

GAYNAWAAN 2004:
Conservation of threatened vertebrates at Mount Sinaka, Mindanao
FINAL PROJECT REPORT

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1. INTRODUCTION



The aims and objectives of the **Gaynawaan 2004** project together have the goal of furthering the conservation of threatened forest vertebrate species in three isolated and fragmented forests of Arakan Valley, North Cotabato as a flagship for the conservation of remnant forests, wildlife and watersheds. The project operates under an umbrella program of the Philippine Eagle Foundation (PEF) that aims to rebuild a forest corridor that would link isolated forests of Mt Mahuson, Mt Sinaka and

the Kabalantian-Binongan-Kulaman (KABIKU) through community-based conservation. Each of Mt Mahuson and Mt Sinaka has a resident breeding pair of the IUCN “critically endangered” Philippine Eagle *Pithecophaga jefferyi*; one of the world’s largest and rarest eagles and the country’s national bird. KABIKU is an eagle hunting ground, but intervening human landscapes makes dispersing eagles vulnerable. By involving local communities in forest restoration and rehabilitation, the program intends to benefit the eagles and biodiversity in general by reducing isolation and facilitating wildlife dispersal while at the same time provide economic incentives and sustainable land-use alternatives to improve the well-being of the local residents.

This final project report for the **BP Conservation Program funded GAYNAWAAN 2004** covers results obtained for each of four objectives/outputs namely: 1) a sound survey of vertebrates (birds, mammals, reptiles and amphibians) within permanent survey sites to initially provide baseline information on the diversity and status of local fauna; 2) a long-term, indicator species monitoring project to ascertain ecosystem health, provide a basis for decisions on species and habitat rehabilitation, and to assess impacts of conservation and development initiatives; 3) a training and awareness project on species survey, monitoring and management to strengthen local capacity for biodiversity research and conservation; and 4) the involvement of Mindanao research students who can contribute further scientific knowledge and can be inspired to opt for a career in conservation biology.

2. STUDY AREA



Figure 1. The respective locations of Mt. Mahuson, Mt. Sinaka and KABIKU in Mindanao

ARAKAN Valley is in North Cotabato at the east central Mindanao. Based on a climate classification by the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAG-ASA), the area has a type IV rainfall pattern where rains are generally evenly distributed throughout the year with May and June as the monsoon months. Average temperature is between 23 ° C and 33 ° C at the lowlands (Arriola 1996), but temperature up in the often fog-covered mountain tops has definitely lower temperature than at the lowlands. The area hosts a variety of flora and fauna including the IUCN “globally threatened” Philippine Eagle, which has been nesting at Mt Sinaka since 1995 and in Mt Mahuson since 1998. One eagle pair nested at KABIKU in 1995, but habitat deterioration made the site unsuitable for breeding as no other breeding records was known since then.

A third class municipality, Arakan was created as a separate town on August 30, 1991. Bounded on the north by the province of Bukidnon and on the east by Davao City, the 13-year old town forms part of the Arakan Valley Complex. This fertile agricultural valley is characterized by a variety of landscapes from undulating to rolling and scattered hills, to both wide and narrow valleys and mountain ranges. The town has a total population of 78,000 residents in 28 communities (barangays) that cover a total land area of 69,432 hectares of which 4 % (2,452 hectares) classified as forests. After years of commercial logging from the 1960’s to the 1980’s, what remains of the former forest cover of Arakan are three isolated forest fragments of Mt Mahuson, Mt Sinaka and the Kabalan-tian-Binoongan-Kulaman (KABIKU) forest strips in a rolling sea of human-dominated landscapes (Figure 1).

3. METHODOLOGY

3.1. Vertebrate surveys

Biodiversity surveys focused on forest-dependent vertebrates namely birds, small flying and non-flying mammals, frogs and reptiles. The project focused on vertebrates because several studies indicate that these animal groups are effective surrogates of biodiversity status when resources are limiting. Vertebrates, particularly birds and mammals are more charismatic than other life forms so that focusing research, monitoring and education on them is a good strategy to win over local people’s interest to species and forest conservation. Forest vertebrate species richness and diversity were conducted at four sites within the Arakan Valley.

Barangay Ganatan, Mt. Mahuson (lat 07° 14.74' N, long 125° 12.35' E). Located at an altitude between 900 – 1300 meters (m), this site is predominantly covered with upper dipterocarp to montane forests, although areas of regenerating forest vegetation (i.e. parang) were found along the forest edge. *Piper aduncum*, *Lantana camara* and species of grasses, shrubs and ferns dominate the edge. *Agathis philippinensis* appear as the common emergent tree in both edge and interior. Tree composition does not vary well as one goes up with elevation although species of Podocarpaceae predominates in the higher elevation. The diameter at breast height (DBH) of trees was estimated to be between 10-90 cm for canopy species and 30-160 cm for emergent trees. Leaf litter was thin and drier near the forest edge and became thick and moist in the interior. Surveys were made from May 15 to 24 (forest edge) and in July 9-17, 2004 (forest interior).



Mount Sinaka surrounded by a mosaic of open landscapes

Barangay Salasang, Mt. Sinaka (lat 07° 22' 25.7" N, long 125° 12' 47.7" E). Covering approximately 870 – 1425 m altitudes, this site covers upper-dipterocarp, montane and mossy forests, although most of the dipterocarp habitats have large forest gaps in between which were planted with coffee and cash crops. DBH of trees were between 30-160 cm (canopy trees) and 100-250 cm for emergent trees. Tree heights ranged from 5-20

m whereas emergent trees could reach as high as 35 m. Rotting logs and small streams were prominent. Leaf litter was thick and the forest floor is wet in the interiors. Surveys were made in July 29 - August 8 (forest interior, Sinai) September 16-28 (edge, Napunungan) in 2004.

Barangay Binoongan Centro, KABIKU (lat 07° 26' 9.2" N, long 125° 10' 8.1" E). This site is a disturbed lowland forest covering altitudes between 650-670 m with large tracts of “parang vegetation” and agricultural lands. *P. aduncum* were common and several pioneer tree species. The terrain was relatively flat with exposed limestone and small caves. Creeks were also observed and the forest floor was dry and leaf litter was very thin. This site was surveyed from August 20 – September 1, 2004.

3.1.a Vertebrate Species Identification

All wildlife seen and/or collected was identified to the lowest taxonomic category possible using field guides and taxonomic keys. Kennedy et al (2000) was used for bird identification; Ingle and Heaney (1992) for bats; Heaney et al (1996) for flying and non-flying mammals; and Brown and Alcala (1998), Frost (2004) and Inger (1954) for amphibians and for reptiles. Captured animals were released after they were identified and measured, except for a number of individuals taken as voucher specimens. All specimens, with the exception of skinned birds, were placed in 10% formalin and later

preserved in 70% ethyl alcohol. All specimens are stored at the Animal laboratory of the University of the Philippines in Mindanao (UP Mindanao) in Davao City.

3.1.b. Vertebrate Species Surveys

A wide range of surveying techniques, appropriate to each vertebrate group, was employed.

Frogs and Reptiles

A modified belt transect survey (Heyer et al., 1994) was employed. We followed the two kilometer transect established for birds placed on existing foot trails. A team of three people searched for amphibians along the transect, starting from the farthest point. About 300 m segment of the transect line was surveyed twice each day (diurnal and nocturnal walks). We also sampled five meters on both sides of the transect. We inspected tree holes, buttresses, leaves, leaf axils, sides of streams, the soil in search of breeding, displaying, basking or foraging frogs and reptiles. Frogs and reptiles seen during transect walks for other vertebrate groups were also collected and preserved.

Mammals

Transect survey - A two kilometer line transect was used at each site. Transect counts were done twice every day during the survey period - early in the morning and again late in the afternoon.

Trapping of non-flying mammals - The removal-trapping method (Rickart 1993) was used to survey small non-flying mammals. The live traps were placed singly in areas where traces of these animals were observed. Examples of these areas were near holes, beside fallen logs, and along possible runways. Either dried fish or fried coconut meat coated with peanut butter was used as the bait. Traps were checked and re-baited during early morning and late afternoon.

Netting - Mist nets were used to survey bats. The nets were set in each site and remained open for 24 hours. All nets were strategically positioned along ridge tops and other possible flyways. The nets were checked twice daily - at dawn and late at night. Most bats captured were marked and released while a few were taken as voucher specimens.

Birds

Transect survey - A two kilometer line transect was used at each site. Transect counts were done twice every day during the survey period - early morning and late in the afternoon. The observer walked the transect trail recording every species seen (with the aid of binoculars), the calls heard, number of individuals, behavior and habitat type, on a standard data sheet.

Netting - Mist nets were used to capture shy, secretive birds. They were set in each site and remained open for 24 hours to capture not only nocturnal birds but bats as well. All

nets were strategically positioned along ridge tops and other possible flyways of understory birds. Some nets were placed close to the ground for the ground dwellers and others slightly above the ground for foraging individuals. Nets were checked three times daily - early morning, noon and late afternoon. Most of the captures were marked and released while a few were taken as voucher specimens.

3.2 Training and awareness project on species survey, monitoring and management

We implemented hands-on training on species survey and identification during actual fieldwork. Prior to field sampling, participants were oriented with the objectives of the project. Survey methods and how field equipments will be used (e.g. binoculars, calipers, etc.) were also explained and illustrated to them. Participants joined the whole survey and they gave a substantial share in setting up transect lines, net lines, surveying vertebrates and in processing and preserving specimens. While at work, each participant is under the supervision of an experienced field biologist. Our pool of participants included two representatives from the local government of Arakan, particularly from the Municipal Environment and Natural Resources (MENRO) office and representatives of the tribal group for each of the study sites also joined the fieldwork. Undergraduate thesis students from UP Mindanao also joined the fieldwork. To make the local people become aware of the diversity of wildlife within their area, two meetings were held to share survey results and explain the implications of the study. The meetings were facilitated by multi-media presentations and an open forum followed each presentation.

3.3. Involvement of undergraduate students

BS Biology students from UP Mindanao participated in the survey. They conducted their thesis research on the three mountains using resources provided by Gaynawaan 2004. Their thesis advisers were also present during the surveys.

4. RESULTS AND DISCUSSIONS

4.1. Vertebrate surveys

Bird species account



The Philippine endemic Tarictic hornbill is common in Arakan

Our survey of three areas recorded at least 78 species of birds within the Arakan Valley, in which 52 (66.6%) are endemic and 42 (53.8%) are residents (Table 1). There were 62 species found in Mt. Mahuson, 47 species in Mt. Sinaka range, and 50 species in KABIKU range. Among the 78 species in Arakan forest reserve, seven are listed as critical, endangered, or vulnerable in the Red Data Book (Table 2). These listed birds are

endemic to the Philippines, which is why it is important to do more and urgent conservation efforts in the area.

Table 1. Number of bird species in the Philippines, in Mindanao, in Arakan Valley, in Mt. Mahuson, in Mt. Sinaka range and in Binoongan Range.

	Philippines	Mindanao	Arakan Valley	Present survey		
				Mahuson	Sinaka	KABIKU
All species	572	337	78	62	47	50
Residents	385	255	42	26	19	21
Philippine endemic	172	102	52	34	28	29
Threatened species	70	41	7	4	4	4

Table 2. Threatened and endemic species of birds found in one or two of the three study areas.

Species	Residency	Status ^a
<i>Pithecophaga jefferyi</i>	Endemic	Critical
<i>Tricoglossus johnstoniae</i>	Endemic	Vulnerable
<i>Tanygnathus lucionensis</i>	Near-endemic	Endangered
<i>Mimizuku gurneyi</i>	Endemic	Endangered
<i>Aceros leucocephalus</i>	Endemic	Endangered
<i>Ficedula basilanica</i>	Endemic	Vulnerable
<i>F. crypta</i>	Endemic	Vulnerable
<i>Erythrura coloria</i>	Endemic	Vulnerable

^a Based on Phil. Red Data Book

Mammalian diversity



The Philippine large-headed fruit bat, a new species described from the Philippines in 2007

(relative abundance=0.431). The list also includes a newly described species of fruit bat in the Philippines; the Philippine large-headed fruit bat *Dyacopterus rickarti*. A single

At least 20 species of fruit bats and insect-eating bats were found, eight of which are endemic to the Philippines and two are considered endangered (Golden-crowned flying fox *Acerodon jubatus*) and vulnerable (Mindanao pygmy fruit bat *Alionycteris paucidentata*). The common short-nosed fruit bat *Cynopterus brachyotis* is the most abundant in Site 1 of Mt. Mahuson, in Mt. Sinaka range, and in Binoongan range (with relative abundance of 0.614, 0.549, and 0.749, respectively).

However, the most abundant bat in Site 2 of Mt. Mahuson is the Philippine pygmy fruit bat *Haplonycteris fischeri*

adult male specimen was collected in the montane forests of Mt Mahuson in 18 May 2004 by J.C. Ibanez (Helgen et al 2007).

Table 3. Bat species account at Mt. Mahuson, Mt. Sinaka range and Binoongan range.

Scientific Name	English Name	Residency	Relative Abundance			
			Mahuson		Sinaka	KABIKU
			Site 1	Site 2		
F. PTEROPODIDAE – Fruit Bats						
<i>Acerodon jubatus</i>	Golden-crowned flying fox	E, En ^a	-	-	0.002	-
<i>Alionycteris paucidentata</i>	Min. Pygmy fruit bat	E, vul ^b	-	0.025	0.005	-
<i>Cynopterus brachyotis</i>	Common short-nosed fruit bat	Res	0.614	0.313	0.549	0.749
<i>Dyacopterus rickarti</i>	Phil. Large-Headed Fruit Bat	E	0.004	-	-	-
<i>Eonycteris robusta</i>	Phil. Nectar bat, Phil. Dawn bat	E	-	-	0.005	-
<i>Eonycteris spelaea</i>	Common nectar bat	Res	0.004	-	-	0.004
<i>Haplonycteris fischeri</i>	Phil. Pygmy fruit bat	E	-	0.431	0.041	-
<i>Harpionycteris whiteheadi</i>	Harpy fruit bat	E	0.004	-	0.023	-
<i>Macroglossus minimus</i>	Dagger-toothed flower bat, lesser long-tongued fruit bat	Non endemic	0.065	0.031	0.023	0.063
<i>Megaerops wetmorei</i>	Min. fruit bat	Non endemic	0.220	-	0.030	0.238
<i>Ptenochirus jadori</i>	Musky fruit bat	Endemic	0.057	0.013	0.136	0.201
<i>P. minor</i>	Lesser musky fruit bat	Endemic	0.024	0.106	0.184	0.088
<i>Rousettous amplexicaudatus</i>	Common rousette	Non endemic	0.004	0.006	-	0.008
F. MEGADERMATIDAE – False Vampire and Ghost Bats						
<i>Megaderma spasma</i>	Common Asian ghost bat, lesser false vampire	Non endemic	-	-	-	0.004
F. RHINOLOPHIDAE – Horseshoe and Round leaf Bats						
<i>Hipposiderous diadema</i>	Diadem round leaf bat	Non endemic	-	-	-	0.008
<i>Rhinolophus philippensis</i>	Enormous-eared horseshoe bat	Endemic	-	-	-	0.008
<i>R. subrufus</i>	Small rufous horseshoe bat	Endemic	0.004	0.013	-	0.017
<i>R. virgo</i>	Yellow-faced horseshoe bat	Endemic	-	-	-	0.013
F. VESPERTILIONIDAE – Vesper and Evening Bats						
<i>Kerivoula whiteheadi</i>	Whitehead's woolly bat	Non endemic	-	-	0.002	0.004
<i>Murina cyclotis</i>	Round-eared tube-nosed bats	Non endemic	-	0.013	0.02	-

^a Based on Phil. Red Data Book, ^b based on Heaney et al (1998)
E – Endemic

Res – Resident
 En – Endangered
 Vul - Vulnerable



The Philippine brown deer is said to have been gone already at KABIKU and is very rare at Sinaka

There were 12 species of land mammals (Table 4), eight (66.6%) of which are endemic to the Philippines, including the Philippine warty pig *Sus philippensis* and the Philippine brown deer *Cervus mariannus*. There were four non-native species of rodents that were captured and all were associated with disturbed habitats or along forest edges. Interestingly, where native species of rodents were abundant, no introduced or non-native species were found. This observation conforms to current trends observed among rodents in several mountains of Luzon and in Mindanao

whereby non-native species fails to penetrate habitats where native species are abundant (Balete et al 2006). Of the large mammals, interviews indicated that the Philippine brown deer has been lost at KABIKU and that it is very rare at Sinaka. Along with the Philippine warty pig, the brown deer is heavily hunted. But unlike the warty pig which is more adaptable, the deer are strictly forest dependent and are sensitive to hunting.

Table 4. Non-volant mammal species account at Mahuson, Sinaka and KABIKU.

Scientific Name	English Name	Residency	Presence			
			Mahuson		Sinaka	KABIKU
			Site 1	Site 2		
<i>F. SCIURIDAE – Squirrels</i>						
<i>Sundasciurus philippinensis</i>	Phil. Tree squirrel	Endemic	-	-	X	-
<i>F. MURIDAE – Mice and Rats</i>						

<i>Apomys hylocoetes</i>	Min. mossy forest mouse	Endemic to Min.	-	X	-	-
<i>Bullimus bagobus</i>	Large Min. forest rat	Endemic	X	X	X	X
<i>Limnomys</i> sp.			-	X	-	-
<i>Mus musculus</i>	House mouse	Non endemic	-	X	-	-
<i>Rattus argentiventer</i>	Rice-field mouse	Non endemic	X	X	-	X
<i>R. everetti</i>	Common Phil. Forest rat	Endemic	X	X	X	X
<i>R. exulans</i>	Polynesian rat, small spiny rice-field rat	Non endemic	-	-	-	X
<i>R. tanezumi</i>	Oriental house mouse	Non endemic	X	-	-	-
<i>Tarsomys apoensis</i>	Dusky moss-mouse, Min. dusky rat	Endemic to Min.	-	-	X	-
F. SUIDAE – Pigs						
<i>Sus philippensis</i>	Phil. warty pig	Endemic	X	-	-	-
F. CERVIDAE – Deer						
<i>Cervus mariannus</i>			X	-	-	-

Table 5. Frog species and number of individuals recorded in Mahuson, Sinaka (2 sites), and Binoongan.

Species	Mahuson	Sinaka		Binoorgan	Status
	1260- 1300 m.a.s.l.	870- 1425 m.a.s.l.	950- 1430 m.a.s.l.	650- 670 m.a.s.l.	
Bufonidae					
<i>Ansonia mcgregori</i> **	7	-	-	-	Vulnerable
<i>Ansonia muelleri</i> **	-	3	-	-	Vulnerable
<i>Bufo marinus</i>	-	-	-	1	Introduced
<i>Pelophryne brevipes</i>	-	2	1	-	
<i>Pelophryne lighti</i> **	-	1	-	-	Vulnerable
Megophryidae					
<i>Megophrys stejnegeri</i> **	9	28	7	2	Vulnerable
Microhylidae					
<i>Chaperina fusca</i>	-	1	-	1	
<i>Kalophrynus pleurostigma</i>	4	3	3	-	
Ranidae					
<i>Fejervarya limnocharis</i>	-	2	-	-	
<i>Limnonectes leytensis</i> *	-	-	3	-	
<i>Limnonectes. magnus</i>	-	-	-	1	Near Threatened
<i>Limnonectes parvus</i> **	-	-	2	-	Vulnerable
<i>Occidozyga laevis</i>	1	-	-	1	
<i>Platymantis corrugata</i> *	-	6	2	-	
<i>Platymantis guentheri</i> **	13	1	4	-	Vulnerable
<i>Rana everetti</i> *	2	3	1	3	Data Deficient
<i>Rana grandocula</i> *	-	17	20	6	
<i>Starois natator</i>	-	-	1	-	
Rhacophoridae					
<i>Nyctixalus spinosus</i> **	-	2	1	1	Vulnerable
<i>Philautus acutirostris</i> **	67	11	10	1	Vulnerable
<i>Philautus worcesteri</i> **	-	1	-	2	Vulnerable
<i>Philautus surdus</i> *	-	-	13	-	
<i>Polypedates leucomystax</i>	3	4	-	8	
<i>Platymantis</i> sp. A	-	5	-	-	Unidentified
<i>Platymantis</i> sp. B	-	-	-	3	Unidentified
Total number of species	8	16	13	12	
No. of individuals	106	90	68	30	

Endemism: ** - Mindanao faunal region endemic; * - Philippine endemic;



Mueller's toadlet is found only in Mindanao and nearby islands and three individuals was found near a stream at Mt. Sinaka.

Twenty five frog species (294 individuals) belonging to 15 genera and five families (Table 5) were documented. Fifty six percent (14 species) were Philippine endemics and 9 of these are confined to the Mindanao faunal region. Nine species of the total 25 were classified by IUCN as "Vulnerable". Majority (56 %) of the species recorded was encountered along the forest edges and these species were recorded to be common in forest interiors. A lot of microhabitat types were also used. These two, presence of species that were previously recorded as found in forest interiors and the use of several

microhabitat types may suggest that all the forest habitat types in Arakan, including disturbed forest edges are important frog habitats. Samples of two more possible species of genus *Platymantis* were also collected.

There were 13 species of reptiles (Table 6) found in both sites of Mt. Mahuson, six (46 %) of which are endemic to the Philippines. As for the two sites, our samples that were deposited at UP Mindanao were missing. Thus, only those from Mt Mahuson were properly identified and processed.

Table 6. Species of reptiles documented at Mt. Mahuson.

Scientific name	English name	Residency	Local abundance	
			Site 1	Site 2
F. GEKKONIDAE				
<i>Cyrtodactylus annulatus</i>	Small bent-toed gecko	Endemic – common	X	-
<i>C. philippinicus</i>	Phil. bent-toed gecko	Endemic – common	X	-
<i>C. agusanensis</i>	Agusan bent-toed gecko	Endemic – rare	X	X
<i>Draco fimbriatus</i>	Min. flying lizard	Rare	X	-
<i>Gonycephalus semperi</i>	White-spotted anglehead	Endemic – rare	X	X
F. SCINCIDAE				
<i>Dasia grisea</i>	Northern keel-scaled tree skink		-	X
<i>D. semicineta</i>	Southern keel-scaled tree skink	Rare	X	-
<i>Mabuya multicarinata</i>	Two-striped Mabouya	Common	X	X
<i>M. englei</i>	Six-striped Mabouya		-	X
<i>M. rudis</i>	Brown Mabouya	Rare	-	X
<i>Sphenomorphus acutum</i>	Pointed-headed Sphenomorphus	Endemic – common	-	X
<i>S. variegatus</i>	Black-spotted Sphenomorphus	Endemic – rare	-	X
<i>Hemiphyllodactylus typus typus</i>	Small smooth-scaled gecko	Rare	X	-

Endemicity and implications to conservation

Endemicity among the vertebrate groups being surveyed is relatively high even though the three areas were already isolated and has been diminished in size. Our results indicate that unique wildlife can be resilient to habitat changes and can persist even in non-optimal habitats. But like all biological systems, these organisms have a threshold of tolerance so that additional human pressures on them and their habitat may ultimately result to population crash and local extinction. Further reduction of the forest is certainly detrimental. The remaining forests of Sinaka, Mahuson and KABIKU need to be protected with the heavily disturbed areas repaired or rehabilitated. Rebuilding forest habitats though ambitious is the way to go to create new habitats and increase local populations of wildlife.

4.2 Training and awareness project on species survey, monitoring and management

Two staff from the MENRO of Arakan, after undergoing training became a permanent member of the team and has participated in all of the surveys. They are Rodel Bravo and Jojo Montero. One local resident of Barangay Salasang, Aniceto Allado, was also trained and also became a permanent team member. For each of the study area, at most four representatives from the tribal community domain participated in the fieldwork. The community representatives were very appreciative of their participation and promised to share with their fellow residents the knowledge and information they have gained.

A presentation of the survey results was made to a multi-stakeholder meeting held under the forest corridor project in 2005. Public reactions to the meeting ranged from appreciation, as majority never realized how diverse wildlife is within the nearby forests, to worry as some knew that forest destruction is happening on a daily basis. The team also presented the result to the Local Government Council of Arakan and the body expressed delight but at the same time concern over whether the species, particularly the threatened ones, will last for long. As a result of these presentations, the council moved forward with the drafting and ratification of the Implementing Rules and Regulation (IRR) of a previous ordinance that declares the three forest fragments as critical watersheds of the town.

4.3. Involvement of undergraduate students

Three students from UP Mindanao and two faculty members from the Biological Science and Environmental Studies (BSES) Department participated in the survey. The faculty members were Dr. Severo T. Bastian, an adviser to one student, and Ms. Fritzie Ates, the adviser of two students. Below are the names of the students and their respective undergraduate thesis:

Name of Student	Thesis Title
Tatiana Rose C. Abano	Forest dependent avifauna at different

	elevations of Mount Mahuson, Mount Sinaka and Binoongan Forest Reserve, Arakan, Cotabato Province
Jennifer Therese Y. Coronel	Avian diversity of the montane forests at Mount Mahuson and Mount Sinaka, Arakan, Cotabato Province
Rai Kristie Salve C. Gomez	Diversity and community similarity of Pteropodids in montane forests of Arakan Valley Conservation Area, Mindanao

The project also came out with three scientific papers published in peer-reviewed journals:

1. KRISTOFER M. HELGEN, DIETER KOCK, **RAI KRISTIE SALVE C. GOMEZ**, NINA R. INGLE, AND MARTUA H. SINAGA. 2007. Taxonomy and natural history of the Southeast Asian fruit-bat genus *Dyacopterus*. Journal of Mammalogy, 88(2):302–318.
2. **ELSA MAY M. DELIMA**, FRITZIE B. ATES, AND **JAYSON C. IBANEZ**. Species composition and microhabitats of frogs within Arakan Valley Conservation Area, Cotabato, Mindanao Island, Philippines. Banwa. 2(1&2):16-30.
3. **GOMEZ, R. K. S. C., J. C. IBANEZ**, AND S. T. BASTIAN, JR. 2005. Diversity and community similarity of pteropodids and notes on insectivorous bats in the Arakan Valley Conservation Area, Mindanao. Sylvatrop 15:87–102.

PROJECT OUTCOMES

1. Sustainability of the Forest Corridor Program in Arakan

GAYNAWAAN 2004 has provided very strong biological and ecological bases for conservation investments to preserve the three forest remnants of Sinaka, Mahuson and KABIKU. The diversity of globally threatened species that the forests of Arakan contains, the high level of uniqueness among its wildlife, and the extent of threats to species survival strongly justified local and international attention to the areas natural resources. The forest corridor initiative found the scientific underpinnings from GAYNAWAAN 2004. Below are the milestones of follow-through activities since 2005:

Year	Milestones	Project/Funding Partners
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2005-06	<p>1. Community-based conservation component of Project GAYNAWAAN received financial support from UNDP and FPE. Activities included 1) organization of two upland communities as a self-reliant and empowered people's organization, 2) livelihood incentives, 3) reforestation of initial rehabilitation sites along the corridor</p> <p>2. Issuance of the Implementing Rules and Regulation (IRR) on Municipal Ordinance No 12 declaring Mahuson, Sinaka and KABIKU as "Critical Watersheds"</p> <p>3. Started a collaborative project with AnthroWatch and Non-Timber Forest Products Task Force (NTFPTF) on ancestral domain management and handicraft livelihood development</p>	<p>United Nations Development Program (UNDP) and Foundation for Philippine Environment (FPE)</p> <p>Local government unit (LGU) Arakan</p> <p>AnthroWatch and NTFPTF</p>
2006-07	<p>1. Organized the Arakan Forest Corridor Multi-Stakeholder Alliance (MSA)</p> <p>2. Continued establishment, maintenance and expansion of nurseries and reforestation sites with a total of 37.5 hectares;</p> <p>3. Continued processing of the joint ancestral domains of two partner tribal communities and continued community education campaigns.</p>	<p>FPE and LGU Arakan</p> <p>FPE</p> <p>FPE</p>
2007-08	<p>1. LGU Arakan passed Executive Order No. 12 creating a technical working group (TWG) for the development of the Arakan Forest Management and Development Plan (AFMDP) and first draft of the AFMDP</p> <p>2. Additional funds amounting to Philippine Peso (PhP) 1.5 Million was provided by the Philippine Tropical Forest Conservation Foundation (PTFCF) to support reforestation activities of one People's Organization (PO)</p> <p>3. Continuing investment by FPE for capacitation of, livelihood support to and</p>	<p>LGU Arakan</p> <p>PTFCF</p> <p>FPE</p>

	resource management by the PO partners	
2008-09	1. European Union (EU) support for the Arakan Forest Corridor Development Program through ancestral domain management and worked on the accreditation of the program as a beneficiary to the Clean Development Mechanism (CDM) initiative or Carbon Credits with the World Bank (WB). 2. Site Monitoring and Assessment within Mt Mahuson and Mt Sinaka to investigate changes in richness and diversity using GAYNAWAAN 2004 data as baselines	EU and WB FPE

2. Training of Future Conservation Biologists

Out of the three students that were part of the team, two opted for a full time career in conservation. After winning the “Best Student Paper” award during a Biodiversity Symposium by the Wildlife Conservation Society of the Philippines (WCSP) in 2005 for her paper presentation on the birds of Arakan Valley, **Tatiana Abano** was hired by PEF as an education officer. She then took her leave of absence and pursued an MSc degree in Biology from the University of the Philippines in Diliman. She is currently working with the PEF over her MSc thesis on “Patterns of movement and dispersal of young Philippine Eagles in Mt Kitanglad, Mindanao inferred from satellite telemetry”.

Rai Gomez’s thesis on bats of Arakan was published in a national scientific journal. She was also hired by PEF as a Field Biologist and worked with national experts for a comprehensive survey of bats in Eastern Mindanao. Her work at Mt Mahuson, Arakan and in eastern Mindanao contributed to the description of a new species of *Dyacopterus* in the Philippines. She co-authored a paper that came out of the Journal of Mammalogy in 2007 describing *Dyacopterus rickartii* or the Philippine Large-headed Fruit bat. Rai also authored and co-authored several popular reports and education materials about bats in eastern Mindanao. She is about to leave for Switzerland for an MSc scholarship to study ecology and evolution of Philippine bats.

One of the team members also opted for a long-career in conservation. **Elsa Delima** just left a multi-national firm when I invited her to join the team. Through self-help and interaction with senior scientists, Elsa got hooked on Herpetology. She was the Senior Author of a publication that described frog diversity in Arakan. This led to a string of publications in scientific journals on her work in eastern Mindanao from 2004-07 as a field biologist with PEF. She is now on her last year of her MSc studies at the Central Mindanao University and is preparing to do her MSc thesis on the “Phylogeny of frogs in Mindanao”.

The GAYNAWAAN 2004 project and the accompanying one-month training provided by BP Conservation Programme to **Jayson Ibanez** in Wales and in London in 2004 made

a big difference to Jayson's professional career. The BP award was the very first research grant he got and the training was also his first outside of the Philippines. Since then, he had received grants from the UNDP, Critical Ecosystem Partnership Fund (CEPF), Ocean Park Conservation Fund (OPCF), and Sea World and Busch Garden Conservation Fund (SWBGCF). Jayson is currently a Fellow with the Wildlife Conservation Society (WCS) studying home range and habitat use of Philippine Eagles in Mindanao using satellite GPS. He just finished his MSc Degree in Biology and was recently promoted as PEF Research Director.

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