

# **RAPID SITE ASSESSMENT OF THE NIPA DELTA (DONCILLA ISLAND), MAGARAO, CAMARINES SUR**

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## **Abstract**

*The Rapid Site Assessment of Doncilla Island (Nipa Delta) is an attempt to determine the level of species diversity and abundance as well as the status of the different habitats within this important ecological system. The purpose is to generate the essential data that can justify the development of the area as a prime ecotourism destination of the municipality of Magarao and provide the basis for formulating the ecotourism framework plan and conservation and management plan. Avian species diversity in the Nipa Delta is relatively high with a recorded total of 68 species in 54 genera in 28 families. In contrast, avian relative abundance is very low with an average total of 661 in individuals counted for all 57 species.*

*Direct encounter, general observation, and opportunistic search are the methods used to collect data on the avifauna, other vertebrate fauna, and flora of the Nipa Delta. Interviews complemented the main methods and are the process used to obtain indicative data on the socio-economic and political status of the area. Prior to the RSA, a two-day reconnaissance and review of secondary data were undertaken to obtain a general picture of the Nipa Delta (Doncilla Island) and contribute in the preparation of the design for the RSA.*

*Generally, the Nipa Delta is not yet severely degraded but is very unstable as an ecosystem due to the high level of threats it is confronted with. It cannot withstand large-scale development activities in the long-term due to its small size and unstable status. Sustainable ecotourism is only possible if the highest priority is placed on preserving all the natural features of the Nipa Delta and adopting low-impact development. A well-meaning response and action from concerned authorities are needed to ensure that the Nipa Delta will remain a viable ecological and socio-economic resource. A set of recommendations has been laid down to provide relevant offices and agencies direction in finding solutions to the problems.*

**KEYWORDS:** avifauna, diversity, doncilla island, ecotourism, nipa delta, rapid site assessment, relative abundance, species, vertebrates, wetland

# INTRODUCTION

## Rationale

The Ramsar Convention (1971) defines wetlands as “areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters”. As ecosystems, wetlands are regarded as the most biologically diverse and among the most productive environments. They are aptly called reservoirs of biodiversity due to their rich biological components and are important storehouses of plant genetic material. Wetlands also perform other important functions including flood control, groundwater replenishment, water refinement, sediment and nutrient retention, shoreline stabilization and protection, recreation and ecotourism, cultural value, and climate change mitigation.

In the province of Camarines Sur (Figure 1), one of the most important freshwater wetland ecosystems along and within the Bicol River floodplains is Doncilla Island, also known as the Nipa Delta, an unoccupied and unclassified public domain in barangays Ponong and Barobaybay, municipality of Magarao (Figure 2). With an area of ca. 150 hectares, Doncilla Island benefits residents by serving as a rich fishing ground, wildlife habitat, and source of native materials for livelihood. Nevertheless, it also functions as a critical foraging and staging area for resident and migratory shorebirds and waterbirds.

The municipality of Magarao has identified ecotourism as one of its priority programs and looks at it as a major revenue-generating initiative that offers an alternative employment and income source both for the constituents and the local government. The perception is that Magarao has many notable natural areas of local, regional, national and, probably, international interest. To maintain this important asset, the local government must recognize the need for a sensitive approach to protect Magarao’s natural attractions, while at the same time enabling an array of ecotourism user groups to access and appreciate these aesthetically unique natural settings. In pushing for this scheme, the local government intends to make Doncilla

Island the centerpiece of its ecotourism program. Already, an elaborate project is being proposed to develop the area as a major visitor destination in the municipality. However, it should be emphasized that the potential benefits from ecotourism are numerous as long as it is done according to the best standards and following the strictest guidelines for the industry.

Promoting the Nipa Delta as ecotourism destination will require thorough assessment and a full inventory of the biodiversity and the habitats within this important ecosystem. The purpose is to generate crucial data, which shall serve as basis in defining the framework, strategies and plans to



FIGURE 1. Map of the Philippines showing the location of Camarines Sur.

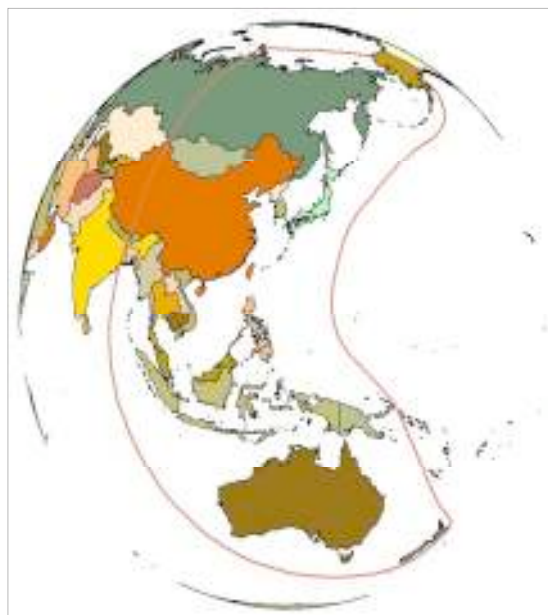


FIGURE 2. Map of Camarines Sur indicating the location of the municipality of Magarao.

implement a sustainable ecotourism program. Nevertheless, the assessment and inventory, if conducted by experts following scientifically accepted standards, will ensure the qualitative integrity of the generated data.

### **Significance of the Nipa Delta to Migratory Birds**

Every year, between the months of August and March, millions of birds migrate from their countries of origins in the northern hemisphere to escape the coming winter and seek refuge in the warmer climate in the southern hemisphere. Many of the birds make their journey to New Zealand, the final destination, in stages from the Arctic Circle via Asia, the Malay Peninsula, Indonesia, the Philippines, New Guinea, and Australia. The route they followed is known as the East Asian–Australasian Flyway (Figure 3). The EAAF is one of the most important flyways in the world being used by at least 250 species of migratory birds.



**FIGURE 3.** Map showing the extent of the East Asian–Australasian Flyway and the strategic location of the Philippines along the EAAF.

The Philippines lie in the center of the EAAF, a location that is a strategic and significant to the migration process. Among the most well-known places regularly visited by migrating birds are Candaba Marsh in Pampanga, Olango Island in Cebu, and Liguasan Marsh in Cotabato. Thousands of birds, including globally threatened species visit these areas every year. The Nipa Delta is relatively small compared with these wetlands but may have unique qualities that are important to large waterbirds such as egrets, herons, ducks and rails in the long term.

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### **Past Research on Doncilla Island**

Except for a survey of the avifauna in 1999-2000, the biodiversity of the the Nipa Delta is poorly studied. As a result, there exists no sufficient baseline information on the biological and physical attributes of the area. There may be other studies conducted afterwards but the results were not consolidated, published or made available.

### **Schedule and Duration**

The Rapid Site Assessment was conducted over a three-day period from 03 November 2010 until 05 November 2010. Fieldwork was done daily beginning at 06:00 in the morning and ending at 06:30 in the afternoon, with breaks between 09:30 AM and 03:00 PM.

### **Weather condition during the RSA**

The weather was very ideal with plenty of sunshine and only slight mist during the entire duration of the RSA. The azure sky was clear of cloud cover for most of the time the field work was undertaken.

## OBJECTIVES

Generally, the RSA was conducted to gather preliminary baseline information on the avifauna and other wildlife of the Nipa Delta (Doncilla Island) in barangay Ponong, municipality of Magarao, province of Camarines Sur, as well as to initially assess the biophysical and the socio-economic conditions in the area.

Specifically, the RSA aimed to generate the following:

- a species list of the birds and other vertebrate fauna of the Nipa Delta (Doncilla Island);
- an evaluation of the present condition of the various habitats of the Nipa Delta (Doncilla Island);
- a documentation of the threats and sources of disturbance to the birds and other wildlife on Doncilla Island;
- a well-analyzed technical information to justify and support the development of Doncilla Island as ecotourism destination for the municipality of Magarao; and
- a set of recommendations for developing a well-defined management and protection plan for the Nipa Delta (Doncilla Island).

## DESCRIPTION OF SURVEY SITE

### General Description of the RSA Site

The Nipa Delta or Doncilla Island (Figure 4), coordinates 13° 41' 02.01" N; 123° 06' 26.93" E, is situated about 9-10 kilometers west of the town proper. It is an elongated island oriented in a north northeast-south southwest plane with the longest end facing the towns of Magarao and Libmanan. The habitat is a beach type freshwater wetland. The vegetation in the outer perimeter is dominated by nipa (*Nypa fruticans*) while the lupi (*Phragmites vulgaris*) and dahat (*Cyperus* sp.) dominated the interior. The dominant tree species are the talisay *Terminalia catappa*, lipata (*Excoecaria agallocha*), dungon (*Heritiera orientalis*), and potat (*Morinda citrifolia*), which mostly comprised the remaining but severely fragmented patches of second growth beach forest. Although the Nipa Delta has been reported being planted to crop plants in the past, the only vegetation that remains to support this is the few stands of coconut palms (*Cocos nucifera*) at the southeast side of the island.



**FIGURE 4.** A satellite image of the Nipa Delta (Doncilla Island) in Magarao.

The soil type is typical of riverine and riparian wetlands. The greyish sandy clay soil along the portions that are constantly in contact with water was soft and sticky. The one in the interior is firmer and colored rusty brown. A network of small and narrow creeks cut through the island in several places and served as access routes to and from the interior. During high tide, the rise in the water level inundates most of the island.

The mudflat is a narrow strip along the northeast end of the Nipa Delta. It is ca. 90-120 meters at its widest and ca. 1,000-1,100 meters at its longest. It is relatively shallow with an average depth of between 45 and 60 centimeters. The soft mud is a mix of sand and clay, brownish on the surface and greyish underneath; the particles very fine and easily mixed with water.

## **METHODOLOGY**

### **A. Birds**

The survey of the avifauna of the Nipa Delta used direct encounter and general observation to gather data. All species were identified by sight and by ear. Birds were surveyed with the aid of 10x25 Nikon field binoculars with each species observed for at least 15 minutes to obtain a positive identification. Distinctive or distinguishing attributes of specific taxa were noted for purposes of comparison. Species were sought in specific areas they are most expected to be encountered, particularly the mudflat, grassland, patches of vegetation, and above ground. The following data were obtained for birds: species, number of individuals, habitat type, threats, and conservation and ecological significance. Secondary information from published literatures was considered in determining the status of the avifauna observed on Doncilla Island. Species identification, nomenclature, classification and information on conservation status followed Kennedy *et al.* (2000) and IUCN (2006).

### **B. Mammals**

The survey of mammals in the Nipa Delta was undertaken using the direct encounter and general observation. All species were identified by sight and, when present, from physical indications such as droppings, scats, claw and teeth marks, and foot and paw prints. Presence of mammals was sought from specific places such as burrows, tangles of vegetation, passageways, holes in trees, and the canopy of trees. Species identification and nomenclature followed Ingle and Heaney (1992) and Heaney *et al.* (1998). Classification of conservation status, endemism and habitat followed Heaney *et al.* (1998) and IUCN (2006).

### **C. Reptiles and Amphibians**

The survey of the herpetofauna used the direct encounter, general observation, and opportunistic search. Amphibians were identified by sight and ear and, if encountered, caught; the process also applied with reptiles although with caution. The specific habitats searched included isolated pools, creeks, burrows, and tangles of vegetation. Taxonomy and nomenclature of the herpetofauna followed Alcalá (1986) and Alcalá and Brown (1998).

### **D. Vegetation**

The survey of plants applied direct *in-situ* identification with emphasis given on dominant and familiar species. Species were identified as they are encountered in the sites. No specimens were collected during the RSA. Taxonomy and nomenclature for flora followed accepted standards and secondary information from published literatures and other sources (the World Wide Web; Salvosa, 1961; etc.) were consulted to obtain positive identification of the flora on the Nipa Delta (Doncilla Island).

## E. Interview

Data gathering was supplemented by interviews with local informants. The process was completely unstructured and opportunistic. The questions put emphasis on the local names of species, patterns of resource use, seasonality, breeding and nesting, foraging areas, threats and disturbance, protection and law enforcement, species-related cultural practices, and timeline of the area. Several of the issues and problems affecting the area were gathered through this method.

## RESULTS AND DISCUSSION

### Fauna

A total of 68 vertebrate species belonging to 54 genera, under 28 families were recorded during a Rapid Site Assessment of the Nipa Delta (Doncilla Island), barangay Ponong in Magarao town (Table 1). From this total, four species are mammals, 57 species are birds, five species are reptiles, and two species are amphibians. In terms of occurrence, five are endemic, 31 are residents, 26 are migratory, three are both resident and migratory, two are introduced, and one has uncertain occurrence status. In terms of relative abundance, 45 are considered common, 15 are uncommon, two are locally common, and six are fairly common (Table 2).

Three species have significant conservation status being included in the IUCN Red List of Threatened Species of Flora and Fauna. The Philippine Duck (*Anas luzonica*) (Figure 4) and Philippine Sailfin Lizard (*Hydrosaurus pustulatus*) (Figure 5) are listed under the Vulnerable category, while the Large flying fox (*Pteropus vampyrus*) is placed under the Near-Threatened category. A Vulnerable species is one which has a 10% chance of going extinct in the wild in the next 100 years if no direct action is undertaken to protect it. In contrast, Near Threatened is a conservation status assigned to species or lower taxa that may be considered threatened with extinction in the near future, although they do not currently qualify for the threatened status. Near Threatened species are dependent on conservation efforts to prevent their becoming threatened. Four individuals of the Philippine Duck were observed flying over the Nipa Delta in the morning of 03 November and 04 November 2010. It is presumed that they come from a marshland adjacent to the wide tracts of rice paddies three kilometers northeast of barangay Ponong. A visit to the area in the afternoon of 04 November 2010 counted 37 individuals which were flushed out from a pond behind a curtain of the Common Reed (*Phragmites vulgaris*). The Philippine Sailfin Lizard was seen as it darted over the water to the opposite bank of the creek when the banca carrying the observer approached its position.

Taxonomically, the family Scolopacidae, which comprises the curlews, godwits, sandpipers, and snipes, is the most diverse with 10 species recorded, all migratory. It is



**FIGURE 4.** The Philippine Duck, the only endemic member of family Anatidae in the Philippines. (Photo Credit: Romy Ocon)



**FIGURE 5.** The Philippine Sailfin Lizard, a Near-Threatened species. (Photo Credit: Anonymous)

followed by family Ardeidae (bitterns, egrets, herons) with eight species, of which three are migratory and two are both resident and migratory. Completing the top five are the family Sternidae (terns and noddies), family Columbidae (doves and pigeons) and family Sylviidae (old world warblers) with four species each. The terns are classified as seabirds and are generally oceanic. But three or four species visit inland habitats, such as rivers, lakes, freshwater marshes and swamps, ponds, fishponds and rice paddies in search of food. The species documented at the Nipa Delta, all migratory, belong to this group of terns. In the case of family Sylviidae, one of the species recorded, the Arctic Warbler *Phylloscopus borealis*, is migratory.

The Whiskered Tern (*Chlidonias hybridus*) (Figure 6), Kentish Plover (*Charadrius alexandrinus*), and the Common Tern (*Sterna hirundo*) are the most numerous bird species in the area with averages of 60, 55 and 45 individuals counted during the RSA, respectively. All three species are migratory but are recorded throughout the year in the Philippines. The numbers indicate very low abundance levels, and can be interpreted to mean that the Nipa Delta is not a preferred habitat for birds. It should be emphasized, however, that abundance varies throughout the migration season and bird densities are relatively higher during the peak period, usually between the months of November and February. And although the RSA was conducted in the first week of November, it was a period when the migratory birds are just starting to arrive and lower densities are still expected. Ideally, bird censuses should be conducted during the peak period when bird populations are at their highest in order to obtain good estimates of relative abundance.



**FIGURE 6.** The Whiskered Tern, the most numerous species in the Nipa Delta. (Photo Credit: Kevin Pacifico)

In the southwest end of the island is a small roost of the Large flying fox *Pteropus vampyrus*, one of the biggest fruit bat species in the Philippines (Figure 7). The residents put the population at more than 1,000 individuals but assessment of the physical condition of the roost site and stature of the roost trees present the conclusion that no more than 400 individuals occurred there. The roost is very small but important considering the flying foxes are among the most heavily hunted species of mammals in the country. Hunting for food has resulted in population declines for the Large flying fox in some areas, but the species appears to be able to change roosting locations in order to avoid heavy hunting pressure. This is consistent with residents' account that the flying foxes previously roosted in barangay Kantomaraw in Libmanan town but left for Doncilla Island because of persistent disturbance from hunters. But even here, the flying foxes may eventually be forced to seek a new roost again because of human-induced disturbance.



**FIGURE 7.** A close-up of the roosting *Pteropus vampyrus* on Doncilla Island. The Large flying fox is one of the largest fruit bat species in the Philippines.

In addition to overhunting, the species is generally threatened by the loss of lowland forest throughout much of its range. However, it is somewhat adaptable to secondary or modified habitats, provided that suitable roosting sites are

available. Therefore, there is a need to protect every roosting site for this species including the one on Doncilla Island, and to regulate or if not ban any hunting so that populations will remain stable. Aside from being categorized as Near Threatened, the Large flying fox is also listed in Appendix II of the Convention on International Trade of Endangered Species (CITES) of Flora and Fauna. CITES Appendix II includes those species that, although not necessarily threatened with extinction, may become so unless trade is strictly regulated in order to avoid utilization incompatible with their survival. International trade in Appendix II species is allowed, but is strictly controlled. Parties may only grant a permit to export such species after it has determined that the export will not be detrimental to the survival of the species.

An individual fitting the description of the Reddish Cuckoo-Dove (*Macropygia phasianella*) was briefly observed in the vicinity of the roosting site of flying foxes in the afternoon of 04 November 2010. When first seen, it was perched on a branch of a dungon tree but immediately took off after noticing the observers. The sighting needs confirmation because the species, although found in a variety of habitats, prefers forests from early second growth to montane mossy types. It is usually seen singly and in pairs flying fast low over fields, over and through the forest.

## Flora

A survey of the vegetation recorded a total of 13 species belonging to 13 genera in 10 families (Table 4). The dominant species are the Mangrove Palm (*Nypa fruticans*), which is primarily found along the perimeter, and the Common Reed (*Phragmites vulgaris*) and the sedge (*Cyperus* sp.) (Figure 8), which occupy most of the interior. The dominant tree species are the Tropical Almond (*Terminalia catappa*), the River Poison Tree (*Excoecaria agallocha*), the Looking-glass Mangrove (*Heritiera littoralis*), the Indian Mulberry (*Morinda citrifolia*) and the Leichhardt Tree (*Nauclea orientalis*). Individuals of these trees are sparsely distributed throughout the Nipa Delta as a result of fragmentation. The trees are harvested for their lumber that the residents use for various purposes. Dense patches are mostly concentrated in the interior and stands of lipata lined the island's perimeter, particularly in portions where the nipa palms are few or almost absent.



**FIGURE 8.** The sedge *Cyperus* sp. is the most abundant plant species on the Nipa Delta.

The Looking-glass Mangrove or locally called dungon is the preferred roost tree of the Large flying foxes on the island, not because it is big but also because of its height, which can reach as high as 15 m. Flying foxes normally choose the biggest and the tallest trees in the locality for their roosts. In forested areas, the usual trees chosen are the dipterocarps, which can reach heights in excess of 35 m.



## On the Origin of the Nipa Delta

The inhabitants of barangay Ponong don't have concrete ideas how the Nipa Delta actually evolved but everybody believed that it was formed by accretion, a process of deposition of sediments and soil particles over time to form a land mass. Recalling from memory, the long-time residents said that from the 1960s until the first half of the 1990s, the so-called Nipa Delta is originally three islets, namely Doncilla, Balangot and Kuyapi. These islets later fused beginning in 1995 to form the present larger island. The so-called "merging" was facilitated when the creek that separated Doncilla from Balangot was overgrown with nipa palms and sedges and became inaccessible. The creek was previously used by residents as a shortcut route to travel from Magarao to Libmanan and vice versa. In the case of Kuyapi, it is so small and the creek that separates it from Balangot so narrow that it looked like it wasn't disjointed from the bigger islet after all.

The accretion angle of the origin of the Nipa Delta needs to be assessed according to scientific context in order to eliminate any misconception in general belief. Although accretion looks plausible it cannot provide answer to the question of how sediments could accumulate in the middle of the course of fast-running water of the Bicol River. It is a given that the deposition of sediments is dependent on the speed of the current. The faster the current the more the sediments are pushed forward giving them no time to settle down; the slower the current the sediments moved slowly and eventually able to settle. This explains why deltas normally form at the mouths of rivers, at the junction where they joined the ocean, sea or estuary because the river current is already slowed down by the sea. In the case of the Nipa Delta, two models are worth considering. The first, that the island is once part of the mainland but became separated when the Bicol River cut through it. And second, it was a pre-existing elevated ground when the Bicol River began running through the area.

## On the Mangrove Reforestation Initiative on Doncilla Island

A mangrove reforestation project is currently being implemented at the Nipa Delta (Figure 9). While the initiative is laudable, it should have been subjected to a thorough evaluation as regards its feasibility and ecological compatibility. Rehabilitating wetland areas, with *Rhizophora* spp. has been a practice of many coastal resource management programs in the Philippines and is carried out without giving due consideration to the type of wetland to be planted. The Nipa Delta, being a freshwater wetland, is ecologically different from a saltwater or estuarine wetland. It, therefore, has disparate conditions for planting which should be



**FIGURE 9.** The mangrove reforestation project in the Nipa Delta.

known first before deciding on the species to be used. Rehabilitating the area with species

other than those that are native to the area may not be ecologically beneficial in the long-term. By introducing other species, we are not restoring the area but rather are altering the ecosystem.

Reforesting the Nipa Delta can proceed in the right direction if the following are highly considered:

- learning about the vegetation history of the area;

- knowing the requirements of mangrove species in terms of salt content of the water and substrate; and,
- determining the type of substrate where the seedlings are going to be planted.

The results from these studies are important in deciding which species should be planted, how it is done, and what are required to ensure the initiative would be highly successful.

## **PROBLEMS AND ISSUES**

### **Gathering of nipa fronds**

This is seen as the most common activity on Doncilla Island occurring on a daily basis in all parts of the island. The gatherers came not only from the town of Magarao but also from the adjacent municipalities of Libmanan, Cabusao, and Canaman. Although the activity poses no direct threat to resident and migratory birds at present, the constant presence of people (which is expected to increase in the coming years) may result to a cumulative level of disturbance that eventually will impact on the behavior and distribution of birds.

### **Disturbance in roost sites**

The colony of Large flying foxes on Doncilla Island is facing pressure from human-induced disturbance. Frequent intrusions of people into the roost site have considerably stressed the bats making them restless. When visitors come to the roost the guides disturb the bats to make them take to the air for the guests to see. It must be emphasized that the bats returned to their roosts to rest after a night of foraging sorties. If they are regularly disturbed and deprived of the much-needed rest the probability is high that they will leave to find a place safe enough for them to stay. At the current rate they are being frightened, at least once a day, it is possible that the roost will disappear in 5-10 years' time. When this happens, the potential of the Large flying fox as an ecotourism interest is gone forever.

### **Hunting**

Residents said that hunting is prevalent in the Nipa Delta. The preferred species hunted are the ducks, flying foxes, viverrids, and sailfin lizard. Most of the hunters come from the adjacent towns. Because of the illicit nature of the activity it is difficult to determine the extent of hunting on Doncilla Island and its impact on wildlife populations. The associated disturbance from hunting directly affects the behavior of wildlife making them always highly agitated and frightful of people. Although they are not sought directly by hunters, individuals of the Little Egret *Egretta garzetta* were observed exhibiting the alarmed posture on several instances after they noticed the RSA team approaching the mudflats. The average distance the egrets are observed to show the alarmed posture when approached is estimated at between 50 and 70 m. The display of this behavior is an indication of stress from human-induced disturbance.

### **Trash and Garbage**

The presence of garbage on the mudflats, although not serious at present, needs to be given attention by concerned authorities. During low tide, debris such as plastics, bottles, cigarette packs, styro-foams, nylons, tin cans, and other materials littered the exposed mudflats. Garbage in any form has a potential to endanger wildlife. When present in large volume, garbage on the mudflats

will deprive migratory birds of ideal foraging spots. It also threatens the lives of birds because when plastics are accidentally ingested they block the digestive tract making the birds suffer from severe discomfort from indigestion and then slowly killing them by starvation.

### **Fishing-related activities**

Only the north side of the Nipa Delta contains a sizable mudflat that migratory and resident bird species will find suitable as foraging and staging area. This narrow strip, ca. 120 m wide at the lowest tide and ca. 1,000 m long, also lies along a stretch of river that is regularly being fished. The current level of disturbance from the fisher folks may not be too high to impact on the birds' activities but it is expected to escalate in the coming years as populations of adjacent communities increase and more people engage in fishing near the mudflat.

### **Territorial jurisdiction**

There were accounts that the Nipa Delta is a territory that is shared between the municipalities of Magarao and Libmanan. This problem needs to be resolved at the soonest time possible by the two local government units because of its implications on the development and management of the Nipa Delta as ecotourism destination.

### **Low level of awareness and knowledge on conservation and wildlife laws**

Except for the Philippine Fisheries Code of 1998 (Republic Act No. 8550), those interviewed or conversed with have little or no awareness and knowledge on many conservation and wildlife laws, such as the Wildlife Resources Protection and Conservation Act (Republic Act No. 9147), the Revised Forestry Code (Presidential Decree No. 705), the Philippine Clean Water Act of 2004 (Republic Act No. 9275), the Water Code of the Philippines (Presidential Decree No. 1067), the Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention of 1971) or the Joint DILG-DENR Memorandum Circular No. 2003-01 (Strengthening and Institutionalizing the DENR-DILG-LGU Partnership on Devolved and Other Forest Management Functions). These laws and policies are essential to the effective conservation and management of natural areas (such as the Nipa Delta) and should be fully understood not only at the level of the local government unit but also at the level of the barangay and the community.

## **CONCLUSIONS**

The three-day Rapid Site Assessment of the Nipa Delta (Doncilla Island) in Ponong, Magarao has generated significant data about its biodiversity, status, and potentials. After analysis of the results, the following conclusions have been drawn:

- The Nipa Delta (Doncilla Island) has a relatively high species diversity and but low relative abundance.
- The Philippine Duck (*Anas luzonica*) is a possible resident of the Nipa Delta.
- Frequent disturbance of the roosting Large flying fox will drive the species from the Nipa Delta in 5-10 years.
- Doncilla Island is very unstable as an ecosystem due to the high level of threats it is confronted with.

- The Nipa Delta cannot withstand large-scale development activities in the long-term due to its small size and unstable status.
- Sustainable ecotourism is possible if the highest priority is placed on preserving all the natural features of the Nipa Delta and adopting low-impact development.
- Rehabilitating the Nipa Delta with species not native to the area has potential negative impacts on the ecosystem.
- There is low awareness of people about biodiversity, its role and importance in the ecosystem.
- The Nipa Delta is an open system which makes it a difficult management and enforcement challenge.
- Anthropogenic activities such as gathering of nipa fronds, disturbance in roost sites, hunting, trash and garbage, fishing-related activities, and territorial concerns are seen as the primary problems that impact on the ecological stability of the Nipa Delta.

## **RECOMMENDATIONS**

The Nipa Delta is a very important component of the Bicol River floodplains and supports a relatively rich avian biodiversity. Its true potential to migratory birds is yet to be realized and efforts must be exerted to preserve and protect it. The proposed development of the area as a prime ecotourism destination for the municipality of Magarao is reasonable as long as the initiative shall conform to strict standards and guidelines. A well-defined conservation and management plan for the area should be formulated using the information generated from the RSA and subsequent studies. In this respect, the following are recommended:

### **On Research and Data Generation**

- The Nipa Delta is highly unstable ecologically. Any initiative to develop the area must be supported by detailed analysis of the impact of disturbance and infrastructure on the ecosystem and on the behavior and abundance of migratory birds.
- Rehabilitation of the delta should consider the vegetation history of the area.
- Year-round monitoring of the birds and other species to establish the regular visitors and the peak period of migration;
- Creation of a database on the flora and fauna of the Nipa Delta;
- Research on the level of social and economic activities to determine their impacts on migratory birds and the long-term sustainability of the Nipa Delta;
- Evaluation of the detrimental effects of the Common Water Hyacinth on the narrow and sensitive mudflat ecosystem of the Nipa Delta and proposing mechanisms in dealing with the issue of biological pollution.

## **On Management**

- Development of a mechanism for regulating the activities of resource users (nipa palm gatherers, fishers, visitors, etc.) on and around the Nipa Delta;
- Taking concrete action to resolve the perennial problem of accumulation of non-biodegradable trash and garbage on the Nipa Delta and the mudflats that serve as foraging habitats of migratory birds;
- Rehabilitation of the vegetative cover of the Nipa Delta using native species but leaving sufficient open areas for the unhampered activities of migratory shorebirds and waterbirds;
- Institution of a regular patrolling program on Doncilla Island and the vicinities of the mudflats to discourage activities that pose disturbance and harm to wildlife;
- Giving orientation to enforcement personnel regarding proper patrolling and execution of environmental and conservation laws;
- Integration of capability-building, information dissemination and awareness-raising, and conservation education on the Nipa Delta to the programs and plans of local government units, people's organizations, non-government organizations, cause-oriented and religious groups, academic institutions, commercial establishments, and other stakeholders;
- Intensifying information and education campaign to all stakeholders putting focus on the local communities that utilize resources and visitors who will come near the bat roost and foraging migratory birds;
- Preservation of extant stands of vegetation because of their established ecological functions, viewing any rehabilitation activities as only enhancing, expanding and strengthening the present vegetative cover;
- Understanding that the restoration of the habitat function of the vegetative cover is not achieved through planting of trees alone but must give utmost consideration to the appropriate species to plant;
- Explore the feasibility of a multi-sector body to be given responsibility in the management of the Nipa Delta; and
- Consider zoning of the Nipa Delta to reconcile the need for socio-economic development and natural resource conservation, in which the zones must define the mechanism for using resources without compromising conservation objectives.

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## ANNEXES

TABLE 1. List of bird species recorded during the Rapid Site Assessment of Doncilla Island on 03-05 November 2010.

<b>Taxon</b>	<b>English Name</b>	<b>Family</b>	<b>Occurrence</b>	<b>Relative Abundance</b>
<b>MAMMALS</b>				
<i>Pteropus vampyrus</i>	Large flying fox	Pteropodidae	Resident	Common
<i>Rattus exulans</i>	Polynesian rat	Muridae	Introduced	Common
<i>Rattus tanezumi</i>	Oriental house rat	Muridae	Introduced	Common
<i>Viverra zangalunga</i>	Malay Civet	Viverridae	Resident	Common
<b>BIRDS</b>				
<i>Ardea purpurea</i>	Purple Heron	Ardeidae	Resident	Fairly Common
<i>Butorides striatus</i>	Little Heron	Ardeidae	Resident/Migrant	Fairly Common
<i>Bubulcus ibis</i>	Cattle Egret	Ardeidae	Resident/Migrant	Locally Common
<i>Egretta alba</i>	Great Egret	Ardeidae	Migrant	Uncommon
<i>Egretta garzetta</i>	Little Egret	Ardeidae	Migrant	Common
<i>Ixobrychus cinnamomeus</i>	Cinnamon Bittern	Ardeidae	Resident	Common
<i>Ixobrychus sinensis</i>	Yellow Bittern	Ardeidae	Resident	Common
<i>Nycticorax nycticorax</i>	Black-crowned Night-Heron	Ardeidae	Migrant	Uncommon
<i>Anas luzonica</i>	Philippine Duck	Anatidae	Endemic	Common
<i>Dendrocygna arcuata</i>	Wandering Whistling-Duck	Anatidae	Resident	Common
<i>Charadrius alexandrinus</i>	Kentish Plover	Charadriidae	Migrant	Common
<i>Charadrius dubius</i>	Little Ringed-Plover	Charadriidae	Resident/Migrant	Common
<i>Pluvialis fulva</i>	Asian Golden-Plover	Charadriidae	Migrant	Common
<i>Actitis hypoleucos</i>	Common Sandpiper	Scolopacidae	Migrant	Common
<i>Heteroscelus brevipes</i>	Grey-tailed Tattler	Scolopacidae	Migrant	Common
<i>Limosa lapponica</i>	Bar-tailed Godwit	Scolopacidae	Migrant	Uncommon
<i>Tringa nebularia</i>	Common Greenshank	Scolopacidae	Migrant	Common
<i>Tringa glareola</i>	Wood Sandpiper	Scolopacidae	Migrant	Common
<i>Tringa ochropus</i>	Green Sandpiper	Scolopacidae	Migrant	Uncommon
<i>Tringa stagnatilis</i>	Marsh Sandpiper	Scolopacidae	Migrant	Uncommon
<i>Tringa totanus</i>	Common Redshank	Scolopacidae	Migrant	Common
<i>Xenus cinereus</i>	Terek Sandpiper	Scolopacidae	Migrant	Fairly Common
<i>Calidris ruficollis</i>	Rufous-necked Stint	Scolopacidae	Migrant	Common
<i>Chlidonias hybridus</i>	Whiskered Tern	Sternidae	Migrant	Common
<i>Chlidonias leucopterus</i>	White-winged Tern	Sternidae	Migrant	Fairly Common
<i>Gelochelidon nilotica</i>	Gull-billed Tern	Sternidae	Migrant	Uncommon
<i>Sterna hirundo</i>	Common Tern	Sternidae	Migrant	Uncommon
<i>Geopelia striata</i>	Zebra Dove	Columbidae	Resident	Common
<i>Streptopelia bitorquata</i>	Island Collared-Dove	Columbidae	Resident	Uncommon
<i>Streptopelia chinensis</i>	Spotted Dove	Columbidae	Resident	Common
<i>Streptopelia tranquebarica</i>	Red Turtle-Dove	Columbidae	Resident	Fairly Common
<i>Cuculus saturatus</i>	Oriental Cuckoo	Cuculidae	Migrant	Uncommon
<i>Centropus viridis</i>	Philippine Coucal	Cuculidae	Endemic	Common
<i>Apus affinis</i>	House Swift	Apodidae	Resident	Locally Common
<i>Collocalia esculenta</i>	Glossy Swiftlet	Apodidae	Resident	Common
<i>Alcedo atthis</i>	Common Kingfisher	Alcedinidae	Migrant	Common
<i>Halcyon chloris</i>	White-collared Kingfisher	Alcedinidae	Resident	Common



<i>Merops philippinus</i>	Blue-tailed Bee-eater	Meropidae	Resident	Fairly Common
<i>Hirundo tahitica</i>	Pacific Swallow	Hirundinidae	Resident	Common
<i>Riparia paludicola</i>	Plain Martin	Hirundinidae	Resident	Uncommon
<i>Pycnonotus goiavier</i>	Yellow-vented Bulbul	Pycnonotidae	Resident	Common
<i>Cisticola juncidis</i>	Zitting Cisticola	Sylviidae	Resident	Common
<i>Megalurus palustris</i>	Striated Grassbird	Sylviidae	Resident	Common
<i>Orthotomus derbianus</i>	Grey-backed Tailorbird	Sylviidae	Endemic	Common
<i>Phylloscopus borealis</i>	Arctic Warbler	Sylviidae	Migrant	Common
<i>Cyornis rufigastra</i>	Mangrove Blue Flycatcher	Muscicapidae	Resident	Common
<i>Muscicapa griseisticta</i>	Grey-streaked Flycatcher	Muscicapidae	Migrant	Common
<i>Rhipidura javanica</i>	Pied Fantail	Muscicapidae	Resident	Common
<i>Anthus gustavi</i>	Pechora Pipit	Motacillidae	Migrant	Uncommon
<i>Anthus novaeseelandiae</i>	Richard's Pipit	Motacillidae	Resident/(Migrant?)	Common
<i>Motacilla flava</i>	Yellow Wagtail	Motacillidae	Migrant	Common
<i>Lanius cristatus</i>	Brown Shrike	Laniidae	Migrant	Common
<i>Nectarinia jugularis</i>	Olive-backed Sunbird	Nectariniidae	Resident	Common
<i>Zosterops meyeri</i>	Lowland White-eye	Zosteropidae	Endemic	Common
<i>Passer montanus</i>	Eurasian Tree Sparrow	Ploceidae	Resident	Common
<i>Lonchura malacca</i>	Chestnut Munia	Estrildidae	Resident	Common
<i>Lonchura punctulata</i>	Scaly-breasted Munia	Estrildidae	Resident	Common
REPTILES				
<i>Hydrosaurus pustulatus</i>	Philippine Sailfin Lizard	Scincidae	Endemic	Uncommon
<i>Eutropsis multicolorata</i>	East Indian Brown Skink	Scincidae	Resident	Uncommon
<i>Eutropsis multifasciata</i>	Common Sun Skink	Scincidae	Resident	Uncommon
<i>Gekko gekko</i>	Tokay Gecko	Gekkonidae	Resident	Uncommon
<i>Hemidactylus frenatus</i>	Common House gecko	Gekkonidae	Resident	Common
AMPHIBIANS				
<i>Rana sp.</i>	Frog	Ranidae	Resident	Common
<i>Bufo marinus</i>	Giant Marine Toad	Bufoidea	Introduced	Common

TABLE 2. Overall summary of the results of the Rapid Site Assessment of the Nipa Delta (Doncilla Island), Magarao.

Faunal Group	Taxon			Occurrence						Relative Abundance			
	S	G	F	E	R	M	R/M	I	U	C	Un	LC	FC
Mammals	4	3	3	0	2	-	-	2	-	4	-	-	-
Birds	57	45	20	4	23	26	3	-	1	38	11	2	6
Reptiles	5	4	3	1	4	-	-	-	-	1	4	-	-
Amphibians	2	2	2	0	2	-	-	-	-	2	-	-	-
Overall	68	54	28	4	32	26	3	2	1	45	15	2	6

**LEGEND:** S = Species; G = Genera; F = Families; E = Endemic; R = Residents; M = Migratory; R/M = Resident/Migratory; I = Introduced; U = Uncertain; C = Common; Un = Uncommon; LC = Locally Common; FC = Fairly Common; - = No data

TABLE 3. Number of bird species recorded per family during the Rapid Site Assessment of the Nipa Delta (Doncilla Island), Magarao.

<b>Family</b>	<b>Bird Group</b>	<b>Species Recorded</b>
Ardeidae	Bitterns, Egrets, Herons	8
Anatidae	Ducks, Geese	2
Charadriidae	Lapwings, Plovers	3
Scolopacidae	Curlews, Godwits, Sandpipers, Snipes	10
Sternidae	Terns, Noddies	4
Columbidae	Doves, Pigeons	4
Cuculidae	Cuckoos, Malkohas, Coucals	2
Apodidae	Swifts	2
Alcedinidae	Kingfishers	2
Meropidae	Bee-eaters	1
Hirundinidae	Martins, Swallows	2
Pycnonotidae	Bulbuls	1
Sylviidae	Old World Warblers	4
Muscicapidae	Flycatchers	3
Motacillidae	Pipits, Wagtails	3
Laniidae	Shrikes	1
Nectariniidae	Spiderhunters, Sunbirds	1
Zosteropidae	White-eyes	1
Ploceidae	Old World Sparrow, Weavers	1
Estrildidae	Adavat, Parrotfinches, Munias	2
<b>TOTAL</b>		<b>57</b>

TABLE 4. List of plant species recorded during the Rapid Site Assessment of the Nipa Delta in Magarao on 03-05 November 2010.

<b>Taxon</b>	<b>English Name</b>	<b>Family</b>	<b>Local Name</b>	<b>Habit</b>
<i>Terminalia catappa</i>	Tropical Almond	Combretaceae	Talisai	Tree
<i>Excoecaria agallocha</i>	River Poison Tree	Euphorbiaceae	Lipata	Tree
<i>Hibiscus tiliaceus</i>	Beach Hibiscus	Malvaceae	Malubago	Tree
<i>Heritiera littoralis</i>	Looking-glass Mangrove	Malvaceae	Dungon	Tree
<i>Morinda citrifolia</i>	Indian Mulberry, Noni Fruit	Rubiaceae	Potat	Tree
<i>Nauclea orientalis</i>	Leichhardt Tree	Rubiaceae	Bangkal	Tree
<i>Nypa fruticans</i>	Mangrove Palm	Arecaceae (Palmae)	Nipa	Palm
<i>Corypha elata</i>	Cabbage Palm	Palmae	Buri	Palm
<i>Cocos nucifera</i>	Coconut	Palmae	Niyog	Palm
<i>Cyperus</i> sp.	Sedge	Cyperaceae	Dahat	Sedge
<i>Phragmites vulgaris</i>	Common Reed	Poaceae	Lupi	Grass
<i>Eichornia crassipes</i>	Common Water Hyacinth	Pontederiaceae		Aquatic plant
<i>Blechnum orientale</i>		Blechnaceae		Fern

TABLE 5. Local names of wildlife species recorded in the Nipa Delta during a Rapid Site Assessment on 03-05 November 2010.

<b>Scientific Name</b>	<b>English Name</b>	<b>Local Name</b>	<b>Taxonomic Group</b>
<i>Ardea purpurea</i>	Purple Heron	Kagang	Bird
<i>Egretta alba</i>	Great Egret	Talaud	Bird
<i>Egretta garzetta</i>	Little Egret	Talaud	Bird
<i>Ixobrychus cinnamomeus</i>	Cinnamon Bittern	Lapay	Bird
<i>Nycticorax nycticorax</i>	Black-crowned Night-Heron	Tugwak	Bird
<i>Anas luzonica</i>	Philippine Duck	Naga	Bird
<i>Actitis hypoleucos</i>	Common Sandpiper	Usok	Bird
<i>Tringa glareola</i>	Wood Sandpiper	Usok	Bird
<i>Tringa ochropus</i>	Green Sandpiper	Usok	Bird
<i>Xenus cinereus</i>	Terek Sandpiper	Usok	Bird
<i>Geopelia striata</i>	Zebra Dove	Rogmok	Bird
<i>Streptopelia chinensis</i>	Spotted Dove	Rogmok	Bird
<i>Megalurus palustris</i>	Striated Grassbird	Toktori-ok	Bird
<i>Nectarinia jugularis</i>	Olive-backed Sunbird	Kuwit	Bird
<i>Passer montanus</i>	Eurasian Tree Sparrow	Costa	Bird
<i>Lonchura malacca</i>	Chestnut Munia	Dignos	Bird
<i>Hydrosaurus pustulatus</i>	Philippine Sailfin Lizard	Layagan	Reptile