10.5
Euphorbiaceae	<i>Macaranga ovatifolia</i> Merr.	“Indang”	1	2.6

### Characteristics of Nesting Trees

The results showed that only few species of trees were utilized as nesting trees (Table 2). All nesting trees have large trunks with deep cavities, massive, tall and mostly reaching the emergent layer. Among the recorded nest trees, *K. excelsa* has the tallest average height of 59.7 m. It was followed by *A. celebica* which is also a massive emergent layer tree with

an average height of 56.1 m followed by a moderately size *S. foxworthyi* Elmer which has an average height of 41.8 m, which is still considerably taller than most of the trees in the area. The shortest recorded nest tree species is the *M. ovatifolia* and is represented only by one individual with the height of 26.5 m.

Table 2. Selected characteristics of nesting trees found in Talakaigan Watershed.

Species of Nesting Tree	Crown Spread (m)		Tree Height (m)		Diameter (dbh) (m)	
	Mean	Range	Mean	Range	Mean	Range
<i>Koompassia excelsa</i> (Becc.) Taub.	28.2	12.5-45.0	59.7	33.7-79.5	2.5	1.6-3.1
<i>Agathis celebica</i> (Koord.) Warb.	32.3	24.0-42.5	56.1	39.0-67.2	3.1	2.6-3.8
<i>Swintonia foxworthyi</i> Elmer	13.5	11.0-14.5	41.8	31.4-50.3	1.5	1.2-1.7
<i>Macaranga ovatifolia</i> Merr.	13.5	---	26.5	----	2.1	---

The species of nesting tree with largest average trunk diameter is *A. celebica* (3.1 m). Meanwhile, *K. excelsa* the nesting tree with the tallest average height has a slightly smaller average trunk diameter of 2.5 m. Likewise, the trunk diameter of the only representative of *M. ovatifolia* (2.1 m) is bigger than the average trunk diameter of the much taller *S. foxworthyi* (1.5 m).

Similarly, the average crown spread (32.3 m) of *A. celebica* was found to be wider than the average crown spread (28.2 m) of species with the tallest average height the *K. excelsa*. Meanwhile, the average canopy spread (13.5 m) of the much taller *S. foxworthyi* is only the same with canopy spread of the single representative of *M. ovatifolia*.

The trunk diameter of nesting trees does not always translate into the tree height. Similarly, the average crown spread also does not always follow the linear pattern of tree height and trunk diameter. However, the two species of nesting trees with the largest average trunk diameter, widest average canopy spread and tallest average height (*A. celebica* and *K. excelsa*) also have the highest number of recorded individual trees with nests of commonly traded birds in Talakaigan Watershed. The presence of trunk cavities is the primary reason why trees were selected for nesting sites.

There are four woodpecker species that thrive in Talakaigan Watershed, the Common Flameback *Dinopium javanense*, Greater Flameback *Chrysocolaptes lucidus*, White-bellied Woodpecker *Dryocopus javensis* and Great Slaty Woodpecker *Mulleripicus pulverulentus*. These birds ensure a steady supply of nesting holes for trunk cavity nesting birds in the watershed. As woodpeckers glean and forage on fungus infested invertebrate rich branches, they create holes which in turn hasten the fungal attack and invertebrate penetration. This cyclical process is repeated through time, making the holes big enough to be used as a cavity nest.

The findings clearly revealed that most of the nesting trees preferred by the commonly poached birds (Blue-naped Parrot and Hill Myna) are massive, with large trunk, wide canopy and are exceptionally tall that reach the emergent layer. This highlights the need for conserving these old stands of nesting tree species which are found only in primary forest or very old secondary forest.

### Nesting Tree Species Preference of Commonly Poached Birds

The findings revealed that most of nest trees of Blue-naped Parrot and Hill Myna were found in trunk cavities of *K. excelsa* compared with other species of nesting trees recorded in the study area (Table 3).

Table 3. Frequency of nesting tree species of the commonly poached species of birds (Blue-naped Parrot and Hill Myna) in Talakaigan Watershed

Species of Nest Trees	<i>Tanygnathus lucionensis</i>		<i>Gracula religiosa</i>	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
<i>Koompassia excelsa</i> (Becc.) Taub.	9	23.7	17	44.7
<i>Agathis celebica</i> (Koord.) Warb.	0	0.0	8	21.1
<i>Swintonia foxworthyi</i> Elmer	1	2.6	3	7.9
<i>Macaranga ovatifolia</i> Merr.	1	2.6	0	0.0

Out of the 38 nesting trees georeferenced and characterized, 17 *K. excelsa* nest trees (44.7% of all the recorded nest trees) had Hill Myna nests, while nine *K. excelsa* nest trees (23.7% of all the recorded nest trees) had Blue-naped Parrot nests. Moreover, the results also revealed that while there was no nest of Blue-naped Parrot recorded in *A. celebica* this tree species was the next preferred nesting tree by Hill Myna. The data showed that out of the 38 total nests trees recorded, eight *A. celebica* trees (21.1%) had nests of Hill Myna. Although relatively much fewer than *K. excelsa* and

*A. celebica*, four *S. foxworthyi* trees were also found to have nests of these two commonly poached bird species. One, with nest of Blue-naped Parrot, while the other three had nests of Hill Myna.

Finally, no nest of Hill Myna was found in the *M. ovatifolia* tree, the only one recorded individual belonging to this species was occupied by Blue-naped Parrot. Furthermore, it was also observed that one *K. excelsa* tree with massive canopy and multiple trunk cavities had nests of both bird species at the same time.

One factor that possibly influenced the nest hollow development in these major nesting tree species was their exposure to strong wind surges during typhoon seasons. Having canopies reaching the emergent layer, they are exposed to strong winds without the protection of the adjacent trees. As a result more branches are broken which may serve as an entry point for fungal attack. However, further studies on nesting preferences of cavity nesting birds and the relative abundance of these tree species remain to be investigated. The locals claimed that Blue-naped Parrot also nests in *A. celebica* but no Blue-naped Parrots were found nesting on this tree species during the survey.

The salient feature of the data is that not all species of huge trees in the watershed is used as nesting places by the commonly poached birds. The findings revealed that only a relatively few species of trees were used as nesting places by these two commonly poached birds. Another noteworthy finding was that majority of the nesting trees used by commonly poached birds (Hill Myna and Blue-naped Parrot) in Talakaigan Watershed belongs to *K. excelsa*. This brings to light the importance of this species as nesting tree of commonly poached birds in the area. However, the reason why this tree species is commonly used as nesting tree remains to be investigated.

The parabiologist divulged that this species is not a common target of illegal loggers. However, they also disclosed that the demand for lumber is continuously increasing and they also noticed that the availability of commonly chosen species for lumber production is also declining at a very fast rate. This scenario is alarming, because there are possibilities that the next target of the illegal logging operators will be the huge stand of nesting trees.

### **Georeferencing of Nesting Trees**

The coordinates of individual nesting trees obtained by using a GPS transceiver together with other specific data such as species of nesting trees and species of the nesting commonly poached birds were recorded and

georeferenced using a GIS interface. The output was projected in Environmentally Critical Areas Network (ECAN) zoning map.

The yellow area in the ECAN map represents the multiple use zone, yellow green area as the controlled use zone, blue area as the restricted use zone and red area as the core zone. For the nest tree species, blue represents *Koompassia*, green for *Agathis*, white for *Swintonia* and black for *Macaranga*.

The map projection of the location of nesting tree species revealed that almost all the nesting trees of commonly poached birds in Talakaigan Watershed are located at the boundary of the controlled use zone and the core zone (Figure 4). This place is relatively far from the multiple use zone. According to the information disclosed by the parabiologists who frequently roam the Talakaigan Forest, massive and tall trees are still abundant in this particular area because the distance made it difficult for illegal logging activity to operate. Moreover, the unforgiving terrain and relative distance of the area from human settlements made the upland cultivation also impractical. This conforms to the observations of Mallari et al. (2011), where they mentioned that upland cultivation was more likely practiced at lower altitudes, while steep and inaccessible areas were spared and old growth forest were most likely preserved in these places. It was also noted that only few nesting trees represented by a single species (*K. excelsa*) are located near the multiple use zone or near the human settlement area. This species together with other nest tree species (*A. celebica*, *S. foxworthyi* and *M. ovatifolia*) were recorded only in the interior part of the forest. The distance of these nesting trees, the difficulty of the terrain and the needed skill to venture out in the jungle for several days most likely explain why all the poachers in the area are Tagbanua Tribesmen since their way of living is known to be closely interwoven with the forest. Being knowledgeable and experienced in the forest, they can easily endure the elements when they venture in the deepest part of the forest to look for the nesting birds. Using only minimal indigenous climbing and safety equipment, they bravely climb and collect the nestlings in the cavities of the towering nesting trees. Meanwhile, the nest trees occupied by Blue-naped Parrot and Hill Myna (Figure 5 and 6) showed no major difference in terms of geographical distribution.

## CONCLUSION AND RECOMMENDATIONS

The poaching and bird trading activity in Talakaigan Watershed is overtly done in the local community. It can be considered that the RA 9147 or known as the Wildlife Resources Conservation and Protection Act of the Philippines is weakly implemented or totally not enforced at all in this area.

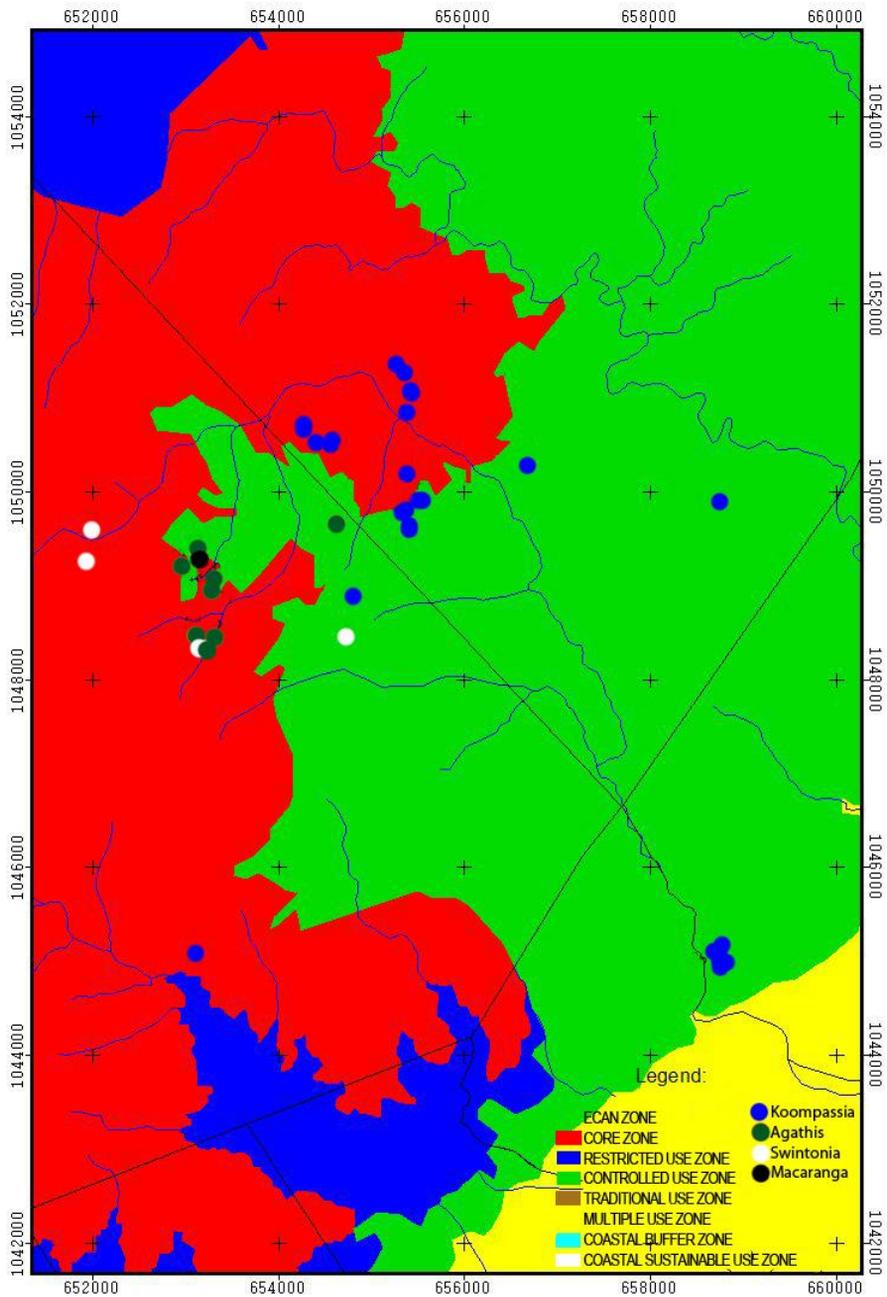


Figure 4. ECAN zoning map of Talakaigan watershed showing the location of all the recorded nesting trees occupied by commonly poached bird species (Blue-naped Parrot and Hill Myna).

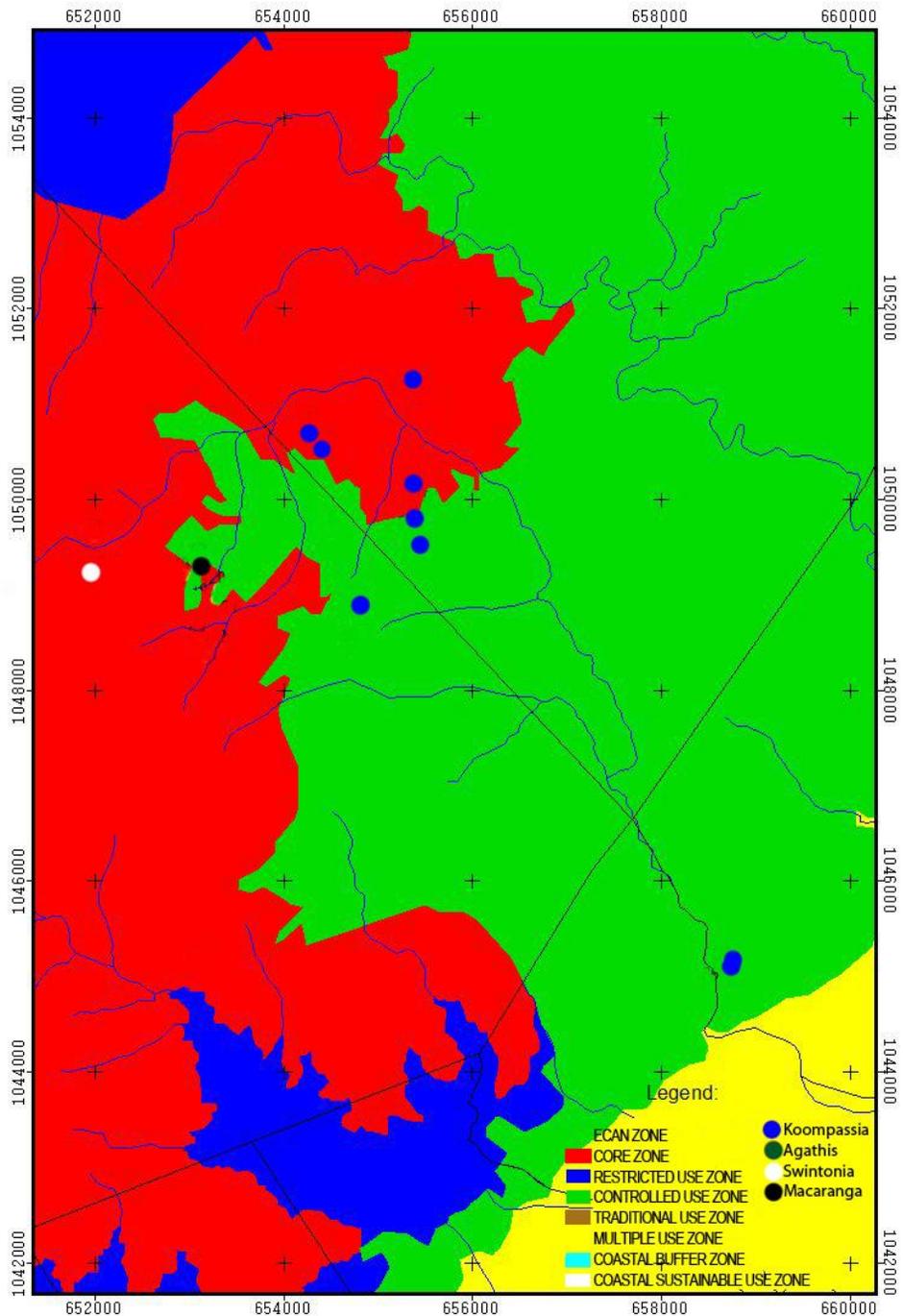


Figure 5. ECAN map showing the location of nest trees occupied by Blue-naped Parrot (*Tanygnathus lucionensis*).

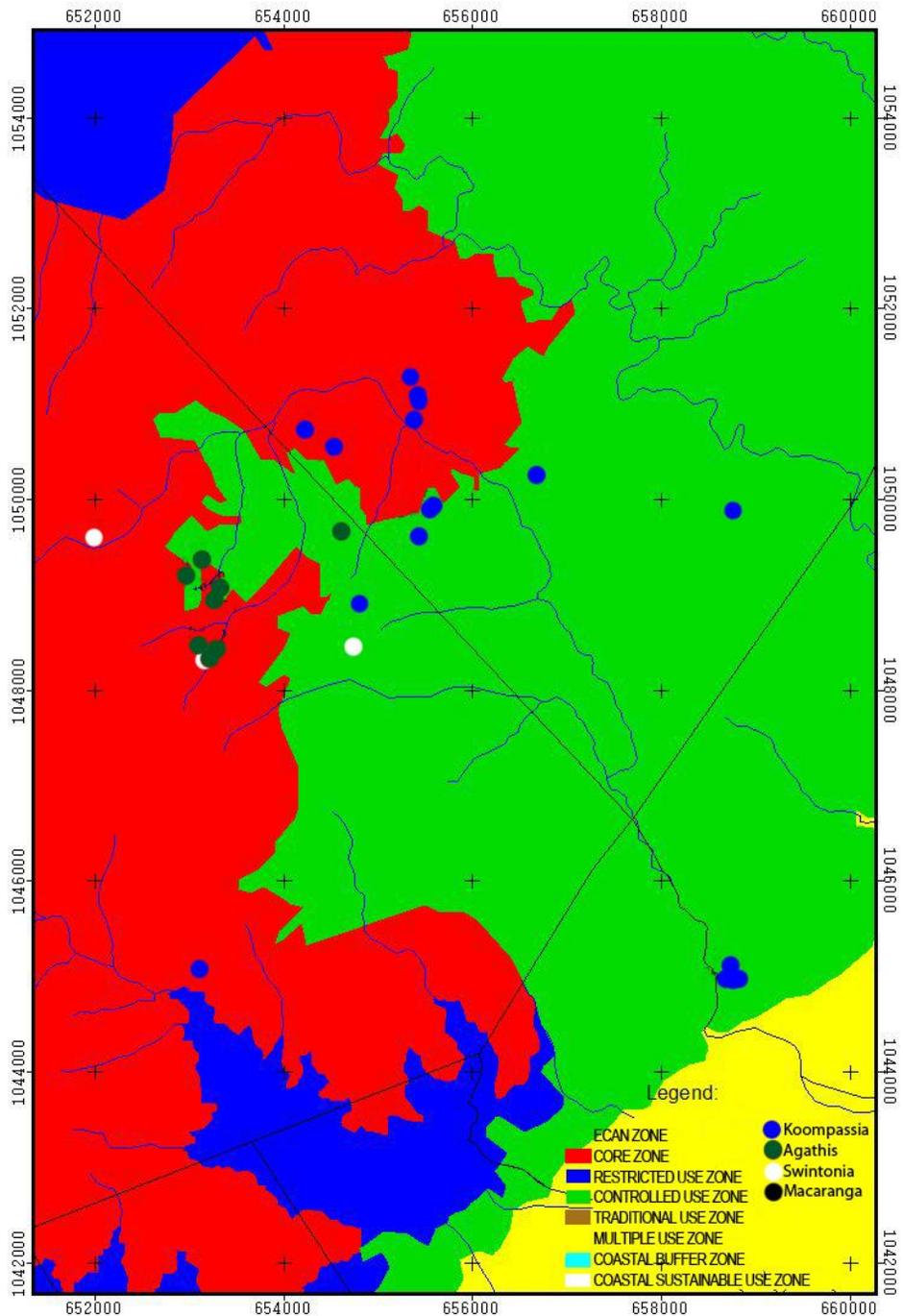


Figure 6. ECAN map showing the location of nest trees occupied by Hill Myna (*Gracula religiosa*).

The local indigenous Tagbanua Tribesmen who are experienced forest going hunters and forest product gatherers play an important role in the poaching of wild birds such as the Blue-naped Parrot and Hill Myna in the watershed area.

The two commonly poached bird species in Talakaigan Watershed appear to be selective in choosing the species of nesting trees. All the recorded nesting trees occupied by the commonly poached birds in the area were represented by only a few number of species and more than half of them belong to *K. excelsa*. This brings to light the important function performed by these selected nest tree species in the reproduction and maintaining the healthy population of commonly poached birds in Talakaigan Watershed.

Aside from tree species selection, the chosen nesting trees generally have massive trunk, large canopy and usually are very tall reaching the emergent layer. This suggests that the nest trees commonly used by these birds are very old and found only in the old growth forest. Losing these trees in the forest might as well affect the nesting of commonly traded birds in the watershed. These findings highlight the need for a more strict and effective protection and conservation measures for the nesting tree species.

Furthermore, most of the nesting trees of commonly poached birds are concentrated near the boundary of the controlled use zone and the core zone, only few remains in the area near the multiple use zones where anthropogenic activity is at the greatest scale. This suggests that the anthropogenic activity in the multiple use zone most likely reduced the number of nest trees in the area. Finally, the majority of the nest trees recorded are concentrated in the innermost part of the forest where human activity is minimal. Future increase in the population of settlers in the periphery of the watershed might as well increase the anthropogenic activity that may lead to the demise of the nesting tree population.

It is highly recommended that the community of people living near the Talakaigan Watershed be involved in any conservation endeavours in the future. The more the people participate in natural resource conservation efforts, the deeper they understand how ecosystem works. Understanding such a concept might as well influence their actions leading towards sustainable resource utilization by learning and acquiring best practices.

It is also recommended that some strict and effective protection and conservation measures be implemented to stop the poaching activity in the area. An information and education campaign must be conducted in the nearby communities to educate the people about the importance of birds in forest ecosystem and to explain the potential impact of poaching on

avifaunal population. The community must also learn about the contents of the RA 9147 with special citation of penalties for violators. The education campaign must be coupled with strict enforcement of RA 9147 to effectively control the existing poaching activity in the area.

The identified nesting tree species must be prioritized in the conservation and protection strategy to ensure that there will be adequate number of standing nest trees in the future. A forest survey must also be done in the watershed to monitor the regeneration of these nest tree species especially in most parts of the watershed that were exposed to more anthropogenic activities such as the controlled use and multiple use zones. It is also recommended that the nesting tree species be included together with other wildlife food plants in reforestation projects. Conservation of old growth forest must be strictly implemented because these massive and tall trees preferred by cavity dwelling birds were found only in old growth forest.

## ACKNOWLEDGMENTS

The author would like to express his gratitude to the two anonymous external reviewers for their valuable comments and suggestions for the improvement of this paper. Sincerest appreciation goes to those who helped during the conduct of the study and during the manuscript writing. This research is funded by the Western Philippines University.

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## **ARTICLE INFO**

*Received: 6 May 2016*

*Accepted: 15 August 2016*