

Post Biological Assessment of Faunal Resources in The Samar Island Natural Park.

Teofanes A. Patindol

*Department of Forest Science, College of Forestry and Environmental Science,
Visayas State University, Baybay City, Leyte, Philippines*

ABSTRACT

Samar Island Natural Park (SINP) is regarded as one of the most important areas in terms of biodiversity in the island of Samar and within the greater Mindanao faunal region. Five priority watersheds within the SINP were surveyed for the post biological assessment. These were the watersheds of Taft, Can-avid, Basey, Suribao and Catubig. Standard faunal survey methods such as transect survey, mist netting, and trapping were used during the entire duration of the study. The methods were augmented with ocular observations and ethnobiological interviews.

Of the 182 species of terrestrial vertebrates recorded from SINP, 121 species were birds, 20 were mammals, 18 amphibians and 23 reptiles. The overall endemism is 40%. The 121 species of birds belong to 15 orders and 45 families. Of these, 26% are endemic to the Philippines and 12% are endemic to the greater Mindanao faunal region. Among avian species, thirteen (11%) are considered threatened or at risk.

Of the 11 mammals, which belong to 6 orders and 9 families, 45% are endemic to the country and 15% are endemic to the greater Mindanao faunal region. Seven (35%) of these species are considered threatened or at risk.

Of the 18 species of amphibians recorded, 2 are introduced and the rest are native to the Philippines. Of the 23 reptiles, 39% are endemic to the country and 3% are endemic to the greater Mindanao faunal region. Among herpetofauna, only one species is considered threatened or at risk.

Samar holds high diversity and high endemism and contains a remarkable number of threatened species being recognized by the international arena in biological diversity conservation, most of which have strong affinity to the Mindanao faunal region. The existing data are sufficient to further highlight the need to establish SINP as conservation priority site in the region.

Keywords: Samar Island Natural Park, faunal diversity, endemism, threatened species

INTRODUCTION

The Samar Island Biodiversity Project (SIBP) was implemented by the United Nations Development Program (UNDP) and the Global Environmental Facility (GEF) through the Department of Environment and Natural Resources (DENR) (UNDP-GEF-DENR, 2007). The project aimed to promote biodiversity conservation and sustainable management of forest resources in Samar Island through a community-based conservation regime. Samar Island has been selected to form part of the GEF by having the largest forested area in Region 8. Although most parts of forest in Samar Island had been logged in the last few decades, its biological resources could have been recovering already through natural regeneration.

The upgrading of the conservation status of the covered area into a natural park, to become the Samar Island Natural Park (SINP), made it imperative to have a more precise accounting of the biological resources therein. Baseline data on the current state of biological resources are basic requisites for planning and decision making for current and future management programs. Baseline data provide insights on the current ecological health status of forest resources, which is also the basis of whether such resources are valuable enough to justify investments in conservation. Baseline data are also providing benchmark with which to compare future biological resource assessment when the interest is to check whether such resources are improving or suffering from degradation. Benchmark also helps in determining the seriousness of the need for action in the conservation of biodiversity in the park.

A biological resources assessment (BRA) in the SINP area has been conducted in 2002 to 2003 as one major activity of the SIBP (SEAMEO-SEARCA, 2004). The BRA was conducted to establish baseline information on biodiversity, conservation values, status of critical natural habitats and to validate SINP's indicative management zones. The BRA in 2002-03 was undertaken by a group of experts in the fields of taxonomy and botany. Their output was a product of a thorough field methodology for an exhaustive enumeration of floral and faunal species along transects in 8 selected watersheds. It produced a very valuable document on biological diversity of the sites and has ultimately confirmed the worth of protecting the natural forests in Samar Island. For the national and international level of interests in line with biodiversity conservation, it represents a big stride in SINP's development programs.

The general objective of the post biological resource assessment was to revalidate the previous baseline information on existing flora and fauna resources, including critical habitats and indicators identified and conduct an analysis of changes and trends for effective management of SINP. Specifically the study aimed to identify patterns of fauna-habitat associations that will provide guidance for the design and implementation of management interventions for particular species' survival within SINP and across their range and to provide bases for policy recommendation

and inputs in the updating of the SINP management plan.

This article presents the result of the post biological assessment of the faunal resources of SINP which include the four major groups of vertebrates, namely: birds, mammals, reptiles and amphibians.

METHODOLOGY

The Study Area

The Samar Island Natural Park as provided for by Presidential Decree (PD) 442 covers 333,330 hectares of protected area and buffer zone of 124,500 hectares. It has 8 watersheds: Suribao, Can-avid, Catubig, Taft, Basey, Dolores, Gandara and Pambujan. This study has covered the first five watersheds in the assessment.

The SINP has abundant rainfall with mean annual rainfall of about 3,600 mm. Climatic types II and IV prevail in the area. Type II is characterized by having no dry season, with pronounced maximum rainfall period in the months of December and January. Type IV has more or less even distribution of rainfall throughout the year, or without period with maximum rains. Within the protected area, only about 2% can be considered flat, 14% as undulating to flat and the rest is rolling to moderately steep and very steeply mountainous. The soil is clay loam to clay.

The geology is mostly Miocene to Holocene sedimentary rocks. Where the SINP is located, the sedimentary formation generally consists of basement rocks, sometimes with overlying clastic rocks or limestone. The area consists of an interior highland with marked accordant peaks and a surrounding limestone or karst terrain. The southern peninsula is made up of jungle-covered limestone ridge that appears to be a younger coral reef. The central highlands are principally of igneous complex intercalated with metamorphosed sedimentary rocks. With the presence of thick mantle of laterite soil, indicates that the igneous rocks have been subjected to intense mechanical and chemical weathering. A more complete physical description of the SINP area is presented in the SINP Management Plan 2006 to 2016 (UNDP-GEF-DENR, 2007).

Faunal Survey

Faunal survey was conducted to cover all four major vertebrate groups (reptiles, amphibians, birds, and mammals). Different techniques or methods of faunal inventory include trapping of non-volant mammals, mist netting of non-volant mammals, and transect survey of birds, reptiles and amphibians. Indirect methods of faunal survey such as those using footprints, fecal droppings, roosting and nesting sites, other physical evidences were likewise used. Ethnobiological interviews that may indicate the probable presence of wildlife in the area were also employed.

Avifaunal Survey

Composition and distribution of avian species were assessed using the transect survey method based on Mallari (1992). A transect line measuring 2 kilometers was set in every sampling site. All species of birds encountered along the transect were recorded. For each species seen or heard, the following information were noted: species name, number of individuals, and habitat types. The avifaunal inventory was conducted early in the morning (from 6:00 to 9:00) and late in the afternoon (from 3:00 to 6:00). Identification was made down to the species level whenever possible. Nomenclature and classification were based on Kennedy *et al.* (2000).

Mammalian Survey

Mist nets for volant mammals and live traps for non-volant mammals were used in the mammalian survey. Nomenclature and classification were based on Rabor (1986).

Mist-netting stations were set up in strategic locations either singly or a series and operated for days in specific study sites. Each net has an average mesh size of 36 mm and an average height of 2 meters. Nets were set 2 meter high with a ground clearance of about 0.5 meter. Species captured were identified up to the species level whenever possible.

Trapping of non-volant mammals involved setting of cage traps baited with cooked coconut meat, sliced ripe mango or dried fish, on the ground near fallen logs or holes, along possible runways or root system of trees or stumps. Similarly, trapped or captured animals were identified up to the species level whenever possible. Tracks and fecal matters were also used to estimate the presence of wildlife in each transect route used in avifaunal survey.

Herpetofaunal Survey

Random sampling of reptiles and amphibians was done whenever possible along the transect route used for the avifaunal survey. Sampling was done along streams, rivers or near bodies of water or any site believed to be harborage of herpetofauna. Animals were either collected by hand or captured by nets for further verification. Nomenclature and classification was based on Alcalá (1986) and Alcalá and Brown (1998).

Other Methods of Faunal Survey

Ethnobiological interviews were conducted to determine the presence of other vertebrates that were not recorded during the field observations. Information on vernacular or local names, habitat type, socioeconomic importance and other patterns of behavior were noted. Other activities

related to the overall decline or loss of wildlife species in the area were also recorded.

Data Presentation and Analysis

Data recorded from the 5 watersheds were presented in tabular form showing the species composition to include order, family, scientific name, common name, and residency status. Conservation status of the different fauna was based on IUNC Rest list of Endangered Species (IUCN, 2015) and DENR DAO 2004-15 (DENR, 2004). Ecological role of each species and economic value of key species and threats of endangered species were also presented. Distribution of species was presented in tabular form.

Quantitative analysis of the data recorded from the 5 study sites was done using level of diversity and similarity. Ecological parameters such as index for species diversity using the Shannon-Weiner function (H') were computed for each site. Species assemblages of the 5 sites were compared using the Jaccard Index of Similarity.

Species Diversity

Diversity was computed for each sampling site using Shannon's Diversity Index (Magurran, 1988):

$$H' = - \sum \left[\frac{n_1}{n} \right] \left[\ln \frac{n_1}{n} \right]$$

where: H' = the Shannon index of diversity
 n_1 = number of individuals per species and
 n = total number of individuals

Similarity Index

The degree of similarity in species composition among sites was presented using a table on Jaccard indices. Jaccard index was calculated using the formula below:

$$J = \frac{c}{a + b - c}$$

where: J = the Jaccard index
 a = the number of species in the first population;
 b = the number of species in the second population;
 c = the number of species occurring in both populations.

RESULTS AND DISCUSSION

AVIFAUNA

Species Composition

A total of 121 bird species were recorded in the five study sites (Table 1). These species belong to 15 orders and 45 families. The most represented order was Passeriformes with 60 species belonging to 23 families. The second most represented order was Columbiformes with 13 species. This was followed by Coraciiformes and Gruiformes with 10 and 6 species, respectively.

Table 1. List of birds recorded from five priority watersheds in Samar Island Natural Park, c. 2011

Order	Family Name	Scientific Name	Common Name	Status*
Anseriformes	Anatidae	<i>Anas luzonica</i>	Philippine mallard	Philippine Endemic
Anseriformes	Anatidae	<i>Dendrocygna arcuata</i>	Wandering whistling duck	Resident
Apodiformes	Apodidae	<i>Collocalia mearnsi</i>	Philippine swiftlet	Philippine Endemic
Apodiformes	Apodidae	<i>Collocalia troglodytes</i>	Pygmy swiftlet	Philippine Endemic
Apodiformes	Apodidae	<i>Collocalia esculenta</i>	Glossy swiftlet	Resident
Caprimulgiformes	Podargidae	<i>Batrachostomus septimus</i>	Philippine frogmouth	Philippine Endemic
Caprimulgiformes	Caprimulgidae	<i>Caprimulgus affinis</i>	Savannah nightjar	Resident
Caprimulgiformes	Caprimulgidae	<i>Caprimulgus manillensis</i>	Philippine nightjar	Resident
Charadriiformes	Scolopacidae	<i>Actitis hypoleucos</i>	Common sandpiper	Migrant
Charadriiformes	Charadriidae	<i>Chardrius leschenaultii</i>	Greater sand-plover	Migrant
Ciconiiformes	Ardeidae	<i>Egretta garzetta</i>	Little egret	Migrant
Ciconiiformes	Ardeidae	<i>Bubulcus ibis</i>	Cattle egret	Resident
Ciconiiformes	Ardeidae	<i>Icobyrychus cinnamomeus</i>	Cinnamon bittern	Resident
Ciconiiformes	Ardeidae	<i>Nycticorax caledonicus</i>	Rufous night heron	Resident
Columbiformes	Columbidae	<i>Chalcophaps indica</i>	Common emerald dove	Resident
Columbiformes	Columbidae	<i>Columba vitiensis</i>	Metallic pigeon	Resident
Columbiformes	Columbidae	<i>Ducula aenea</i>	Green imperial pigeon	Resident
Columbiformes	Columbidae	<i>Gallicolumba criniger</i>	Mindanao bleeding heart	Mindanao Endemic
Columbiformes	Columbidae	<i>Geopelia striata</i>	Zebra dove	Resident
Columbiformes	Columbidae	<i>Macropygia phasianella</i>	Reddish cuckoo dove	Resident
Columbiformes	Columbidae	<i>Phapitreron amethystina</i>	Amethyst brown dove	Philippine Endemic
Columbiformes	Columbidae	<i>Phapitreron leucotis</i>	White-eared brown fruit dove	Philippine Endemic
Columbiformes	Columbidae	<i>Ptilinopus lebancher</i>	Black chinned fruit dove	Resident
Columbiformes	Columbidae	<i>Ptilinopus occipitalis</i>	Yellow-breasted fruit dove	Philippine Endemic
Columbiformes	Columbidae	<i>Streptopelia chinensis</i>	Spotted dove	Resident
Columbiformes	Columbidae	<i>Treron pompadora</i>	Pompador green pigeon	Philippine Endemic
Columbiformes	Columbidae	<i>Treron vernans</i>	Pink-necked green pigeon	Resident
Coraciiformes	Alcedinidae	<i>Alcedo argentatus</i>	Silvery king fisher	Mindanao Endemic
Coraciiformes	Alcedinidae	<i>Ceyx lepidus</i>	variable dwarf-kingfisher	Philippine Endemic
Coraciiformes	Alcedinidae	<i>Ceyx melanurus</i>	Philippine dwarf-kingfisher	Philippine Endemic
Coraciiformes	Alcedinidae	<i>Halcyon chloris</i>	White-collard king fisher	Resident
Coraciiformes	Alcedinidae	<i>Halcyon coromanda</i>	Rudy kingfisher	Philippine Endemic
Coraciiformes	Alcedinidae	<i>Halcyon smyrnensis</i>	White throated king fisher	Resident
Coraciiformes	Bucerotidae	<i>Buceros hydrocorax</i>	Rofous hornbill	Philippine Endemic
Coraciiformes	Bucerotidae	<i>Penelopides affinis</i>	Tarictic hornbill	Mindanao Endemic
Coraciiformes	Coraciidae	<i>Eurystomus orientalis</i>	Dollard bird	Resident
Coraciiformes	Meropidae	<i>Merops viridis</i>	Blue-throated bee-eater	Resident
Cuculiformes	Cuculidae	<i>Cacomantis variolosus</i>	Brush cuckoo	Resident
Cuculiformes	Cuculidae	<i>Centropus melanops</i>	Mountain coucal	Mindanao Endemic
Cuculiformes	Cuculidae	<i>Centropus viridis</i>	Philippine coucal	Philippine Endemic
Cuculiformes	Cuculidae	<i>Eudynamys scolopacea</i>	Common koel	Resident
Cuculiformes	Cuculidae	<i>Phaeniphacus curvirostris</i>	Chestnut -breasted malkoha	Resident
Falconiformes	Accipitridae	<i>Haliastur indus</i>	Brahminy kite	Resident
Falconiformes	Accipitridae	<i>Pitheophaga jefferyi</i>	Philippine Eagle	Philippine Endemic
Falconiformes	Accipitridae	<i>Spilornis cheela</i>	Crested serpent eagle	Resident
Falconiformes	Accipitridae	<i>Spizaetus philippensis</i>	Philippine Hawk-eagle	Philippine Endemic
Falconiformes	Falconidae	<i>Microhierax erythrogenys</i>	Philippine falconet	Philippine Endemic

Table 1. Continuation

Order	Family Name	Scientific Name	Common Name	Status*
Galliformes	Megapodiidae	<i>Megapodius cumingii</i>	Tabon scrubfowl	Resident
Gruiformes	Rallidae	<i>Amanromis phoenicurus</i>	White-breasted waterhen	Resident
Gruiformes	Rallidae	<i>Gallinula chloropus</i>	Common moorhen	Resident
Gruiformes	Rallidae	<i>Gallirallus torquatus</i>	Barred rail	Resident
Gruiformes	Rallidae	<i>Porzana cinerea</i>	White browed crane	Resident
Gruiformes	Rallidae	<i>Rallina eurizonoides</i>	Slaty-legged rake	Resident
Gruiformes	Turnicidae	<i>Turnix suscitator</i>	Barred button quail	Resident
Passeriformes	Artamidae	<i>Artamus leucorhynchus</i>	White-breasted wood swallow	Resident
Passeriformes	Campephagidae	<i>Lalage nigra</i>	Pied triller	Resident
Passeriformes	Corvidae	<i>Corvus macrorhynchus</i>	Large-billed crow	Resident
Passeriformes	Dicaeidae	<i>Dicaeum anthonyi</i>	Flame-crowned flower pecker	Philippine Endemic
Passeriformes	Dicaeidae	<i>Dicaeum hypoleucum</i>	Buzzing flower pecker	Philippine Endemic
Passeriformes	Dicaeidae	<i>Dicaeum nigrilore</i>	Olive-capped flowerpecker	Philippine Endemic
Passeriformes	Dicaeidae	<i>Dicaeum trogonostigma</i>	Orange-bellied flowerpecker	Resident
Passeriformes	Dicruridae	<i>Dicrurus balicassius</i>	Balicassiao	Philippine Endemic
Passeriformes	Dicruridae	<i>Dicrurus hottentottus</i>	Spangled drongo	Resident
Passeriformes	Estrildidae	<i>Erythrura coloria</i>	Red-eared Parrot-finch	Mindanao Endemic
Passeriformes	Estrildidae	<i>Lonchura leucogastra</i>	White bellied munia	Resident
Passeriformes	Estrildidae	<i>Lonchura malacca</i>	Chestnut munia	Resident
Passeriformes	Estrildidae	<i>Lonchura punctulata</i>	Scaly-breasted munia	Resident
Passeriformes	Estrildidae	<i>Padda oryzivora</i>	Java sparrow	Resident
Passeriformes	Eurylaimidae	<i>Eurylaimus steerii</i>	Wattled broadbill	Mindanao Endemic
Passeriformes	Fringillidae	<i>Pyrrhula leucogenis</i>	White-checked bullfinch	Philippine Endemic
Passeriformes	Laniidae	<i>Lanius cristatus</i>	Brown shrike	Migrant
Passeriformes	Laniidae	<i>Lanius schach</i>	Long tailed shrike	Resident
Passeriformes	Motacillidae	<i>Anthus novaeseelandiae</i>	Richard's pipit	Resident
Passeriformes	Motacillidae	<i>Motacilla cinerea</i>	Grey wagtail	Migrant
Passeriformes	Motacillidae	<i>Motacilla flava</i>	Yellow wagtail	Migrant
Passeriformes	Muscicapidae	<i>Brachypteryx montana</i>	White browed shortwing	Resident
Passeriformes	Muscicapidae	<i>Eumyias panayensis</i>	Mountain verideter flycatcher	Resident
Passeriformes	Muscicapidae	<i>Ficedula crypta</i>	Cryptic flycatcher	Mindanao Endemic
Passeriformes	Muscicapidae	<i>Rhipidura javanica</i>	Pied fantail	Resident
Passeriformes	Muscicapidae	<i>Rhipidura superciliaris</i>	Blue fantail	Mindanao Endemic
Passeriformes	Muscicapidae	<i>Terpsiphone cinnamomea</i>	Rofous paradise-flying catcher	Resident
Passeriformes	Nectariniidae	<i>Aethopyga pulcherrima</i>	Metallic-winged sunbird	Philippine Endemic
Passeriformes	Nectariniidae	<i>Nectarinia jugularis</i>	Olive-backed sunbird	Resident
Passeriformes	Nectariniidae	<i>Nectarinia sperata</i>	purple throated sunbird	Resident
Passeriformes	Oriolidae	<i>Irena puella</i>	Philippine fairy blue bird	Philippine Endemic
Passeriformes	Oriolidae	<i>Oriolus chinensis</i>	Black naped oriole	Resident
Passeriformes	Pachycephalidae	<i>Pachycephala homeyeri</i>	White-vented whistler	Near Endemic
Passeriformes	Pachycephalidae	<i>Pachycephala philippinensis</i>	Yellow-bellied whistler	Philippine Endemic
Passeriformes	Phasianidae	<i>Coturnix chinensis</i>	Blue breasted quail	Resident
Passeriformes	Phasianidae	<i>Gallus gallus</i>	Red jungle fowl	Resident
Passeriformes	Pittidae	<i>Pitta kochi</i>	Whiskered pitta	Resident
Passeriformes	Pittidae	<i>Pitta steerii</i>	Steere's pitta	Mindanao Endemic
Passeriformes	Ploceidae	<i>Passer mantanus</i>	Eurasian tree sparrow	Resident
Passeriformes	Pycnonotidae	<i>Hypsipetes everetti</i>	Yellowish bulbul	Mindanao Endemic
Passeriformes	Pycnonotidae	<i>Hypsipetes philippinus</i>	Philippine bulbul	Philippine Endemic
Passeriformes	Pycnonotidae	<i>Pycnonotus goiaver</i>	Yellow vented bulbul	Resident
Passeriformes	Pycnonotidae	<i>Pycnonotus ustictus</i>	Yellow-wattled bulbul	Philippine Endemic
Passeriformes	Strigidae	<i>Bubo philippensis</i>	Philippine eagle-owl	Philippine Endemic
Passeriformes	Strigidae	<i>Ninox sculata</i>	Brown hawk owl	Resident
Passeriformes	Sturnidae	<i>Aplonis panayensis</i>	Asian glossy starling	Resident
Passeriformes	Sturnidae	<i>Sarops calvus</i>	Colecto	Near Endemic
Passeriformes	Sylviidae	<i>Cisticola juncidis</i>	Zitting cisticola	Resident
Passeriformes	Sylviidae	<i>Megalurus palustris</i>	Striated grassbird	Resident
Passeriformes	Sylviidae	<i>Megalurus timoriensis</i>	Tawny grassbird	Resident
Passeriformes	Sylviidae	<i>Orthotomus castaneiceps</i>	Philippine tailorbird	Philippine Endemic
Passeriformes	Sylviidae	<i>Orthotomus samarensis</i>	Yellow-breasted tailorbird	Mindanao Endemic
Passeriformes	Sylviidae	<i>Phylloscopus borealis</i>	Arctic warbler	Migrant
Passeriformes	Sylviidae	<i>Phylloscopus cebuensis</i>	Lemon-throated leaf warbler	Philippine Endemic
Passeriformes	Sylviidae	<i>Phylloscopus trivirgatus</i>	Mountain leaf warbler	Resident
Passeriformes	Timaliidae	<i>Macronous striaticeps</i>	Brown tit babbler	Mindanao Endemic
Passeriformes	Timaliidae	<i>Micromacronous leytenis</i>	Miniature tit babbler	Mindanao Endemic
Passeriformes	Timaliidae	<i>Ptilocicula mindanensis</i>	Streaked ground babbler	Mindanao Endemic
Passeriformes	Turdidae	<i>Zosterops danma</i>	Scaly ground thrush	Migrant
Passeriformes	Zosteropidae	<i>Zosterops montanus</i>	Mountain white eye	Resident

Source: Kennedy, et al. 2000.

Columbidae was the most represented family with 8 species of dove and 5 species of pigeon. It was followed by family Sylviidae with 8 species. Most Columbidae species are frugivorous and are often encountered in brushlands bordering secondary forest areas. Their ability as good agents for seed dispersal enables them to play vital role in the forest ecosystem. On the other hand, members of the family Sylviidae are generally insectivorous, thus effective to control insect populations. This was followed by three families represented by 6 species each: Dicaeidae, Alcedinidae, and Muscicapidae. Another three families were represented by 5 species each: Cuculidae, Rallidae and Estrildidae. This indicates that the avifauna of the watersheds on Samar Island was composed largely of frugivorous birds such as pigeons and doves; insectivorous birds such as flycatchers, warblers, cuckoos and coucals; seed eaters such as munias; predators such as the kingfishers and rails; and nectivores such as the flowerpeckers.

The five priority watersheds were also dominated by another three families having 4 species each, including family Accipitridae (raptors), Pycnonotidae (bulbuls) and Psittacidae (parrots), as well as two avian families represented with 3 species each, such as Apodidae (swifts) and Motacillidae (wagtails). This assemblage of species indicates that the avifauna of Samar was composed of large birds of prey, frugivorous and insectivorous birds such as sunbirds and parrots; as well as sweeping insectivorous such as swifts and swiftlets.

The result of the study shows that the lowland forests of Samar is home to diverse species of birds which may indicate the ecological conditions of various habitats and form an important link between the food web and nutrient cycle. The natural vegetation in the forests includes a wide range of trees of different species, sizes and heights, thus creates several canopy layers representing various ecological niches. Such niches are used by a diverse number of birds for foraging, nesting and roosting due to their heterogeneity of microhabitats and available rich food sources. For example, the emergent canopy layer is mainly occupied by warbler (Silvidae) species, whereas the ground layer is occupied by babbler (Timaliidae) species.

Of the 121 avian species recorded, forty-seven (39%) were endemic to the Philippines, of which fourteen (12%) were endemic to the Mindanao faunal region; three (2%) were near endemic, and eight (7%) were migrant. Several interesting similarity may be observed between the result of the present study and the 2003 BRA in terms of endemic species. But the present study has higher percent endemism owing to the slightly lower number of species recorded to the previous one. It is noteworthy that although the number of endemic species was the same, there was slight difference in composition of endemics between the two surveys.

Conservation status of avian species recorded in the five priority watersheds were assessed based on DENR DAO 2004-15. Some 13 species of birds were considered threatened. These include the critically

endangered *Pithecophaga jefferyi* and endangered *Gallicolumba criniger*. The Philippine cockatoo (*Cacatua haematuropygia*), a critically endangered species which was recorded in the previous BRA was not observed during the present study. This species may be present in other watersheds within Samar Island being part of its geographic range. Some 10 species were vulnerable, such as *Anas luzonica*, *Spizaetus philippensis*, *Bubo philippensis*, *Megapodius cimingii*, *Alcedo argentatus*, *Ceyx melanurus*, *Buceros hydrocorax*, *Eurylaimus steerii*, *Pitta steerii* and *Tanygnathus lucionensis*.

Bird Species Distribution, Diversity and Similarity

The distribution of bird species in the five priority watersheds is shown in Table 2. Catubig had the highest number of species with a total of 101; Suribao had the lowest with 55. Taft, Can-avid and Basey had 66, 62 and 85 species, respectively. All sites had high species diversity with Catubig Watershed having the highest index of diversity of 3.92 and Taft Watershed having the lowest with 3.25.

Table 2. Distribution of bird species recorded from five priority watersheds in Samar Island Natural Park, c. 2011

Scientific Name	Common Name	Taft	Can-avid	Basey	Suribao	Catubig
<i>Alcedo argentatus</i>	Silvery king fisher	x	x	x	x	x
<i>Artamus leucorhynchus</i>	White-breasted wood swallow	x	x	x	x	x
<i>Bubo philippensis</i>	Philippine eagle-owl	x	x	x	x	x
<i>Bubulcus ibis</i>	Cattle egret	x	x	x	x	x
<i>Buceros hydrocorax</i>	Rofous hornbill	x	x	x	x	x
<i>Centropus melanops</i>	Mountain coucal	x	x	x	x	x
<i>Chalcophaps indica</i>	Common emerald dove	x	x	x	x	x
<i>Dicaeum hypoleucum</i>	Buzzing flower pecker	x	x	x	x	x
<i>Dicrurus balicassius</i>	Balicassiao	x	x	x	x	x
<i>Dryocopus javensis</i>	White bellied wood pecker	x	x	x	x	x
<i>Eurystomus orientalis</i>	Dollard bird	x	x	x	x	x
<i>Ficedula crypta</i>	Cryptic flycatcher	x	x	x	x	x
<i>Halcyon smyrnensis</i>	White throated king fisher	x	x	x	x	x
<i>Haliastur indus</i>	Brahminy kite	x	x	x	x	x
<i>Hypsipetes everetti</i>	Yellowish bulbul	x	x	x	x	x
<i>Hypsipetes philippinus</i>	Philippine bulbul	x	x	x	x	x
<i>Irena puella</i>	Philippine fairy blue bird	x	x	x	x	x
<i>Lanius cristatus</i>	Brown shrike	x	x	x	x	x
<i>Lonchura malacca</i>	Chestnut munia	x	x	x	x	x
<i>Loriculus philippensis</i>	Colasisi	x	x	x	x	x
<i>Motacilla cinerea</i>	Grey wagtail	x	x	x	x	x
<i>Pachycephala homeyeri</i>	White-vented whistler	x	x	x	x	x
<i>Penelopides panini</i>	Tarctic hornbill	x	x	x	x	x

Table 2. Continuation

Scientific Name	Common Name	Taft	Can-avid	Basey	Suribao	Catubig
<i>Phapitreron leucotis</i>	White-eared brown fruit dove	x	x	x	x	x
<i>Pycnonotus goiaver</i>	Yellow vented bulbul	x	x	x	x	x
<i>Rallina eurizonoides</i>	Slaty-legged rake	x	x	x	x	x
<i>Sarcoptes calvus</i>	Coletto	x	x	x	x	x
<i>Terpsiphone cinnamomea</i>	Rofous paradise-flying catcher	x	x	x	x	x
<i>Treron pompadora</i>	Pompadour green pigeon	x	x	x	x	x
<i>Treron vernans</i>	Pink-necked green-pigeon	x	x	x	x	x
<i>Anas luzonica</i>	Philippine mallard	x	x	x		x
<i>Bolbopsittacus lunulatus</i>	Guiabero	x	x	x		x
<i>Ceyx melanurus</i>	Philippine dwarf-kingfisher	x	x	x		x
<i>Ninox sculata</i>	Brown hawk owl	x	x	x		x
<i>Orthotomus samarensis</i>	Yellow-breasted tailorbird	x	x	x		x
<i>Ptilocicula mindanensis</i>	Streaked ground babbler	x	x	x		x
<i>Spizaetus philippensis</i>	Philippine Hawk-eagle	x	x	x		x
<i>Streptopelia chinensis</i>	Spotted dove	x	x	x		x
<i>Batrachostomus septimus</i>	Philippine frogmouth	x	x		x	x
<i>Collocalia troglodytes</i>	Pygmy swiftlet	x	x		x	x
<i>Gallus gallus</i>	Red jungle fowl	x	x		x	x
<i>Megalaima baemacephala</i>	Coppersmith barbet	x	x		x	x
<i>Pitta steerii</i>	Steere's pitta	x	x		x	x
<i>Ptilinopus occipitalis</i>	Yellow-breasted fruit dove	x	x		x	x
<i>Amanornis phoenicurus</i>	White-breasted waterhen	x		x	x	x
<i>Halcyon chloris</i>	White-collard king fisher	x		x	x	x
<i>Centropus viridis</i>	Philippine coucal		x	x	x	x
<i>Corvus macrorhynchos</i>	Large-billed crow		x	x	x	x
<i>Dicrurus hottentottus</i>	Spangled drongo		x	x	x	x
<i>Erythrura coloria</i>	Red-eared Parrot-finch		x	x	x	x
<i>Gallirallus torquatus</i>	Barred rail		x	x	x	x
<i>Dicaeum nigrilore</i>	Olive-capped flowerpecker	x	x			x
<i>Phylloscopus borealis</i>	arctic warbler	x	x			x
<i>Actitis hypoleucos</i>	Common sandpiper	x	x	x		
<i>Caprimulgus affinis</i>	Savannah nightjar	x		x		x
<i>Columba vitiensis</i>	Metallic pigeon	x		x		x
<i>Gallicolumba criniger</i>	Mindanao bleeding heart	x		x		x
<i>Gallinula chloropus</i>	Common moorhen	x		x		x
<i>Geopelia striata</i>	Zebra dove	x		x		x
<i>Macropygia phasianella</i>	Reddish cuckoo dove	x		x		x
<i>Oriolus chinensis</i>	Black naped oriole	x		x		x
<i>Pithecopbaga jefferyi</i>	Philippine Eagle	x		x		x
<i>Prioniturus discurus</i>	Blue-crowned racquet tail	x		x		x
<i>Phapitreron amethystina</i>	Amethyst brown dove	x		x		x
<i>Merops viridis</i>	Blue-throated bee-eater	x		x	x	
<i>Collocalia mearnsi</i>	Philippine swiftlet		x	x	x	
<i>Nectarinia jugularis</i>	Olive-backed sunbird		x		x	x
<i>Microbierax erythrogyne</i>	Philippine falconet		x	x		x
<i>Nycticorax caledonicus</i>	Rofous night heron		x	x		x
<i>Phylloscopus trivirgatus</i>	Mountain leaf warbler		x	x		x
<i>Collocalia esculenta</i>	Glossy swiftlet			x	x	x
<i>Hypsipetes palawanensis</i>	Sulphur bellied bulbul			x	x	x

Table 2. Continuation

Scientific Name	Common Name	Taft	Can-avid	Basey	Suribao	Catubig
<i>Lanius schach</i>	Long tailed shrike			x	x	x
<i>Lonchura punctulata</i>	Scaly-breasted munia			x	x	x
<i>Phylloscopus cebuensis</i>	Lemon-throated leaf warbler			x	x	x
<i>Rhipidura javanica</i>	Pied fantail			x	x	x
<i>Zosterops montanus</i>	Mountain white eye			x	x	x
<i>Ixobrychus cinnamomeus</i>	Cinnamon bittern	x				x
<i>Tanygnathus lucionensis</i>	Blue naped parrot	x				x
<i>Spilornis cheela</i>	Crested serpent eagle	x		x		
<i>Pachycephala philippinensis</i>	Yellow bellied whistler		x	x		
<i>Dicaeum anthonyi</i>	Flame crowned flower pecker		x		x	
<i>Egretta garzetta</i>	Little egret		x		x	
<i>Eudynamis scolopacea</i>	Common koel		x			x
<i>Ortobotomus castaneiceps</i>	Philippine tailorbird		x			x
<i>Motacilla alba</i>	White wagtail				x	x
<i>Aplonis panayensis</i>	Asian glossy starling			x		x
<i>Cisticola juncidis</i>	Zitting cisticola			x		x
<i>Ducula aenea</i>	Green imperial pigeon			x		x
<i>Eurylaimus steerii</i>	Wattled broadbill			x		x
<i>Micromacronous leytenis</i>	Miniature tit babbler			x		x
<i>Megapodius cumingii</i>	Tabon scrubfowl			x		x
<i>Passer mantanus</i>	Eurasian tree sparrow			x		x
<i>Pitta koehi</i>	Whiskered pitta			x		x
<i>Caprimulgus manillensis</i>	Philippine nightjar	x				
<i>Macronous striaticeps</i>	Brown tit babbler	x				
<i>Porzana cinerea</i>	White browed crane	x				
<i>Anthus novaeseelandiae</i>	Richard's pipit		x			
<i>Lonchura leucogastra</i>	White bellied munia		x			
<i>Aethopyga pulcherrima</i>	Metallic-winged sunbird			x		
<i>Brachypteryx montana</i>	White browed shortwing			x		
<i>Charadrius leschenaultii</i>	Greater sand-plover			x		
<i>Lalage nigra</i>	Pied triller			x		
<i>Megalurus timoriensis</i>	Tawny grassbird			x		
<i>Pyrrhula leucogenis</i>	White-cheeked bullfinch			x		
<i>Rhipidura superciliaris</i>	Blue fantail			x		
<i>Turnix suscitator</i>	Barred button quail			x		
<i>Cacomantis variolosus</i>	Brush cuckoo					x
<i>Ceyx lepidus</i>	Variable dwarf-kingfisher					x
<i>Coturnix chinensis</i>	Blue breasted quail					x
<i>Dendrocygna arcuata</i>	Wandering whistling duck					x
<i>Dicaeum trogonostigma</i>	Orange-bellied flowerpecker					x
<i>Emyias panayensis</i>	Mountain verideter flycatcher					x
<i>Halcyon coromanda</i>	Rudy kingfisher					x
<i>Megalurus palustris</i>	Striated grassbird					x
<i>Nectarinia sperata</i>	Purple throated sunbird					x
<i>Padda oryzivora</i>	Java sparrow					x
<i>Phaeniphaeus curvirostris</i>	Chestnut -breasted malkoha					x
<i>Ptilinopus lechancher</i>	Black chinned fruit dove					x
<i>Tyto capensis</i>	Grass owl					x

Table 2. Continuation

Scientific Name	Common Name	Taft	Can-avid	Basey	Suribao	Catubig
<i>Zoothera dauma</i>	Scaly ground thrush					x
	Total number of species	66	62	85	55	101
	Index of diversity	3.25	3.66	3.71	3.48	3.92

Among the 121 species of birds, 30 species were widely distributed 5 sites and are considered common; 21 species were present in 4 sites and 26 were present in 3 sites.

Twenty-seven species were recorded only in a single site, while 17 were observed only in 2 sites. Of the 27 species, which appeared to be in their restricted range as they were recorded only in a single site, 3 were recorded only in Taft (*Caprimulgus manillensis*, *Macronous striaticeps* and *Porzana cinerea*); 2 in Can-avid only (*Anthus novaeseelandiae* and *Lonchura leucogastra*); and 8 in Basey only (*Aethopyga pulcherrina*, *Brachypteryx Montana*, *Chardrius leschenaultia*, *Lalage nigra*, *Megalurus timoriensis*, *Pyrrhula leucogenis*, *Rhipidura superciliaris* and *Turnix suscitator*).

The highest number of restricted species of birds was obtained in Catubig with 14 species. These include *Cacomantis variolosus*, *Ceyx Lepidus*, *Coturnix chinensis*, *Dendrocygna arcuata*, *Dicaeum trogonostigma*, *Eumyias panayensis*, *Halcyon coromanda*, *Megalurus palustris*, *Nectarinia sperata*, *Padda oryzivora*, *Phaenicphaeus curvirostris*, *Ptilinopus lechancher*, *Tyto capensis* and *Zoothera dauma*.

Similarity patterns of bird species in the 5 priority watersheds were computed using the Jaccard index of similarity. The result showed high degree of similarity between watersheds which ranged from 0.43 to 0.63 (Table 3), which means that at least 43% of the bird species are shared between paired sites. Basey and Catubig had the highest value while Catubig and Taft had the lowest percentage. The result suggests that even if many species of birds are uniquely associated to particular watershed, many species are shared between the 5 five watersheds thus, similarity indices remain high. This condition does not call for highly site specific conservation measures when dealing with bird species within SINP.

Table 3. Similarity indices for birds recorded from five priority watersheds in Samar Island Natural Park, c. 2011

	Taft	Can-avid	Basey	Suribao	Catubig
Taft		44	51	38	50
Can-avid	68.75		48	44	54
Basey	67.54	65.31		46	72
Suribao	62.81	75.21	65.71		51
Catubig	59.88	66.26	77.42	65.38	

*Values in shaded cells refer to the number of species common to both sites.

MAMMALS

Species Composition

A total of 20 terrestrial mammals were recorded in the 5 priority watersheds (Table 4). These belonged to 7 orders and 12 families. Of these 20 mammals, nine (45%) were endemic to the Philippines, four (20%) of which were endemic to the greater Mindanao faunal region. The rest were resident species. The Mindanao endemics were *Cynocephalus volans*, *Tarsius syrichta*, *Sundasciurus philippinensis* and *Nannosciurus surrutilus*. These were observed in nearly all the sites and thus represent important biological indicators for Samar's lowland forests as suggested by the previous BRA.

Table 4. List of terrestrial mammals recorded from five priority watersheds in Samar Island Natural Park, c. 2011

Order	Family	Scientific Name	Common Name	Status*
Artiodactyla	Cervidae	<i>Cervus mariannus</i>	Philippine Brown Deer	Philippine Endemic
	Suidae	<i>Sus philippensis</i>	Philippine Warty Pig	Philippine Endemic
Carnivora	Viveridae	<i>Paradoxurus hermaphroditus</i>	Common Palm Civet	Resident
		<i>Viverra zibetha</i>	Malay Civet	Resident
Chiroptera	Pteropodidae	<i>Acerodon jubatus</i>	Golden-crowned Flying Fox	Philippine Endemic
		<i>Cynopterus brachyotis</i>	Short-nosed Fruit Bat	Resident
		<i>Rousettus amplexicaudatus</i>	Common Rousette	Resident
		<i>Pteropus vampyrus</i>	Large Flying Fox	Resident
	Rhinolophidae	<i>Rhinolophus inops</i>	Philippine Forest Horseshoe Bat	Philippine Endemic
		<i>Scotophilus kuhlii</i>	Lesser Asian House Bat	Resident
Dermoptera	Cynocephalidae	<i>Cynocephalus volans</i>	Philippine Flying Lemur	Mindanao Endemic
Insectivora	Soricidae	<i>Suncus murinus</i>	Asian House Shrew	Resident
Primates	Cercopithecidae	<i>Macaca fascicularis</i>	Long-tailed Macaque	Resident
	Tarsiidae	<i>Tarsius syrichta</i>	Philippine Tarsier	Mindanao Endemic
Rodentia	Muridae	<i>Rattus everetti</i>	Common Philippine Forest Rat	Philippine Endemic
		<i>Rattus exulans</i>	Polynesian Rat	Resident
		<i>Rattus mindanensis</i>	Common Field Rat	Resident
		<i>Rattus tanezumi</i>	Oriental House Rat	Resident
		<i>Sundasciurus philippinensis</i>	Philippine Tree Squirrel	Mindanao Endemic
	Scuriidae	<i>Nannosciurus surrutilus</i>	Mindanao Pygmy Squirrel	Mindanao Endemic

Source: Rabor, 1986

Seven species of mammals were considered threatened under DENR DAO 2004-15. These include the endangered *Acerodon jubatus* and the vulnerable *Cervus mariannus* and *Sus philippensis*. Other threatened species include the *Cynocephalus volans*, *Tarsius syrichta*, *Macaca fascicularis* and *Pteropus vampyrus*.

It is quite interesting to note that majority (71%) of the threatened species of terrestrial mammals recorded in the present study are endemic to the Philippines with 2 (28%) endemic to the greater Mindanao faunal region. Most of these are forest dependents and are threatened due to habitat loss and hunting. Although some can tolerate a certain degree of disturbance they still prefer undisturbed forests as habitat.

Mammalian Species Distribution and Similarity

The distribution of mammals in the five priority watersheds is shown in Table 5. Highest number of species of 17 was observed in Catubig followed by Taft with 16. Basey had the lowest number of 9 species. Four species of mammals (*Sundasciurus philippinensis*, *Acerodon jubatus*, *Scotophilus kuhlii* and *Nannosciurus surrutilus*) were considered fairly common being present only in 3 sites. Another four species (*Rousettus amplexicaudatus*, *Rattus everetti*, *Cynocephalus volans* and *Rattus mindanensis*) had limited distribution in 2 sites.

Table 5. Distribution of terrestrial mammals recorded from five priority watersheds in Samar Island Natural Park, c. 2011

Scientific Name	Common Name	Taft	Can-avid	Basey	Suribao	Catubig
<i>Cervus mariannus</i>	Philippine Brown Deer	x	x	x	x	x
<i>Sus philippensis</i>	Philippine Warty Pig**	x	x	x	x	x
<i>Paradoxurus hermaphroditus</i>	Common Palm Civet	x	x	x	x	x
<i>Viverra zibetha</i>	Malay Civet	x	x	x	x	x
<i>Pteropus vampyrus</i>	Large Flying Fox*	x	x	x	x	x
<i>Suncus marinus</i>	Asian House Shrew	x	x	x	x	x
<i>Macaca fascicularis</i>	Long-tailed Macaque*	x	x	x	x	x
<i>Rattus tanezumi</i>	Oriental House Rat	x	x	x	x	x
<i>Tarsius syrichta</i>	Philippine Tarsier*	x		x	x	x
<i>Sundasciurus philippinensis</i>	Philippine Tree Squirrel	x	x		x	
<i>Acerodon jubatus</i>	Golden-crowned Flying Fox	x	x			x
<i>Scotophilus kuhlii</i>	Lesser Asian House Bat	x	x			x
<i>Nannosciurus surrutilus</i>	Mindanao Pygmy Squirrel		x		x	x
<i>Rousettus amplexicaudatus</i>	Common Rousette	x				x
<i>Rattus everetti</i>	Common Philippine Forest Rat	x				x
<i>Cynocephalus volans</i>	Philippine Flying Lemur**		x			x
<i>Rattus mindanensis</i>	Common Field Rat				x	x
<i>Cynopterus brachyotis</i>	Short-nosed Fruit Bat	x				
<i>Rattus exulans</i>	Polynesian Rat	x				
<i>Rhinolophus inops</i>	Philippine Forest Horseshoe Bat					x
		16	13	9	12	17

Very few species of mammals showed very limited distribution having been recorded only in a single site. *Cynopterus brachyotis* and *Rattus exulans* were recorded only in Taft watershed while *Rhinolophus inops* was observed only in Catubig. Two species of rats (*Rattus mindanensis* and *Rattus exulans*) which were commensal species were recorded in some sites. Their presence may somehow indicate some degree of habitat degradation in these watersheds due to expansion of clearings for cultivation and settlements.

The result showed high degree of similarity between watersheds which ranged from 0.53 to 0.75 (Table 6). This means that approximately at least 53% of the species were present in paired sites. The highest value was observed between Basey and Suribao while the lowest value was observed

between Basey and Catubig. Identical similarity index was observed between Can-avid compared to Suribao and Catubig. The result suggest that many species of mammals were shared between the 5 watersheds as evidenced by close similarity values. This may somehow show that the 5 watersheds exhibit similar habitat conditions which means similar management intervention when addressing mammalian species.

Table 6. Similarity indices for terrestrial mammals recorded from five priority watersheds in Samar Island Natural Park, c. 2011

	Taft	Can-avid	Basey	Suribao	Catubig
Taft		11	9	10	13
Can-avid	75.86		8	10	12
Basey	72.00	72.73		9	9
Suribao	71.43	80.00	85.71		11
Catubig	78.79	80.00	69.23	75.86	

*Values in shaded cells refer to the number of species common to both sites.

REPTILES

Species Composition

A total of 23 reptiles belonging to 4 orders and 9 families were recorded in the 5 priority watersheds of SINP (Table 7). Of these, ten (43%) were endemic to the Philippines of which three (13%) were endemic to the greater Mindanao faunal region. The most represented family was Scincidae with 10 species of ground and tree dwelling skinks which were mostly common in secondary and primary forest. Colubridae was next most represented family with 3 species of snakes. Geckonidae, Agamidae and Elapidae 2 species each. The two species of geckos (*Gekko gecko* and *Lepidodactylus planicaudus*) are associated to human dwellings. Agamidae was represented by two endemic species of lizards (*Draco mindanensis* and *Hydrosaurus pustulatus*) while Elapidae with 2 species of cobras (*Naja samarensis* and *Ophiophagus hannah*). The Samar Cobra (*Naja samarensis*) is a subspecies of the Philippine Cobra endemic to the place and the greater Mindanao faunal region (Alcala, 1986).

Two species of reptiles were considered threatened under DENR DAO 2004-15 and Vulnerable by IUCN (IUCN, 2015). These included the *Hydrosaurus pustulatus* and *Python reticulatus*. The presence of the critically endangered Philippine crocodile (*Crocodylus mindorensis*) in the 5 priority watersheds which was reported in the previous BRA cannot be confirmed by local informants.

Although relatively low for Samar, the present record of reptiles can still demonstrate interesting habits and specialized feeding adaptations which is reflective of the overall health of Samar lowland forest ecosystem.

Table 7. List of reptiles recorded from five priority watersheds in Samar Island Natural Park, c. 2011

Order	Family	Scientific Name	Common Name	Status*		
Squamata	Scincidae	<i>Brachymeles gracilis</i>	Common Burrowing Skink	Philippine Endemic		
		<i>Lipinia pulchellum.</i>	Yellow-striped Slender Tree skink	Philippine Endemic		
		<i>Lamprolepis smaragdina</i>	Spotted Green Tree Skink	Resident		
		<i>Mabuya multicarinata</i>	Two-striped Mabouya	Resident		
		<i>Mabuya multifasciata</i>	Common Mabouya	Resident		
		<i>Otosaurus cummingi</i>	Cumming's Eared Skink	Philippine Endemic		
		<i>Sphenomorphus acutus</i>	Point-headed Sphenomorphus	Philippine Endemic		
		<i>Sphenomorphus coxi</i>	Cox's Sphenomorphus	Philippine Endemic		
		<i>Sphenomorphus fasciatus</i>	Banded Sphenomorphus	Philippine Endemic		
		<i>Tropidophorus grayi</i>	Spiny Waterside Skink	Resident		
		Geckonidae	<i>Gekko gekko</i>	Tokay Gecko	Resident	
			<i>Lepidodactylus planicaudus</i>	Smooth-scaled gecko	Resident	
			<i>Varanus salvator</i>	Gray Monitor Lizard	Resident	
		Sauria	Varanidae	<i>Varanus salvator</i>	Gray Monitor Lizard	Resident
			Agamidae	<i>Draco mindanensis</i>	Mindanao Flying Lizard	Mindanao Endemic
Serpentes	Boidae	<i>Hydrosaurus pustulatus</i>	Philippine Sailfin Lizard	Philippine Endemic		
		<i>Python reticulatus</i>	Reticulated Python	Resident		
	Elapidae	<i>Naja samarensis</i>	Samar Cobra	Mindanao Endemic		
		<i>Ophiophagus hannah</i>	King Cobra	Resident		
	Colubridae	<i>Calamaria lumbricoidea</i>	Dark-bellied Worm Snake	Resident		
		<i>Dendrelaphis puctualata</i>	Common Green Tree Snake	Resident		
		<i>Macropopbis dendrophiops</i>	Spotted Water Snake	Mindanao Endemic		
		<i>Tropidolaemus wagleri</i>	Wagler's Pit-viper	Resident		
	Testudinata	Emydidae	<i>Cuora amboinensis</i>	Malayan Freshwater Turtle	Resident	

Source: Alcala, 1986

Reptile Species Distribution and Similarity

The distribution of reptiles in the five priority watersheds is shown in Table 8. Highest number of species of 17 was observed in Basey while the lowest was in Can-avid with 12. Eight species (*Cuora amboinensis*, *Gekko gekko*, *Lepidodactylus planicaudus*, *Hydrosaurus pustulatus*, *Naja samarensis*, *Ophiophagus Hannah*, and *Python reticulatus*) were recorded in all 5 sites. Only one species was observed in 4 sites.

Five species had limited distribution to only 1 site. *Sphenomorphus acutus*, *Calamaria lumbricoidea*, and *Dendrelaphis puctualata* were recorded only in Basey watershed while *Sphenomorphus fasciatus* and *Sphenomorphus coxi* were observed only in Suribao and Catubig, respectively.

The similarity indices of reptiles for the 5 priority watersheds are shown in Table 9. The result showed high degree of similarity between watersheds which ranged from 0.42 to 0.73. Highest value was observed identical between Taft and Suribao. Lowest value was observed between Taft and Catubig, Can-avid and Suribao. Two paired sites (Taft versus Can-avid and Suribao versus Can-avid) have identical index of 0.67. The result suggests that many species of reptiles were shared between the 5 watersheds as evidenced by close similarity values thus, does not call for highly site specific conservation measures.

Table 8. Distribution of reptiles recorded from five priority watersheds in Samar Island Natural Park, c. 2011

Scientific Name	Common Name	Taft	Can-avid	Basey	Suribao	Catubig
<i>Cuora amboinensis</i>	Malayan Freshwater Turtle	x	x	x	x	x
<i>Gekko gekko</i>	Tokay Gecko	x	x	x	x	x
<i>Lepidodactylus planicaudus</i>	Smooth-scaled gecko	x	x	x	x	x
<i>Hydrosaurus pustulatus</i>	Philippine Sailfin Lizard	x	x	x	x	x
<i>Naja samarensis</i>	Samar Cobra*	x	x	x	x	x
<i>Ophiophagus hannah</i>	King Cobra	x	x	x	x	x
<i>Python reticulatus</i>	Reticulated Python*	x	x	x	x	x
<i>Varanus salvator</i>	Gray Monitor Lizard*	x	x	x	x	x
<i>Brachymeles gracilis</i>	Common Burrowing Skink	x	x	x	x	
<i>Mabuya multifasciata</i>	Common Mabouya	x	x		x	
<i>Draco mindanensis</i>	Mindanao Flying Lizard		x	x		x
<i>Tropidophorus grayi</i>	Spiny Waterside Skink	x		x		
<i>Tropidolaemus wagleri</i>	Wagler's Pit-viper	x		x		
<i>Lamprolepis smaragdina</i>	Spotted Green Tree Skink	x			x	
<i>Lipinia pulchellum.</i>	Yellow-striped Slender Tree skink		x			x
<i>Otosaurus cummingsi</i>	Cumming's Eared Skink			x		x
<i>Macropophis dendrophiops</i>	Spotted Water Snake			x		x
<i>Mabuya multicarinata</i>	Two-striped Mabouya				x	x
<i>Sphenomorphus acutus</i>	Point-headed Sphenomorphus			x		
<i>Calamaria lumbricoidea</i>	Dark-bellied Worm Snake			x		
<i>Dendrelaphis punctulata</i>	Common Green Tree Snake			x		
<i>Sphenomorphus fasciatus</i>	Banded Sphenomorphus				x	
<i>Sphenomorphus coxi</i>	Cox's Sphenomorphus					x
		13	12	17	13	14

Table 9. Similarity indices for reptiles recorded from five priority watersheds in Samar Island Natural Park, c. 2011

	Taft	Can-avid	Basey	Suribao	Catubig
Taft		10	11	11	8
Can-avid	80.00		10	10	10
Basey	73.33	68.97		9	11
Suribao	84.62	80.00	60.00		9
Catubig	59.26	76.92	70.97	66.67	

*Values in shaded cells refer to the number of species common to both sites.

AMPHIBIANS

Species Composition

A total of 18 species of amphibians belonging to 4 families were recorded from the 5 priority watersheds (Table 10). Of the 18 species, two were introduced (*Bufo marinus* and *Rana erythraea*) and the rest were native. Seven (39%) species of amphibians were endemic to the Philippines. Only one species of amphibian was considered vulnerable under DENR DAO 2004-15 and IUCN. This is the *Platymantis rabori*.

This Mindanao endemic species inhabits arboreal microhabitats in lower montane and lowland forests. It breeds by direct development and lays its eggs in nests in tree ferns and pandans. The major threat is the loss of lowland rainforest due to small-scale logging, conversion to agricultural land and mining (IUCN, 2015).

Table 10. List of amphibians recorded from five priority watersheds in Samar Island Natural Park, c. 2011

Order	Family	Scientific Name	Common Name	Status*
Anura	Bufonidae	<i>Bufo marinus</i>	Giant Marine toad	Introduced
	Microhylidae	<i>Kalophrynus pleurostigma</i>	Spotted Narrow-mouthed frog	Resident
	Pelobatidae	<i>Megophrys monticola</i>	Horned litter toad	Resident
	Ranidae	<i>Limnonectes magna</i>	Giant Philippine frog	Endemic
		<i>Occidozyga laevis</i>	Common puddle frog	Resident
		<i>Platimantis dorsalis</i>	Common Forest Frog	Endemic
		<i>Platimantis rabori</i>	Rabor Forest Frog	Endemic
		<i>Rana erythraea</i>	Common Green Frog	Resident
		<i>Rana everitti</i>	Everett's frog	Endemic
		<i>Rana limnocharis</i>	Common Ricefield Frog	Resident
		<i>Rana microdisca</i>	Small-disk Frog	Resident
		<i>Rana signata</i>	Variable-backed Frog	Resident
		<i>Rana woodworthi</i>	Woodworth's frog	Endemic
		<i>Staurois natator</i>	Rock frog	Resident
	Rhacophoridae	<i>Philautus leitensis</i>	Leyte forest tree frog	Endemic
		<i>Philautus surdus</i>	Common Forest Tree Frog	Endemic
		<i>Polypedates leucomystax</i>	Common Tree Frog	Resident
		<i>Rhacophorus bimaculatus</i>	Asian Tree Frog	Resident

Source: Alcala, 1986

One species of frog found in Samar is of special concern due to its apparently limited distribution. The island endemic Samar tree frog (*Polypedates hecticus*) is known only in Samar island, and found nowhere else in the world. This species is however listed as Data Deficient by IUCN (IUCN, 2015) in view of the absence of recent information on its extent of occurrence, status and ecological requirements. Unfortunately, the present study was not able to record this unique anuran species. As pointed out in the 2003 study, the Samar Tree Frog along with other island-endemic species increases the value of the island's remaining forest habitats as a vital refuge for many other restricted-range taxa, putting higher global priority into these watersheds for biodiversity conservation.

The relatively low number of amphibians recorded in the present study as compared to the 2003 BRA does not mean decline of amphibians in SINP and should not be considered alarming because the presence of indicator species which demonstrate that the environmental health of SINP is still good. As in the previous BRA, resource partitioning among frogs in the multi-layer lowland evergreen rainforest of Samar Island, has been very evident by representation of certain species to occupy distinct microhabitats within the forest – canopy layer, understory, undergrowth and forest floor, each with unique adaptations for survival. Based on the

present survey, amphibians found inhabiting forest floor include *Kalophrynus pleurostigma* and *Megophrys monticola*; amphibians inhabiting the moist undergrowth include *Philautus leitensis* and *Philautus surdus*; amphibians found in riverine habitats include *Limnonectes magna*, *Staurois natator*, *Occidozyga laevis* and *Rana signat*; arboreal amphibians inhabiting forest canopy include *Rhacophorus pardalis*) and *Polypedates leucomystax*.

Amphibian Species Distribution and Diversity

The distribution of amphibians in the five priority watersheds is shown in Table 11. Highest number of species of 14 was observed in Taft followed by Catubig with 13. Can-avid, Basey and Suribao had equal number of 9 species. Four species of ranids (*Occidozyga laevis*, *Rana everitti*, *Rana woodworthi*, *Philautus leitensis*) were recorded in all sites. Five species (*Staurois natator*, *Platimantis dorsalis*, *Rana signata*, *Limnonectes magna*, *Megophrys monticola*) were observed to be common 4 sites. Five species had limited distribution to 2 sites. These include *Bufo marinus*, *Rana erythraea*, *Rhacophorus bimaculatus*, *Kalophrynus pleurostigma*, and *Polypedates leucomystax*. Four species had very limited distribution and were observed only in a single site. These include *Platimantis rabori* and *Rana limnocharis* which were observed only in Taft and *Rana microdisca* and *Philautus surdus* which were recorded only in Catubig.

Table 11. Distribution of amphibians recorded from five priority watersheds in Samar Island Natural Park, c. 2011

Scientific Name	Common Name	Taft	Can-avid	Basey	Suribao	Catubig
<i>Occidozyga laevis</i>	Common puddle frog	x	x	x	x	x
<i>Rana everitti</i>	Everett's frog	x	x	x	x	x
<i>Rana woodworthi</i>	Woodsworth's frog	x	x	x	x	x
<i>Philautus leitensis</i>	Leyte forest tree frog	x	x	x	x	x
<i>Staurois natator</i>	Rock frog	x	x	x	x	
<i>Platimantis dorsalis</i>	Common Forest Frog	x	x	x		x
<i>Rana signata</i>	Variable-backed Frog	x	x		x	x
<i>Limnonectes magna</i>	Giant Philippine frog	x	x		x	x
<i>Megophrys monticola</i>	Horned litter toad	x		x	x	x
<i>Bufo marinus</i>	Giant Marine toad	x	x			
<i>Rana erythraea</i>	Common Green Frog	x			x	
<i>Rhacophorus bimaculatus</i>	Asian Tree Frog	x				x
<i>Kalophrynus pleurostigma</i>	Spotted Narrow-mouthed frog			x		x
<i>Polypedates leucomystax</i>	Common Tree Frog			x		x
<i>Platimantis rabori</i>	Rabor Forest Frog	x				
<i>Rana limnocharis</i>	Common Ricefield Frog	x				
<i>Rana microdisca</i>	Small-disk Frog					x
<i>Philautus surdus</i>	Common Forest Tree Frog					x
Total Number of Species		14	9	9	9	13
Index of Diversity		2.13	2.01	1.83	1.93	1.97

The indices of diversity of amphibians for the five priority watersheds were fairly high with values ranging from 1.83 to 2.13. The highest index was observed in Taft watershed while the lowest in Basey watershed. The fairly high indices could be due to the high degree of abundance in amphibians along stream transects in which observations were made. Observations outside transect were not included in the computation.

The presence of *Bufo marinus* in Taft and Can-avid and *Rana erythraea* in Taft and Suribao may somehow indicate some degree of habitat degradation in these watersheds due to expansion of clearings for cultivation and settlements.

Amphibian Species Similarity

Similarity pattern of amphibians in the 5 priority watersheds was computed using the Sorensen's index of similarity. The similarity indices of amphibians for the 5 priority watersheds are shown in Table 12. The result showed high degree of similarity between watersheds which ranged from 0.61 to 0.78. which means that more than 60% of the species were present in 2 sites. Highest value was observed identical between Taft compared to Basey and Suribao. Lowest value was observed identical when Catubig was compared to Can-avid and Suribao. The result suggest that many species of amphibians were shared between the 5 watersheds as evidenced by close similarity values thus, does not call for highly site specific conservation measures.

Table 12. Similarity indices for amphibians recorded from five priority watersheds in Samar Island Natural Park, c. 2011

	Taft	Can-avid	Basey	Suribao	Catubig
Taft		9	7	9	9
Can-avid	0.64		6	7	7
Basey	0.43	0.50		6	8
Suribao	0.64	0.63	0.50		7
Catubig	0.50	0.46	0.57	0.46	

*Values in shaded cells refer to the number of species common to both sites.

CONSERVATION ISSUES

The species richness of the lowland forest of Samar within the SINP in terms of terrestrial vertebrates is remarkably high. In addition to its high diversity, Samar contains a significant number of endemic faunal species whose contribution is limited to the greater Mindanao faunal region, most of which are recognized by both the national authority and international conservation groups as threatened. The presence of these species further stresses the need to make SINP a conservation priority site in the Philippines.

The most serious threat to terrestrial fauna in SINP is hunting and capture for both subsistence and for commercial trade. The primary target

species are the big games particularly wild pig and deer because of their large amount of meat per catch and the associated high price if traded commercially. The population of deer however has declined tremendously in recent years according to local informants, so that most commercial hunters in the area focus only in the pursuit of wild pig. With the changing trend from subsistence to commercial hunting in wild pig, sophistication in hunting techniques has also improved to increase catch per hunting effort.

Habitat alteration is another threat to wildlife in SINP. Natural habitats, especially the primary and secondary forests are under increasing pressure from growing human populations and unsound resource utilization. The conversion of forest to agricultural land use and small-scale illegal logging operations or timber poaching is a serious threat. Aside from lumber, local residents are also extracting timber to be made into boat keels, which is indirectly linked to the fishing industry and local navigational transport system within the island. Clearing of forests for charcoal making which has become very rampant is also a significant threat.

Clearing of forests to some extent may be beneficial to wildlife because of increased habitat diversity and complexity due to increased horizontal stratification. However if the current rate of forest clearance continues, forests may be decimated to the disadvantage of those highly sensitive interior species of wildlife, which are mostly affected by the habitat transformation or fragmentation. Because fragmentation disrupts species ecology and reproduction, this means that populations of already threatened species can very quickly fall below minimum viable level so that their long-term prospect for survival becomes bleak.

The combination of high species richness, high regional endemism, and unique wildlife assemblages should make Samar forests a high conservation priority. It is highly recommended to protect what remains of these important lowland forests. Aside from protection, considering the on-going destruction and degradation of Samar forests within SINP brought about by economic struggle of local inhabitants, there is therefore an urgent need to implement some conservation measures. Such conservation measures must integrate economical viable and socially acceptable livelihood alternatives for the local communities in order to lessen their dependence on the resources of SINP.

CONCLUSION AND RECOMMENDATION

Results of the study showed that Samar holds high diversity, high endemism and an unusual combination of terrestrial vertebrate species. It contains a remarkable number of threatened species being recognized by the international arena in biological diversity conservation, most of which have strong affinity to the Mindanao faunal region. Although there is still a clear need to continue faunal assessment in Samar island, the existing data are sufficient to further highlight the need to establish SINP as

conservation priority site in the region.

Hunting and habitat destruction must be put to complete stop to preserve what is left of the wildlife resources in the SINP. Along with strict enforcement of laws, effective information dissemination and relevant educational efforts could convince the local people to protect the remaining wildlife resources being an important heritage of the Samarenos.

REFERENCES

- ALCALA, A.C. 1986. Guide to Philippine Flora and Fauna: Amphibians and Reptiles. University of the Philippines. 10:1-195.
- ALCALA, A.C. and W.C. BROWN. 1998. Philippine Amphibians: an illustrated field guide. Bookmark Inc., Makati City, Philippines. 113p
- DENR. 2004. Department Administrative Order 2004-15. Establishing the List of Terrestrial Threatened Species and their Categories, and the List of Other Wildlife Species Pursuant to Republic Act No. 9147, otherwise known as the Wildlife Resources Conservation Act and Protection of 2001. Quezon City: Department of Environment and Natural Resources.
- GONZALES, P.C. and C. P. REES. 1988. Birds of the Philippines. Haribon Foundation for the Conservation of Natural Resources, Inc. Manila, Philippines. 184 p.
- IUCN. 2015. The IUCN Red List of Threatened Species 2015: www.iucnredlist.org.
- KENNEDY, R.S., P.C. GONZALES, E.H. DICKINSON, H.C. MIRANDA Jr., and T.H. FISHER. 2000. A guide to the Birds of the Philippines. Oxford University Press. New York. 369 p.
- MAGURRAN, A.E. 1988. Ecological Diversity and Its Measurement. Princeton University Press. 179 p.
- MALLARI, N.A.D, B.R. TABARANZA and M.J. CROSBY. 2001. Key Conservation Sites in the Philippines: a Haribon Foundation and Birdlife International Directory of Important Bird Areas. DENR and Bookmark, Inc. 485 p.
- MALLARI, N.A.D. 1992. Species diversity along elevational gradients in different study sites in Sierra Madre Mountains in Isabela and Cagayan. B.S. Thesis, UP at Los Baños. 88 p.
- RABOR, D.S. 1986. Guide to Philippine Flora and Fauna: Birds and Mammals. University of the Philippines. 2:1-284
- SEAMEO-SEARCA. 2004. Biological resources assessment – Samar Island Natural Park, Philippines. PAWB, DENR-8, Tacloban City. 191p.
- UNDP-GEF-DENR. 2007. Samar Island Natural Park Management Plan June 2006 – May 2016. DENR-R8, Tacloban City. 249p.