



## Local Communities' Knowledge, Attitude and Perception Toward Cebu Black Shama (*Copsychus cebuensis* Steere) and its Habitat Characteristics in Cebu Island, Philippines



### ABSTRACT

A knowledge, attitude & perception (KAP) survey was conducted in four important bird areas (IBAs) in Cebu island, Philippines towards the protection and conservation of the Cebu black shama (*Copsychus cebuensis*) and its habitat. Similarly, the habitat quality of the black shama in the island was also assessed in terms of vegetation composition and diversity. A total of 193 households were interviewed from July 2013 to December 2013. Most of the respondents only finished elementary and high school levels. However, their mean knowledge score was above 6.50 while their attitude mean score was above 9.40. Their perception scores, on the other hand, were highly positive. Regardless of their educational attainment, people living near the identified black shama territories were highly knowledgeable, aware and positive towards the protection and conservation of the endangered bird and its habitat. Forty-five black shama territories were sampled employing 20 m x 20 m quadrats from September 2013 – February 2014. The black shama habitat is characterized with high plant species diversity ( $H' > 3.50$ ), even plant distribution ( $e > 0.75$ ), and low dominance index ( $D > 0.01$ ). In terms of vegetation composition, the black shama habitats were not similar. Integrating the social and ecological knowledge to conservation will likely promote a wider perspective of effective conservation program implementation than social or ecological knowledge alone.

Richard B. Parilla<sup>1\*</sup>  
Rita P. Laude<sup>2</sup>  
Anna Pauline O. De Guia<sup>2</sup>  
Maria Victoria O. Espaldon<sup>3</sup>  
Leonardo M. Florece<sup>3</sup>

<sup>1</sup> Biology Department, University of San Carlos-Talamban Campus, Cebu City, Philippines

<sup>2</sup> Institute of Biological Sciences, University of the Philippines Los Baños (UPLB), College, Laguna 4031

<sup>3</sup> School of Environmental Science and Management, UPLB, College, Laguna 4031

**Key words:** Cebu black shama, *Copsychus cebuensis*, important bird areas, habitat quality, biodiversity conservation

\*corresponding author:  
richard\_parilla@yahoo.com

### INTRODUCTION

The Philippines is considered as the most critical among the megadiverse countries (Myers *et al.* 2000) with regards to the percentage of endemic species threatened with extinction, as well as on declining number and size of suitable wildlife habitats. The remaining forested areas (without brushlands), according to *Philippine Strategy for Sustainable Development* (1989), is 6.5 M ha, which is 21% of the country's total area of 30 M ha, and 40% of the legally classified forest lands of 16 M ha. The country is losing 119,000 ha each year or about 14 ha hr<sup>-1</sup> due to illegal logging, forest fires and slash and burn agriculture.

In the island of Cebu alone, only one percent (ca. 14,407 ha) of its original forests is left and distributed as isolated patches (Mallari *et al.* 2001; DENR-FMB 2010). Forested areas are rapidly converted into other land uses such as agricultural and commercial purposes. As early as 1870, Cebu was described to be "severely eroded and deforested" due to agriculture such as rice, corn, and sugar cane cultivation, as well as timber extraction for growing urban areas (as cited by Roth 1983 in Bensel 2008). In 1876, forest cover was estimated at only 6% (as cited by Vandermeer

1967 in Bensel 2008). According to Bagarinao (2010) the forest fragmentation in Central Cebu has reached an alarming level, which may have lead to extinction of some rare endemic species found in the province.

Thriving in the forest fragments in the island of Cebu are rare bird species endemic to the island such as the Cebu black shama (*Copsychus cebuensis* Steere). This bird is classified as Endangered according to the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species since 1994 (Birdlife International 2012). Their long existence in the island was challenged by the deteriorating quality of their habitat (Rabor 1959; Bagarinao 2010). Lim *et al.* (2010) pointed out that the black shama became isolated and diverged after invading the island of Cebu 2.83 million years ago.

Conversely, most of the threats to the black shama's existence are anthropogenic in nature (Linke *et al.* 2007 *cf.* Sovero *et al.* 2010; Posa and Sodhi 2006). Hence, according to Myers *et al.* (2000), the future of biodiversity and the vital processes it provide is dependent on what we [humans]

do or do not do. Likewise, understanding how social factors such as cultural beliefs, values and demographic change shape human interactions with the environment is vital to conservation actions (Mascia *et al.* 2003 in Fox *et al.* 2006). It is recommended that humans should take part on conservation efforts to mitigate the threats affecting this species as their support and commitment is the key to the success of the conservation efforts (IIRR 1992).

Many conservationists acknowledged that ecological knowledge albeit necessary is not sufficient for conservation success. They recognized the importance of the social dimensions of conservation problems (Fox *et al.* 2006). In this regard, this study measured the knowledge, attitude, and perception of the local communities in relation to black shama conservation initiatives in their respective area. Four important bird areas (IBAs) in Cebu were selected for this study. These areas include Tabunan (Cebu City), Nug-as (Alcoy), Tabayag (Argao), and Casili (Mandaue City/Consolacion).

## MATERIALS AND METHODS

### Description of Study Sites

Four important bird areas (IBAs), i.e. black shama habitats, in Cebu were surveyed and assessed from September 2013 – February 2014, and the residents of the local community in the IBAs were interviewed from July 2013 – December 2013. These IBAs were Tabunan in Cebu City, Nug-as in the municipality of Alcoy, Tabayag in the municipality of Argao, and Casili in Mandaue City/and the municipality of Consolacion (**Figure 1**). They were also known habitats of the endangered Cebu black shama (*Copsychus cebuensis*) (Birdlife International 2001).

**Tabunan (Cebu City).** Barangay Tabunan is a mountain barangay of Cebu City, located 36 km northwest of the Cebu City hall. The entire barangay is part of the Central Cebu Protected Landscape (CCPL) with a total land area of 1,014 ha. As of 2010 National Statistics Office Census of Population and Housing (NSO-CPH), barangay Tabunan has 440 households with a total household population of 1,951. The main source of livelihood of the residents is farming. Tabunan has been designated as an important bird area (IBA) (PH068) as several avian taxa endemic to the island, including the ubiquitous Cebu black shama, find refuge in its forest (Birdlife International 2014). The forest in Tabunan is a thin segmented strip of secondary growth located on a steep slope with an estimated area of 300 ha or 3 km<sup>2</sup> (Birdlife International 2001).

**Nug-as (Alcoy).** Barangay Nug-as is the largest and farthest mountain barangay of the municipality of Alcoy, located 92

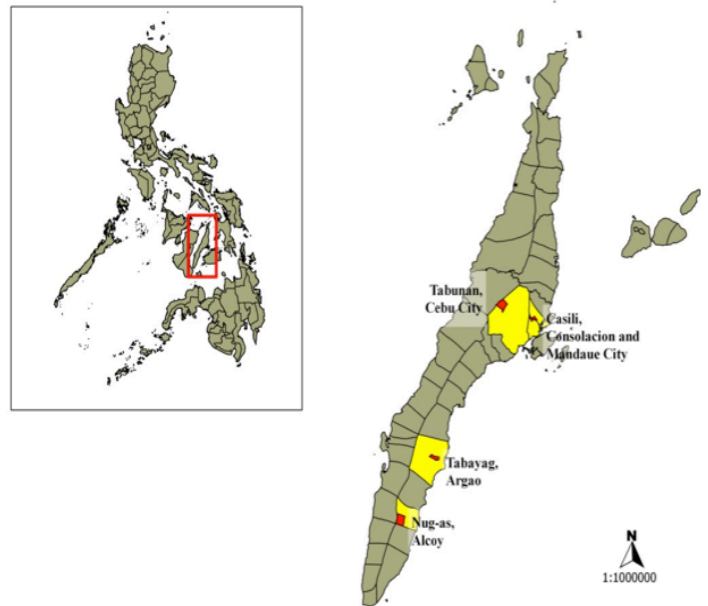


Figure 1. The study site highlighting the four IBAs in Cebu province.

km south of Cebu City, 16 km west of the municipal hall, and with a total land area of 25 km<sup>2</sup>. As of 2010 NSO-CPH, barangay Nug-as has a total population of 2,923. Nug-as was also designated as an IBA (PH071) as its forest, which is the largest of the remaining forests in the island, hosts a number of endemic subspecies of birds (Brooks *et al.* 1995 *c.f.* Paguntalan and Jakosalem 2008). The forest in Nug-as has a total cover of ca. 12 km<sup>2</sup> (Paguntalan and Jakosalem 2008).

**Tabayag (Argao).** Barangay Tabayag is among the mountain barangays situated at the foot of Mt. Lantoy, another important IBA (PH071) (Birdlife International 2014), in the municipality of Argao, located 60 km south of Cebu City. As of 2010 NSO-CPH, barangay Tabayag has a total population of 999. The upper slope of Mt. Lantoy is a low secondary forest and dense scrub, typical of dry karst limestone conditions, with an estimated area of ca. 300 ha on the peak. Most of the surrounding low-lying areas, such as barangay Tabayag, are covered with farmland, agroforestry, secondary growth and reforested areas, planted with exotic trees (Birdlife International 2014). These areas also proved to be a habitat of the black shama (Birdlife International 2014a).

**Casili (Mandaue City/Consolacion).** Barangay Casili, a mountain barangay, of the highly industrialized city of Mandaue and municipality of Consolacion, located 23 km north of Cebu city. As of 2010 NSO-CPH, Casili, Mandaue City has a total population of 3,743 while barangay Casili, Consolacion has a total population of 12,745. It was in Casili that largest record of black shama sightings was reported by Magsalay (1983) when it was believed to be very rare since the 1950s (Rabor 1959).

**Household Interviews**

The residents of the local communities in the four IBAs were interviewed following an interview schedule in local dialect. Sample size of 193 were determined following *Parrel et al. (1973)*, wherein Tabunan (n=51), Nug-as (n=33), Tabayag (n=29), and Casili (n=80). Systematic sampling with a random start was employed in the conduct of the interview. Only one of the adult household members, i.e. 18 years old above, was interviewed.

The questionnaire was divided into four parts. Part 1 determined the socio-economic condition, educational attainment, and estimated monthly income of the respondents. Part 2 focused on the respondent’s level of knowledge on habitat/forest ecology and wildlife conservation. It is a 10-item test about key environmental concepts answerable by TRUE or FALSE, wherein each correct answer is given 1 point. Part 3 assessed the respondent’s attitude towards the conservation and protection of wildlife and their habitat, as well as their likelihood in committing to help in the conservation initiatives by answering YES or NO to each item. Each positive reply generates 2 points while negative reply generates only 1 point. However, the respondents have the option to not answer the question and the said item will not be included in the analysis. Part 4 evaluated the respondents’ perception of the forests and the wildlife living inside the forests. A 10-item test queried about key issues/concerns wherein the respondents would reply on a degree of how much they agree or disagree on each statement. Perception scores were based on a 5-degree Likert scale, i.e. each Likert item is organized and coded as strongly disagree (SD), disagree (D), neutral/undecided (U), agree (A), and strongly agree (SA).

**Vegetation Analyses**

Known black shama territories per IBA were located with the help of local guides/ forest wardens. A black shama territory was estimated to have an area of ca. 1,000 m<sup>2</sup> (*Pedro pers.comm.*). Inside each territory, one 20 m x 20 m quadrat was established randomly. All plants inside the quadrat were identified and counted. Indices of diversity and dominance were calculated using Shannon-Weiner index (H’) and Simpson’s index (D), respectively. The Jaccard’s similarity coefficient (*Chao et al. 2005*) was also used to determine community similarity among and between territories and/or IBAs.

**RESULTS AND DISCUSSIONS**

**Socio-Demographic Characteristics**

**Respondent’s Age Structure and Gender.** In the age

structure of the respondents in four IBAs, the majority of the respondents were between 21-50 years old (**Figure 2**). The oldest and the youngest respondents were noted in Casili, i.e. 82 y.o. and 18 y.o. respectively. Conversely, the respondents in four sites were mostly females/wives (**Table 1**).

**Respondents’ Educational Attainment.** The level of educational attainment of the respondents varies with each IBA (**Figure 3**). Nug-as has the highest percentage of respondents with no high school education (70%). It is followed by Tabunan (57%) and Tabayag (48%). These IBAs, as presented earlier, are mountainous barangays. Casili, on the other hand, has the highest percentage of respondents with at least high school education. With the exception of Casili, the other IBAs were located far away from town centers where most schools are situated. Hence, accessibility of schools and the ability of the household to send a family member to school were seen to be the major reasons of the respondents’ educational attainment in these areas. To attend higher education became more expensive for the family with limited income.

**Respondents’ Sources of Livelihood and Estimated Monthly Income.** The main source of livelihood

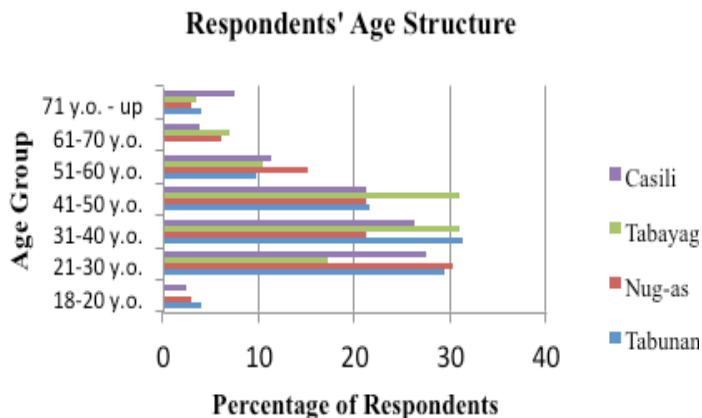


Figure 2. Respondents’ age structure per location.

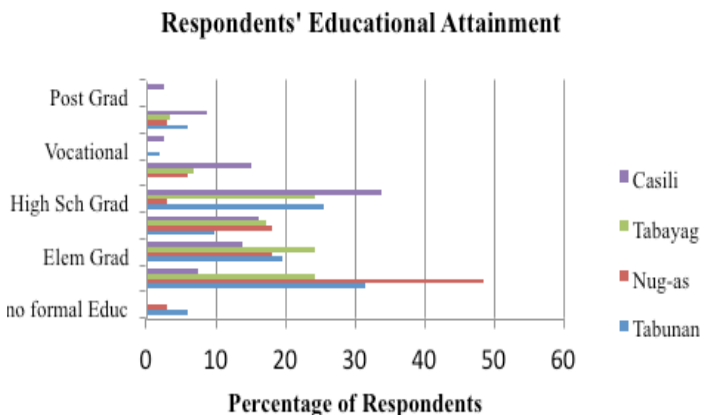


Figure 3. Respondents’ educational attainment in four sites.

Table 1. Respondents' Age and Gender.

Number of Respondents (N)	Tabunan (n=51)	Nug-as (n=33)	Tabayag (n=29)	Casili (n=80)
Age (in years)				
Minimum	20	20	21	18
Maximum	75	74	72	82
Median	34	38	42	36
Average (Mean)	37.35	40.48	41.62	40.35
Standard Deviation	12.73	14.05	12.74	15.06
Gender (in percentage)				
Females	55	55	65	78
Males	45	45	35	22

particularly of respondents from Tabunan, Nug-as, and Tabayag is agriculture. While those in Casili, their sources of income came from small businesses and employment in both private and government firms (Figure 4). In this sense, the estimated household income of the Casili respondents was higher than those in Tabunan, Nug-as, and Tabayag (Figure 5). However, bigger proportion of the respondents from all the sites is thriving below per capita poverty threshold of PhP 9,436.00 (NSCB 2012), i.e. they're living in poverty.

**Respondents' Knowledge, Attitude, and Perception (KAP).** The highest knowledge score was recorded in Tabunan, with an average score of 7.53, while the lowest score was in Tabayag at an average score of 6.72 (Table 2). It was observed that respondents in Casili generated the second highest, at an average of 7.34, but it was also in Casili that few respondents scored the lowest.

As per item assessment of the percentage of respondents who answered correctly, it was worth noticing that many of the respondents in all sites, particularly in Nug-as (64%), did not know that the black shama is a threatened bird (item 6) (Table 3). Likewise, many of the respondents in four sites did not know that black shama is endemic to Cebu (item 7) and the black shama population is declining (item 8). On the other hand, the respondents were very much aware and knowledgeable on the importance of the forest to the environment (item 1) as well as the negative impact of forest conversion and deforestation (item 5). However, many of them did not know that black shama lived in the forest (item 9). It was also worth mentioning that, albeit a number of information, education, and communication (IEC) campaigns were conducted in these areas over the years, especially in Tabunan and Nug-as, the result of the assessment had suggested a need to address some gaps in the focus of IEC campaigns, such as the conservation status of the black shama, its habitat, and its biogeographic distributions.

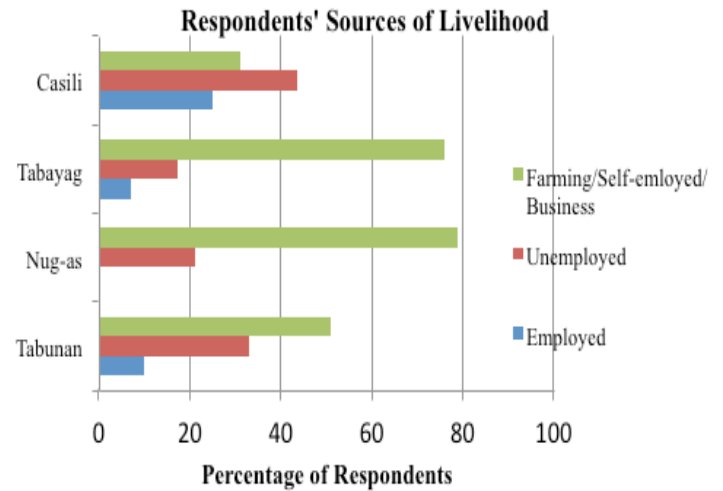


Figure 4. Source of livelihood of respondents in four sites.

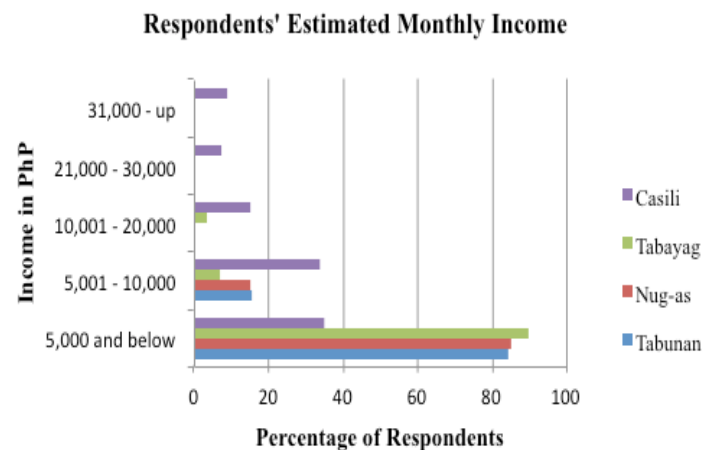


Figure 5. Estimated monthly income of the respondents in four sites (PhP1 = US\$45 (NSCB, 2012)).

Table 2. Knowledge scores of respondents in Tabunan, Nug-as, Tabayag, and Casili in relation to habitat/forest ecology and wildlife conservation.

	Tabunan	Nug-as	Tabayag	Casili
Minimum Score	4.00	4.00	4.00	3.00
Maximum Score	10.00	10.00	10.00	10.00
Median Score	7.00	8.00	7.00	7.00
Mean Score	7.53	7.06	6.72	7.34
Std. Deviation	1.50	1.73	1.36	1.70

On the other hand, the average attitude scores of respondents in four sites is very high (Table 4). This is an indicative of highly positive populace towards conserving and protecting threatened birds and their habitats. Likewise, the conservation actions for the black shama in these areas may be accepted with full support by the local people.

Likewise, as per item assessment of percentage of respondents who answered the 5-item attitude test (Table 5),

Table 3. Percentage of responses by the local community in Tabunan, Nug-as, Tabayag, and Casili in knowledge test.

	Tabunan (n=51) (%)		Nug-as (n= 33) (%)		Tabayag (n=29) (%)		Casili (n=80) (%)	
	False	True	False	True	False	True	False	True
1. The forest is an important component of the environment.	0	100	0	100	0	100	3	96
2. Biodiversity is basically the very web of life.	4	94	6	94	0	100	16	84
3. Birds are part of earth’s biodiversity.	0	100	0	100	0	100	4	96
4. Birds are threatened with extinction because of habitat loss.	22	78	36	64	34	66	21	78
5. Habitat loss includes deforestation, forest conversion to agricultural and residential uses.	22	78	24	76	24	76	6	93
6. Siloy or the black shama is a threatened bird.	39	61	64	36	34	66	25	69
7. The black shama or siloy is found all over the world.	27	71	48	52	24	76	30	59
8. Siloy’s population size all over the world is still large.	43	55	30	70	21	79	56	38
9. Siloy’s habitat is the open grassland.	49	51	58	42	24	76	36	55
10. Humans have responsibility of protecting the siloy and all biodiversity.	0	100	0	100	3	97	4	96

Table 4. Attitude scores of respondents in Tabunan, Nug-as, Tabayag, and Casili in relation to conservation and protection of wildlife and their habitat, as well as their role and commitment to it.

	Tabunan	Nug-as	Tabayag	Casili
Minimum Score	8.00	8.00	8.00	8.00
Maximum Score	10.00	10.00	10.00	10.00
Median Score	10.00	10.00	9.00	10.00
Mean Score	9.49	9.67	9.45	9.66
Std. Deviation	0.54	0.54	0.57	0.55

most of the respondents are willing to help and support the conservation and protection of the Cebu black shama and its habitat. The result indicates easy implementation and potential success of any conservation efforts to be implemented in the island. It has been widely accepted that the active role and support of the community was seen to be important in the success of the conservation efforts (IIRR 1992; Agarwal and Gibson 1999).

The perception of the local community in the four IBAs is highly positive towards protecting and conserving the black shama and its forest habitat (Table 6). The communities are aware that black shama and other wildlife must be protected (items 8 and 9). They show understanding of the bird’s role in the maintenance of a healthy environment (items 5, 6, and 7). According to them converting the forest to other uses will bring more harm than good to the environment (items 3 and 4). They also know how important the forest in the continuous existence of the birds and other wildlife (item 2). On the other hand, they have an impression that the forest is a dangerous place due to presence of wild and dangerous animals (item 1). Likewise, they also believed that the government has the greatest responsibility in the campaign for the protection of the bird and its forest habitat (item 10).

**Cebu Black Shama Habitat Characteristics**

**Plant Community Composition.** The characteristic plant

Table 5. Percentage of respondents’ answers in four sites in attitude test.

	Tabunan (n=51) (%)		Nug-as (n= 33) (%)		Tabayag (n=29) (%)		Casili (n=80) (%)	
	False	True	False	True	False	True	False	True
1. Is siloy and other threatened bird species worth protecting?	2	98	0	100	0	100	4	96
2. Are you willing to give up something to protect threatened bird species?	6	94	6	94	0	93	5	94
3. Is protecting threatened bird species, like the siloy, a problem of the government only?	59	41	73	27	55	45	79	21
4. Should the people in the local community help to protect threatened birds?	2	98	0	100	0	100	6	94
5. Will you help in the active campaign of protecting threatened birds?	6	94	0	100	3	97	5	95
Mean score	9.5		9.7		9.4		9.7	
Std. deviation	0.5		0.5		0.6		0.5	

Table 6. Most frequent responses to each item in the 10-point perception test by respondents and its percent distribution in Tabunan, Nug-as, Tabayag, and Casili.

	Tabunan (n=51) (%)	Nug-as (n= 33) (%)	Tabayag (n=29) (%)	Casili (n=80) (%)
1. The forest is dangerous due to presence of wild animals.	A (57)	SA (42)	SA (52)	A (48)
2. The forest is the best place for birds to live.	A (62)	SA (73)	SA (55)	A (48)
3. Converting forests to agricultural fields is good for the environment.	D (58)	D (39)	D (62)	D (48)
4. Converting the forest to other uses will not affect the wildlife organisms, such as the birds, that depend on it.	D (55)	D (42)	D (48)	D (63)
5. We need the birds for our own survival.	A (60)	SA (52)	A (52)	A (61)
6. Birds are mostly pests in the farmlands that need to be hunted and killed.	D (58)	D (61)	D (52)	D (51)
7. Birds are necessary for the maintenance of ecological integrity.	A (68)	SA (52)	A (48)	A (73)
8. The birds and all other wildlife must be protected.	A (60)	A (48)	A (55)	A (69)
9. The siloy or black shama is one of the birds that need protection.	A (64)	SA (58)	A (55)	A (79)
10. Protecting the siloy and other threatened wildlife is the government's sole responsibility.	A (47)	D (39)	A (38)	A (40)

Legend: SA – strongly agree, A – agree, D – disagree, SD – strongly disagree

Table 7. Summary of Vegetation Survey.

Location	No. of Quadrats	No. of Plant Species	No. of Plant Families	Shannon-Weiner (H')	Simpson's (D)	Evenness (e)
Tabunan	13	77	38	3.67	0.04	0.82
Nug-as	14	105	49	3.96	0.03	0.82
Tabayag	10	76	37	3.54	0.05	0.78
Casili	8	73	38	4.11	0.02	0.86
Total	45					

community, physical factors, and availability of potential food sources in the black shama habitat/territory were crucial in understanding and predicting the bird's movements and distribution pattern. The interplay of these factors can help improve planning conservation and management strategies in the future.

In a total of 45 black shama territories that were surveyed and analyzed, plant species diversity indices in all sites were high ( $H' > 3.5$ ) and dominance indices were low ( $D \leq 0.05$ ) (Table 7).

Conversely, when the similarity of vegetation composition between the sites was computed using abundance-based Jaccard's similarity index, it was shown that black shama territories were different (Table 8). This, similarity index, and together with species diversity and dominance indices highly suggest that the black shama presence in a habitat is not dictated by distinct species of plant/s. In this regard, the black shama is a bird species that can survive not only in thick, less disturbed forest such as Tabunan and Nug-as forests but also in moderately disturbed and altered habitats such as in Tabayag and to a highly disturbed ones such as in Casili. Thus, it is paramount to say that black shama is not an obligate deep forest species and the habitat of the black shama is not equated with native/or

Table 8. Community similarity in territories of the black shama in Tabunan, Nug-as, Tabayag, and Casili using Jaccard's similarity index.

	Tabunan	Nug-as	Tabayag	Casili
Tabunan	1.000			
Nug-as	0.341	1.000		
Tabayag	0.296	0.796	1.000	
Casili	0.154	0.109	0.128	1.000

dominant vegetation. As articulated by Fischer and Lindemeayer (2007), the habitat is a species-specific concept. Among those threatened bird species in the island, the black shama can be considered a persistent and resilient type of bird, i.e. able to thrive and continues to exist not only in pristine forests but also in disturbed habitats.

## SUMMARY AND CONCLUSION

The local communities in the IBAs of Cebu island are relatively knowledgeable on environmental and conservation issues regardless of their socioeconomic condition. They are also positive and supportive towards the conservation and protection of the black shama and its habitat. In this sense, it could be seen that any future conservation efforts towards black shama in the island will encounter less problems in terms of seeking support of the

people.

The community compositions between territories across all the black shama habitats were not at all similar. No distinct vegetation features will define what a black shama territory should be. This is very important. The black shama is therefore not selective, i.e. it can survive in any kind of habitats, whether natural forests, mixed forests, man-made forests, and/or highly disturbed forests as long as the vegetation composition is diverse.

The existence of black shama in Cebu is seen to continue for a little much longer assuming that the current level of knowledge, attitude, and perception of the local communities will be sustained for several generations, as well as its forest habitat condition. It was also expected by the people that the government should be actively involved in the conservation actions. Likewise, integrating social and ecological perspectives to conservation will likely promote more effective conservation programs.

## RECOMMENDATIONS

An effective incentive system for the local community to fully commit their support in the conservation and protection of the Cebu black shama and its habitat is highly called for, such as government support in the form of sustainable alternative livelihood sources and/or education opportunities for those who will sign up as deputy brigade, for example, who will watch over the forest and/or black shama habitat. This will be aimed to remove some pressures of extracting resources and forest encroachment from the people.

Likewise, local government and all other agencies involved in promoting conservation programs should reexamine the focus of information, education, and communication programs. Furthermore, in any reforestation and rehabilitation efforts, it would be useful to plant different varieties of plants and/or trees for the continuous existence of threatened species like the Cebu black shama and all other wildlife that depend on them.

## REFERENCES

- Agarwal, A. and Gibson, C. 1999. Enchantment and disenchantment: The role of community in natural resource conservation. *World Development*. 27(4):629-649
- Bagarinao, R.T. 2010. Forest fragmentation in Cental Cebu and its potential causes: A landscape ecological approach. *Journal of Environmental Science and Management* 13 (2): 66 – 73
- Bensel, T. 2008. "Fuelwood, deforestation, and land degradation: 10 years of evidence from Cebu Province, The Philippines." *Land Degrad. Develop.* 19: 587–605 doi: 10.1002/ldr.862
- BirdLife International. 2001. *Threatened birds of Asia: the BirdLife International Red DataBook*. Cambridge, UK: BirdLife International
- BirdLife International. 2012. *Copsychus cebuensis*. The IUCN Red List of Threatened Species 2012: e.T22710009A38202144. <http://dx.doi.org/10.2305/IUCN.UK.2012-1.RLTS.T22710009A38202144.en>
- BirdLife International. 2014. Endemic Bird Area factsheet: Cebu. Downloaded from <http://www.birdlife.org> on 24/08/2014
- BirdLife International. 2014a. Important Bird Areas factsheet: Nug-as and Mount Lantoy. Downloaded from <http://www.birdlife.org> on 24/08/2014
- Department of Environment and Natural Resources (DENR) – Forest Management Bureau (FMB). 2010. Philippine Forest Cover. <http://forestry.denr.gov.ph/landusereg.htm>
- Fox, H.E., C. Christian, J.C. Nordby, O.R.W. Pergams, G.D. Peterson, and C.R. Pyke. 2006. Perceived barriers to integrating social science and conservation. *Conservation Biology* 20(6):1817-1820 doi:10.1111/j.1523-1739.2006.00598.x
- Fischer, J. and Lindenmayer, D.B. 2007. Landscape modification and habitat fragmentation: A synthesis. *Global Ecology and Biogeography* 16:265-280
- IIRR. 1992. Ideas for action: An information kit. Environment, Agriculture, and Natural Resources Management. 146pp
- Lim, H.C., F. Zou, S.S. Taylor, B.D. Marks, R.G. Moyle, G. Voelker and F.H. Sheldon. 2010. "Phylogeny of magpie-robins and shamas (Aves: Turdidae: Copsychus and Trichixos): implications for island biogeography in Southeast Asia." *Journal of Biogeography* 37:1894–1906.
- Magsalay, P. The Ecology and Population Status of the Black Shama *Copsychus cebuensis*, Steer, From Cebu Philippines. (An unpublished thesis presented to the Faculty of the Graduate School, University of San Carlos, in partial fulfillment of the requirements for the degree Master of Science in Biology). 1983
- Malaki, A.B., R.V.O. Cruz, N.C. Bantayan, D.A. Racelis, I.E. Buor Jr., and L.M. Florece. 2013. Landscape pattern impacts on the population density and distribution of black shama (*Copsychus cebuensis* Steere) in Argao watershed reserve, Argao, Cebu, Philippines. Hindawi Publishing Corporation. ISRN Biodiversity. Article ID 568498. <http://dx.doi.org/10.1155/2013/568498>
- Mallari, N.A.D., B.R. Tabaranza Jr., and M.J. Crosby. 2001. Key conservation sites in the Philippines: A Haribon Foundation

and Birdlife International Directory of Important Bird Areas. Bookmark, Makati City, Philippines. 485 pp.

Myers, N., R.A. Mittermeyer, C.G. Mittermeyer, G.A.B. Fonseca and J. Kent. 2000. Biodiversity hotspots for conservation priorities. *Nature* 403:853-858

NSCB. 2012. Poverty incidence unchanged, as of 1st semester 2012: Press release (downloaded on December 03, 2014 at <http://nscb.gov.ph/poverty/defaultnew.asp>)

Posa, M.R.C. and Sodhi, N.S. 2006. Effects of anthropogenic land use on forest birds and butterflies in Subic Bay, Philippines. *Biological Conservation* 129: 256-270

Rabor, D.S.1959. The impact of deforestation on birds of Cebu, Philippines, with new records for that island. *Auk* 76: 37-43

Soverel, N.O., N.C. Coops, J.C. White, and M.A. Wulder. 2010. Characterizing the Forest Fragmentation of Canada's National Parks. *Environ Monit Assess* 164:481-499 DOI 10.1007/s10661-009-0908-7