Report on the Rapid Assessment of Tres Marias Islets, Palompon, Leyte

February 7-11, 2000

Save Nature Society, Inc.

INTRODUCTION

Palompon is a coastal municipality in the province of Leyte, a large island in Eastern Visayas. It has a land area of 104 square kilometers. Slightly off the coast of the municipality are three islets, namely, Tabuk, Gumalac, and Cabgan. These islets are collectively calledTres Marias. Tabuk Island is closed to human activities and fishing is banned within its surrounding waters. Baseline data on its bird life was taken in 1991. This was followed by another assessment in 1997.

Objectives of the Study

The present study was undertaken to produce an ecological profile of the area to serve as invaluable input into the decision-making process involved in prioritization and usage of resources. The Local Government Unit of the town of Palompon, Leyte is developing some islets within its jurisdiction as sanctuaries, gene bank or as ecological destinations for domestic as well as international tourists. But effective promotion of tour packages, education, public awareness and environmental appreciation require sufficient data on the islets resources particularly the avifauna and their feeding and roosting sites for which there is very limited information that should form the basis for sound management. Hence, this study

Methodology

On foot survey shall be done in all of the fieldwork in the islets of Tabuk, Gumalac and Cabgan. With the use of binocular telescopes, spotting scopes, field guide for shorebirds and mangroves, field notebook, portable tape recorder and a working map of the islets, the following general activities shall be carried out:

A. Identification of Feeding Sites – During low tide, the water birds are in the tidal flats doing some activities related to feeding. These sites are the most productive parts of the islets/sanctuary where there are seagrass beds with small fish, worms, crustaceans and even mollusks, which serve as the food items of the birds. These sites should be indicated in the map. The presence of feeding flocks or congregations of birds in these areas would simply indicate that these are the feeding sites.
B. Identification of Roosting Sites – During high tide when the feeding grounds are under water, the birds will look for elevated grounds where the birds can rest or roost while waiting for the tide to recede in the next low tide. Most often, the roosting sites are in the mangrove forest or below it in the elevated ground. At the onset of high tide, the feeding grounds will gradually be inundated and the birds will start to leave the feeding grounds and head toward the roosting sites. The roosting sites are where the birds congregate in the mangroves and wait for the next low tide to come. In a strategic location in the sanctuary, these sites are identified and indicated in the sanctuary map. This will also be a site for regular monitoring of the bird population.

C. Enumeration of Shorebirds in the Roosting Site – The species, count and the major vegetation in the roosting site are recorded.
D. Determination of Diurnal Tide Levels Relevant to Feeding and Roosting Activities – Using published tide tables as reference, the tide levels are measured when identifying roosting sites and the time of the day the birds have completely aggregated. This is important in scheduling site visits for bird watching during high tide.
E. Characterization of the Feeding and Roosting Sites – The biological and physical attributes of the sites are described. The biological components will include dominant vegetation like the mangroves as well as marine resources like mollusks, seagrasses, seaweeds and corals. Physical parameters include air and water temperature, water salinity, pH and conductivity, substrate and other features. Threats to the area will also be noted.
F. Data Consolidation – Data gathered by the members of the team shall be consolidated into one set of data.
G. Report – Data gathered by the members of the team shall be consolidated into one set of data.
H. Report Writing – Once the data have been consolidated, a written report shall be prepared and submitted to the Municipal Government of Palompon and Coastal Resource Management Project on the first week of March for incorporation into ecotourism plans and packages as well as into the municipal plan.

RESULTS OF THE STUDY

Physico-chemical Environment (Seawater Characteristics)

Temperature

The temperature readings of the three islets as shown on Table 1 reveal an average of 32.2 deg. C. This reading, though slightly higher than 32 deg. C, the mean temperature value for coastal waters, is still within the maximum temperature increase set by the Department of Environment and Natural Resources for coastal and marine waters. The maximum allowable variance based on DENR Administrative No. 34 is 3 deg. C. Extremes in temperature variance may affect the productivity of the flora and fauna in the seas, including the phytoplankton.

Salinity

The average salinity of the three islets at 33.4 parts per thousand is within the typical salinity range of 33.0 ppt to 35.0 ppt for coastal seawater. The differences of average salinity readings in the three islets which is 33.0 ppt for Tabuk, 32.6 for Gumalac and 34.6 ppt for Cabgan may be due to dilution from freshwater inputs from the river and streams or sewage outfalls.

pH

pH is a value used to express the relative degree of quality and alkalinity of a solution and is defined as the negative logarithm of the solution hydrogen ion activity. Units ranged from 0 (most acidic) to 7 (neutral) to 14 (most alkaline/basic).

There is minimal difference in the pH value of the three islets. For waters near Tabuk and Cabgan islets, the pH was 6.93 and 6.97, respectively. The pH in Gumalac Islet was at the neutral pH of 7.00. Though slightly lower than that of Gumalac, the pH of Tabuk Islet waters is higher than that of waters close to Cabgan Islet. The average pH value of waters surrounding the three islets is 6.961 which is well within the range for coastal and marine waters set by the Department of Environment and Natural Resources. DENR Administrative Order No. 34 sets a pH range from 6.5 to 8.5 as standard for class SC waters (fishery).

The pH is another important parameter for evaluating the condition of the seawater in relation to the existing marine life. Low pH is a major cause of stress for marine organisms since it can adversely affect the chemical composition of seawater in various ways. For example, hydrogen ions (H+) can destroy the bicarbonate alkalinity, which is converted to free carbon dioxide. The carbon dioxide is directly toxic and can also decrease the ability of fish and other organisms to absorb oxygen in the water.

Dissolved Oxygen

Analysis of dissolved oxygen can provide important information on the biological and biochemical interactions taking place in the aquatic environment. Oxygen in seawater is a basic requirement for fish and most bottom fauna. The amount of dissolved oxygen affects aquatic life directly, especially those that are dependent on aerobic respiratory processes to generate energy needed for growth and reproduction. It can also provide vital information as to the capacity of water to degrade organic waste without causing inconvenience or killing aquatic life. Oxygen content in water can be a reflection of organic loading, nutrient input and biological activity.

The values of the dissolved oxygen in the study site ranges from 5.43 mg/L as registered by waters near Tabuk Islet to a high of 7.26 mg/L as that for waters near Cabgan. The average value of 6.21 mg/L is several milligrams higher than the optimum dissolved oxygen requirement of 5.0mg/L on all use category for marine waters under government standards. This indicates a toxic condition which could be caused by increases in photosynthetic activity brought about by a consequent increase in phytoplankton population. This also means excellent aeration of the waters around the Tres Marias, particularly that around Cabgan Islet. However, such aeration is less in the area near Tabuk. This is expected.

In contrast to Cabgan islet, Tabuk is closer to the town's commercial center where human activities tend to increase the organic load of the receiving waters. Organic load in the water is increased directly, as garbage thrown into the sea, or indirectly, through run-off from the uplands and agricultural areas, through seepage from septic tanks (when the bottoms are not made of concrete), or through the sewerage outfalls allowed to empty into the sea. As microorganisms break down large organic compounds into simple elements, they consume a huge amount of oxygen and deplete the oxygen dissolved in water.

Table 1. Water Quality Values of Seawater Around the Tres Marias Islets

ISLETS	TRIALS	WATER QUALITY VALUES			
		TEMP (C)	SALINITY (ppt)	pH	DO (mg/L)
TABUK	1	31.8	32.0	6.94	5.92
	2	32.5	33.0	6.93	5.6
	3	32.0	34.0	6.92	4.77
	AVE.	**32.1**	**33.0**	**6.93**	**5.43**
GUMALAC	1	31.2	33.0	7.0	6.73
	2	31.1	34.0	7.0	5.88
	3	33.7	31.0	6.99	5.23
	AVE.	**32.0**	**32.6**	**7.0**	**5.95**
CABGAN	1	33.4	36.0	6.97	7.45
	2	32.5	34.0	6.97	7.05
	3	32.3	34.0	6.97	7.29
	AVE.	**32.6**	**34.6**	**6.97**	**7.26**
GENERAL AVE.		**32.2**	**33.4**	**6.96**	**6.21**

Table 1 shows the excellent water quality values of seas around the Tres Marias Islets of Palompon, Leyte. All values are within DENR standards.

Flora and Fauna

Mangrove Forest

The Tres Marias Islets and Tang-tang Islet are practically mangrove islets, with a composite area of 347.5 hectares in 1960. Dominant species are *Avicennia marina* and *Sonneratia alba.* The other species also present are *Rhizophora stylosa, Rhizophora mucronata,* and *Sonneratia caseolaris.* One individual of the latter species reported in Gumalac may require further validation. The mangrove forest is not diverse. The physical boundary between the islets and the mainland prevent other species from colonizing the islets. Landward species are absent. The mangrove flora is typical of the islets.

Anecdotal history of the islets reveals that the mangrove forest used to be more extensive that today, but because of massive cutting for various reasons, the area has been greatly reduced. As public concern is mounting and the importance of the coastal resources is being recognized, rehabilitation efforts are increasing as shown by the previous and present attempts to establish mangrove plantations in various parts of the Tres Marias islets. Gumalac was a mangrove reforestation site of the municipal government of Palompon in 1996.

Seagrasses

A vast seagrass area exists around Gumalak, Cabgan and Tang-tang islets with about five species present, namely, *Cymodocea serrulata, Halodule uninervis, Enhalus acoroides, Halophila ovalis,* and *Thalassia hemprichii.* Inside the islets are small patches of seagrass beds.

Tabuk Islet has a very limited area of seagrasses on its western coast. Small patches of seagrasses are also found interspersed between mangrove stands. Recovery of the seagrass areas in this islet may take a longer time.

Seagrasses are very important to the stability and productivity of the coastal ecosystem of Tres Marias islets. To the ducks, shorebirds, mollusks, fishes and siganids, particularly, and other marine animals, the seagrass bed is a rich source of food and serves as feeding, breeding and roosting areas. It also helps stabilize the substrate by holding the organic matter and sand particles, thereby reducing the pollution load of the water. Seagrasses then should be conserved and protected, if the *danggit* (siganid) fishery and wildlife were to be sustained.

Seaweeds

A total of 23 seaweeds of economic and ecological values have been observed in Tres Marias islets, including the edible *Caulerpa cupressoides* and *Caulerpa racemosa,* although they are present in very small quantities. The rest of the seaweeds are sources of food for other organisms.

Other Marine Organisms

The Tres Marias Islets are a rich source of food as shown by the kinds of species of marine life observed and by the number of people local fishing and gleaning in the vast mudflats and seagrass bed around the islets. Mollusks as a group are a source of protein. The various species of sea urchins are edible and are sources of protein. The sea stars like *Protoreaster, Archaster* and *Linckia* can be processed into souvenir items.

Snake

Dog-faced Snake (*Cerberus rhybchops)* is the lone species of snake found in the Tres Marias Islets, particularly in Tabuk Islet.

Birds

A. Tabuk Islet

The islet supports a total of 15 different kinds of birds, seven are resident and eight are migratory. Two species of ducks were recorded, namely the endemic Philippine Mallard with a population of 686 birds and the migratory Pintail numbering some 24 birds. Four species are terrestrial in habit, including the Brahminy Kite, Philippine Bee Easter and the songbird of the mangroves, the Yellow Vented Wren. The rest of the species are shorebirds, including the resident Rufous Night Heron and the Mangrove Heron, and the migratory Little Egret, Gray-tailed Tattler, Kentish Plover, Whimbrel, Mongolian Plover and the endangered Chinese Egret. The most dominant shorebird species is the Gray Plover, with a population of 33 birds. Table 2 presents the bird count on Tabuk Islet.

Of the bird populations observed, the most important is the Philippine Mallard, the bird being endemic and native to the country. As the bird is not migratory in habit, the ducks should be present on the islet the whole year round and therefore the islet is very important to the ducks as a feeding and roosting habitat. The Pintail though is on the islet and uses it as a major wintering site in the country and may leave the area at the onset of the summer season in the northern hemisphere.

The resident species stay on the islet and its vicinity and utilizes the area year-round. The migratory shorebirds may utilize the area only from September to March, during the winter season in China, Russia and Siberia, where these birds breed. The populations of the shorebirds are smaller compared to the populations on the other islets because the seagrass area (feeding area) is very small. (Generally, places with an extensive seagrass bed harbor bigger populations of shorebirds.)

Inside the mangrove forest of Tabuk Islet are several tidal pools that serve as feeding and roosting areas for the ducks. Some of the tidal pools are visible from the outer edges of the mangrove forest; others can only be seen inside. Those ducks that use the tidal pools during low tide are very sensitive to human disturbance so that a very light noise and sights of moving human beings can easily disrupt their activities and scare them away from where they are feeding or roosting. Ducks just have a very typical behavior of responding t a distress call being made by other ducks of their flock so that any disturbance can be communicated very rapidly to other ducks and drive them away.

Tabuk Islet is within the proximity of the industrial area of Palompon wharf, where other forms of disturbance and pollution, either organic or chemical, may have negative impacts not only to the mangrove forest and seagrasses but to the ducks and other birds as well. The islet is now a protected area where human disturbance may be controlled, but water pollution due to ship discharges may be difficult to control unless the local government imposes strict regulations relevant to oil and other waste disposal. The ducks, particularly, are sensitive to pollution and therefore extra care should be exerted to minimize pollution in the area.

In the Midwestern coast of Tabuk, there is an area where the substrate is sandy but is underlain by a soft subsoil indicative of a previous presence of some type of vegetation that is now covered by the present sandy substrate. The previous vegetation is suspected to be seagrasses and the overlying sand may have come from coral rubbles resulting from the destruction of corals by dynamite and other destructive forms of fishing.

Table 2. Bird Count on Tabuk Islet, Palompon, Leyte

SPECIES	NUMBER OF INDIVIDUALS
Philippine Mallard	686
Pintail	24
Rufous Night Heron	1
Mangrove Heron	12
Little Egret	11
Chinese Egret	1
Gray Plover	33
Kentish Plover	13
Gray-tailed Plover	3
Whimbrel	7
Mongolian Plover	4
White-collared Kingfisher	13
Brahminy Kite	2
Philippine Bee Eater	3
Yellow vented Wren	5
TOTAL	**818**

Table 2 shows 818 individuals belonging to the 15 bird species found on Tabuk Islet, Palompon, Leyte during rapid assessment conducted from February 7 to 11, 2000.

B. Gumalac Islet

Gumalac is an elongated islet, the biggest of the three islets. Lying north of Gumalac is Tabuk Islet, to its south is Cabgan Islet. This islet has sandy to sand-muddy type of substrate, but one portion is coralline. On its mid-southern half is a small, elevated area, which does not get inundated even during high tide. This area serves as the high tide roosting site of thousands of birds converging and waiting for the next low tide to come in.

The island is densely covered, with mangrove vegetation growing naturally at its southern and northern parts; vegetation is sparse on the middle. Other flora such as seagrasses and algae were also common in the vicinity. This attracts both terrestrial and marine fauna. The island has diverse invertebrates and thus is a good feeding area for migratory shorebirds and endemic bird species.

A total of 25 different kinds of birds were found on the islet at different tides. During high tide, 1,621 individuals were counted; during low tide the count was 1,059. Two kinds of ducks – the Philippine Mallard with a count of 567 and the Garganey Duck with a count of 23 birds — were identified. There were 17 bird species, the most numerous of which is the Gray Plover, with a count of 572 individuals, followed by the Kentish Plover, with 142 individuals. The Golden Plover has a population of only 106 birds. The endangered Chinese Egret was represented by only one bird. Similar results were gathered during low tide.

Gumalac Islet is as important as Tabuk Islet to the ducks and shorebirds. The vast seagrass area around the islet provides an excellent feeding area for the birds and other economically important species of marine organisms, such as the Rabbitfishes. The mangrove area and elevated ground serve as their high tide roosting area. All the requirements for their survival are provided by the islet. It should not be surprising why many birds inhabit the islet, which therefore deserves the kind of protection being accorded to Tabuk Islet.

Table 3. Bird count at two bird roost sites on Gumalac Islet, Palompon, Leyte

SPECIES	NUMBER OF INDIVIDUALS	
	High Tide Roost Site	**Low Tide** Roost Site
Philippine Mallard	567	767
Garganey	23	25
Little Egret	3	18
Chinese Egret	1	7
Great Egret	3	5
Intermediate Egret	9	62
Cinnamon Bittern		1
Gray Plover	572	204
Mongolian Plover	5	3
Golden Plover	106	2
Kentish Plover	142	3
Greater Sand Plover	5	8
Ruddy Turnstone	1	3
Gray-tailed Tattler	54	5
Redshank	46	2
Greenshank	9	2
Marsh Sandpiper		2
Terek Sandpiper	1	
Little Whimbrel		3
Whimbrel	72	5
Bar-tailed Godwit		3
Great Knot	1	
Curlew	2	
Green-back Heron		13
Black Tern		6
TOTAL	**1,621**	**1,059**

Table 3 shows 25 bird species at two roost sites on Gumalac Islet, Palompon, Leyte during rapid assessment conducted from February 7 to 11, 2000. The high tide roost site had 1,621 individuals, while the low tide roost site had 1,059.

C. Cabgan Islet

The islet is the most southern of the group, and like Gumalak, is also surrounded by a vast area of seagrass bed, which serves as the feeding ground for both the birds and other marine organisms. A total of 12 kinds of birds have been identified, 10 of which are migratory, including the Golden Plover, which has the biggest population count of 154, Gray Plover with 13 individuals, and Little Egret also with 13 individuals. The endangered Chinese Egret, as well as the Mongolian Plover, was represented by six individuals. The Whimbrel had five individuals, while the Kentish Plover, Ruddy Turnstone, Gray-tailed Tattler, and Common Sandpiper had one bird each. The resident species observed on the islet include the Mangrove Heron and the White-collared Kingfisher. (See Table 4)

Table 4. Bird count on Cabgan Islet, Palompon, Leyte

SPECIES	NUMBER OF INDIVIDUALS
Mangrove Heron	12
Little Egret	13
Chinese Egret	6
Mongolian Plover	6
Golden Plover	154
Kentish Plover	1
Gray Plover	13
Ruddy Turnstone	1
Gray-tailed Tattler	1
Common Sandpiper	1
Whimbrel	5
White-collared Kingfisher	8
TOTAL	**221**

Table 4 shows 221 individuals belonging to 12 bird species on Cablat Islet, Palompon, Leyte during the rapid assessment conducted from February 7 to 11, 2000.

Ducks have not been observed on this islet. This is because of the fishing activities occurring around the islet – ducks are normally wary of people. In contrast, the migratory birds have apparently adjusted to the presence of fishers and appear undisturbed by the human activities.

D. Tang-tang Islet

East of Cabgan is another islet called Tang-tang, which is also an important feeding area for migratory and resident birds. A total of 10 kinds of birds with a total population of 42 individuals representing 7 migratory species and 3 resident species have been observed. The small bird population may be due to the presence of

Table 5. Bird count on Tang-tang Islet, Palompon, Leyte

SPECIES	NUMBER OF INDIVIDUALS
Mangrove Heron	16
Little Egret	3
Golden Plover	3
Gray Plover	2
Little Whimbrel	3
Gray-tailed Tattler	1
Common Sandpiper	2
Whimbrel	3
Yellow-vented Wren	2
White-collared Kingfisher	4
TOTAL	**42**

human activities – mostly fishing and gleaning – in the area.

Table 5 shows 42 individuals belonging to 10 bird species on Tang-tang Islet, Palompon, Leyte during rapid assessment conducted from February 7 to 11, 2000.

Table 6. Summary : Birds identified on Tres Marias Islets, Palompon, Leyte

Species Common Name	Status	Tabuk	Gumalac	Cabgan	Tangtang
Anas acuta Pintail	M	x			
Anas querquedula Garganey Teal	M		x		
Egretta eulophotes Chinese Egret	M	x	x	x	
Egretta garzetta Little Egret	M	x	x	x	x
Egretta intermedia Intermediate Egret	M		x		
Egretta alba Great Egret	M		x		
Charadrius alexandrinus Kentish Plover	M	x	x	x	
Charadrius mongolus Mongolian Plover	M	x	x	x	
Charadrius leschenaultii Greater Sandplover	M		x		
Pluvialis dominica Golden Plover	M		x	x	x

Species Common Name	**Status**	**Tabuk**	**Gumalac**	**Cabgan**	**Tangtang**
Anas acuta Pintail	M	×			
Anas querquedula Garganey Teal	M		×		
Egretta eulophotes Chinese Egret	M	×	×	×	
Egretta garzetta Little Egret	M	×	×	×	×
Egretta intermedia Intermediate Egret	M		×		
Egretta alba Great Egret	M		×		
Charadrius alexandrinus Kentish Plover	M	×	×	×	
Charadrius mongolus Mongolian Plover	M	×	×	×	
Charadrius leschenaultii Greater Sandplover	M		×		
Pluvialis dominica Golden Plover	M		×	×	×
Pluvialis squatarola Gray Plover	M	×	×	×	×
Arenaria interpres Ruddy Turnstone	M		×	×	
Calidris tenuirostris Great Knot	M		×		
Tringa stagnatilis Marsh Sandpiper	M		×		
Tringa hypoleucos Common Sandpiper	M			×	×
Tringa totanus Redshank	M		×		×
Tringa nebularia Greenshank	M		×		
Xenus cinereus Terek Sandpiper	M		×		
Tringa brevipes Gray-tailed Tattler	M	×		×	×
Numenius arquata Eurasian Curlew	M		×		
Limosa lapponica Bar-tailed Godwit	M		×		
Numenius phaeopus Whimbrel	M	×	×	×	×
Numenius minutus Little Whimbrel	M		×		×
Anas luzonica Philippine Mallard	E	×	×		
Sterna sumatrana Black-naped Tern	M		×		
Butorides striatus Mangrove Heron Green-back Heron	R	×	×	×	×
Ixobrychus cinnamomeus Cinnamon Bittern	R		×		
Nycticorax caledonicus Rufous Night Heron	R	×			
Haliastus indus Brahminy Kite	R	×			
Haliastus chloris White-collared Kingfisher	R	×		×	×
Merops philippinus Philippine Bee Eater	R	×			
Gerygone sulfurea Yellow-vented Wren	R	×			×

E. Comparative records of past studies

The present study recorded a total of 32 bird species on the Tres Marias Islets. There were 15 species recorded on Tabuk Islet, 25 on Gumalak Islet, 12 on Cabgan, and 10 on Tang-tang Islet. Combined with previous records (1991 and 1997), a total of 40 bird species have been recorded in the area. Consistently present were the Little Egret and the Greenback Heron or Mangrove Heron. Present from 1997 to 2000 on Tabuk were species such as the Kentish Plover, Mongolian Plover, Gray Plover, Gray-tailed Tattler, Whimbrel, Philippine Mallard, Rufuos Night Heron, and White-collared Kingfisher. Similar bird species were recorded for Gumalac for the same period. Not sighted in the 2000 study were the Common Kingfisher and Large-billed Crow.

Table 7. Comparative bird inventory records (1991, 1997, 2000), Tabuk and Gumalak Islets, Palompon, Leyte

Species Common Name	**Status**	**Tabuk** (1991)	**Tabuk** (1997)	**Tabuk** (2000)	**Gumalac** (1991)	**Gumalac** (1997)	**Gumalac** (2000)
Anas acuta Pintail	M			x			x
Anas querquedula Garganey Teal	M			x			x
Egretta eulophotes Chinese Egret	M			x			x
Egretta garzetta Little Egret	M	x	x	x	x	x	x
Egretta intermedia Intermediate Egret	M						x
Egretta alba Great Egret	M						x
Charadrius alexandrinus Kentish Plover	M		x	x	x	x	x
Charadrius mongolus Mongolian Plover	M		x	x	x	x	x
Charadrius leschenaultii Greater Sandplover	M		x		x	x	x
Pluvialis dominica Golden Plover	M		x		x	x	x
Pluvialis squatarola Gray Plover	M		x	x	x	x	x
Arenaria interpres Ruddy Turnstone	M		x		x	x	x
Calidris tenuirostris Great Knot	M		x		x		
Tringa stagnatilis Marsh Sandpiper	M						x
Tringa hypoleucos Common Sandpiper	M						x
Tringa totanus Redshank	M				x		x

Species Common Name	**Status**	**Tabuk** (1991)	**Tabuk** (1997)	**Tabuk** (2000)	**Gumalac** (1991)	**Gumalac** (1997)	**Gumalac** (2000)
Anas acuta Pintail	M			×			×
Anas querquedula Garganey Teal	M			×			×
Egretta eulophotes Chinese Egret	M			×			×
Egretta garzetta Little Egret	M	×	×	×	×	×	×
Egretta intermedia Intermediate Egret	M						×
Egretta alba Great Egret	M						×
Charadrius alexandrinus Kentish Plover	M		×	×	×	×	×
Charadrius mongolus Mongolian Plover	M		×	×	×	×	×
Charadrius leschenaultii Greater Sandplover	M		×		×	×	×
Pluvialis dominica Golden Plover	M		×		×	×	×
Pluvialis squatarola Gray Plover	M		×	×	×	×	×
Arenaria interpres Ruddy Turnstone	M		×		×	×	×
Calidris tenuirostris Great Knot	M		×		×		
Tringa stagnatilis Marsh Sandpiper	M						×
Tringa hypoleucos Common Sandpiper	M						×
Tringa totanus Redshank	M				×		×
Tringa nebularia Greenshank	M						
Xenus cinereus Terek Sandpiper	M						×
Tringa brevipes Gray-tailed Tattler	M		×	×	×	×	×
Numenius arquata Eurasian Curlew	M		×			×	×
Limosa lapponica Bar-tailed Godwit	M		×			×	×
Numenius phaeopus Whimbrel	M		×	×	×	×	×
Numenius minutus Little Whimbrel	M						×
Calidris ruficollis Rufous-necked Stint	M		×		×	×	
Anas luzonica Philippine Mallard	E		×	×			×
Sterna sumatrana Black-naped Tern	M						×
Larus ridibundus Black-headed Gull	M		×		×	×	
Sterna hirundo Common Tern	M		×			×	
Sterna hybrida Whiskered Tern	M				×		
Butorides striatus Mangrove Heron Green-back Heron	R	×	×	×	×	×	×
Ixobrychus cinnamomeus Cinnamon Bittern	R						×
Nycticorax caledonicus Rufous Night Heron	R		×	×			
Haliastus indus Brahminy Kite	R			×			
Alcedo atthis Common Kingfisher	R	×					
Haliastus chloris White-collared Kingfisher	R	×	×	×		×	
Hirundo rustica Barn Swallow	M		×				
Corvus macrorhynchus Large-billed Crow	R	×					
Merops philippinus Philippine Bee Eater	R			×			
Gerygone sulfurea Yellow-vented Wren	R			×			

Conclusion

The Tres Marias Islets are an interesting and unique coastal resource that deserves the protection of the local municipal government of Palompon and its constituency. In terms of tourism potential, no other place can compare with the area on the whole island of Leyte. The birds of Ormoc Bay, Carigara Bay and Palo, all in Leyte, cannot compare with the majesty of the Mallards and Garganey of the Tres Marias Islets. The vast seagrass area is also valuable to the flourishing siganid industry, which provides significant revenues to the government and the local fishers. The strip of mangrove around the islets and the mainland provides not only protection from destructive winds and waves but also roosting, feeding and breeding areas for ducks, shorebirds, siganids and several marine organisms.

The values that can be derived from the extant resources of the Tres Marias Islets cannot be overestimated. It is thus imperative that the local government of Palompon and its general constituency protect and conserve the Tres Marias Islets.

Recommendations

1. Encourage regular monitoring for one year of the bird population to determine the extent of the utilization of the islets as an important habitat. An NGO such as the Save Nature Society or Wetlands Philippines may be requested to assist the LGU of Palompon in the monitoring activities.
2. Monitor water quality in the vicinity of the Tres Marias Islets, particularly in the nearby Tabuk islet, which is near the industrial area of the town. The birds are most susceptible to water and even noise pollution, which may have adverse effects on the birds. Water pollution can render the tidal pools unfit for feeding. The use of pollution data will help the LGU formulate actions to arrest any increase in pollution levels.
3. Mangrove plantations may only be established in sites where natural mangrove stands used to exist. The planting of mangroves in seagrass beds should not be allowed as this would only reduce the birds' and siganids' feeding area. Roosting and feeding areas should not be planted with mangroves. There is an area in Gumalac, where the substrate is composed of organic matter from decaying mangrove stumps, indicating the previous existence of a mangrove stand. It is near the high tide roost site and the newly established mangrove plantation. The same may be rehabilitated later. For the moment, the area is not yet suitable for planting mangroves as the substrate is unstable.
4. Mangrove planting, although encouraged, should not encroach on areas being utilized by the ducks and shorebirds as feeding and roosting sites. Seagrass beds, in particular, should not be planted with mangroves.
5. Gumalak Islet is as important to the birds as Tabuk Islet and therefore should be protected and declared a bird sanctuary as well. As a protected area, zones for various uses should be designated as this will also gain support from residents.
6. Harvesting of marine shells and other invertebrates for shellcraft and other commercial purposes should be prohibited as it can deplete the resources very rapidly.
7. Intensify information campaign among the local constituents, particularly students, fishers and coastal dwellers.
8. The local constituency should be involved in the advocacy campaign and protection activities. The Human and Ecological Security Commission may be strengthened; the group may affiliate with similar bodies at the provincial or regional level.
9. Promote bird watching and nature appreciation among students and bird enthusiasts.
10. The Wetlands Philippines, in collaboration with Save Nature Society and the Palompon LGU, will

recommend the Tres Marias Islets for inclusion in the network of sites for international importance for shorebirds. An international project on ducks will be informed about the existence of a huge population of ducks in the area so that proper action, promotion and recognition of the site can be taken.

11. Conduct bird identification training for constituents who are keen to learn about birds. Members of POs and NGOs can be tapped to serve as tour guides for groups who may want to visit the islets and do bird watching.
12. Create an ecotourism program that will encompass an organized community service catering to visitors and tourists, pricing, and marketing. Infrastructure which may be installed include an observation hide-cottage, east of the high tide roost site on Gumalak Islet similar to the one found on Tabuk Islet. The observation cottage on Tabuk does not serve its purpose during high tide because the birds are inside the mangrove forest and the birds are not observable. On Gumalak, however, the birds can be seen during high tide. The hide should not be too close to the roosting site. The LGU may charge tourist groups, both local and international, a minimal fee for the maintenance of the cottages, signboards, patrol boats and others. This may even be a source of additional revenue for the local government.
13. Information materials to be produced may include a brochure on the Tres Marias Islets. Warning sign-boards should also be installed in strategic locations so people are informed that such areas/sites are bird sanctuaries and that hunting, fishing and mangrove cutting are punishable by law.

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Acknowledgment

The assessment of Tres Marias Islets was made possible only through the collective efforts of the following offices, organizations and individuals:

The Hon. Ramon C. Onate and Hon. Eulogio S. Tupa, Mayor and Vice Mayor, respectively; the members of the Sangguniang Bayan, all of the municipality of Palompon, for their concern and serious involvement in the protection and conservation of their natural resources, which serve as the inspiration of other town and organizations to pursue the same noble cause in their respective jurisdiction, and for providing funds for the assessment of the Tres Marias Islets.

Mr. Raul Bacalla coordinated competently with the Coastal Resource Management Project – Cebu for the Save Nature Society in the conduct of the assessment and arranged accommodations at the Resort Hotel.

The Whispering Beach Resort provided excellent food and accommodation during the assessment period.

The members of the Human Ecological Services Commission and Bantay Danggit Task Force operated the pumpboat and patiently ferried the assessment team to and from the islets.

Dr. Dioscoro Melana provided direction and guidance in the conduct of the assessment

Ms Manolita Morales coordinated with the Palompon LGU, CRMP, Wetlands Philippines Inc., and Save Nature Society, and assisted in the preparation and editing of the report.

The Wildbird Society of Japan, Wetlands International and the Coastal Resource Management Project provided the optical instruments, cameras, water analysis kit, and computers.

Desiderio Asane, Rowena Freisburger, Karl Freisburger and Amuerfino Mapalo, all of Save Nature Society, conducted the assessment.

To God Almighty who made all these things possible and wonderful, be glorified and praised forever.

Appendix A

Mangrove species found on Tres Marias Islets, Palompon, Leyte

1. *Avicennia marina*
2. *Sonneratia alba*
3. *Rhizophora apiculata*
4. *Rhizophora stylosa*
5. *Rhizophora mucronata*
6. *Sonneratia caseolaris*

Appendix B

Seagrasses found on Tres Marias Islets, Palompon, Leyte

1. *Cymodocea serrulata*
2. *Cymodocea*
3. *Halodule uninervis*
4. *Enhalus acoroides*
5. *Halophila ovales*
6. *Thalassia hemprichii*

Appendix C

Seaweeds found on Tres Marias Islets, Palompon, Leyte

1. *Enteromorpha intestinales*
2. *Ulva lactuca*
3. *Chaetomorpha crassa*
4. *Dictyosphaeria cavernosa*
5. *Caulerpa cupressoides*
6. *Caulerpa racemosa*
7. *Halimeda discoidea*
8. *Halimeda macrolaba*
9. *Halimeda opuntia*
10. *Avrainvillae erecta*
11. *Chlorodesmis fastigrata*
12. *Padina australis*
13. *Padina japonica*
14. *Hormophysa cuneiforms*
15. *Hydroclathrus clathratus*
16. *Sargassum sp.*
17. *Turbinaria ornate*
18. *Actinotrichia fragilis*
19. *Galaxaura apiculata*
20. *Galaxaura fasciculate*
21. *Galaxaura oblongata*
22. *Amphiroa fragilissima*
23. *Gracilaria salicornia*

Appendix D

Mollusks and other marine invertebrates observed on Tres Marias Islets, Palompon, Leyte

1. Bursa sp.
2. Paphia amabilis
3. Haliotis asinina
4. Tectus pyramis
5. Echininus cumingii
6. Terebralia sulcata
7. Rhinoclavis sinensis
8. Rhinoclavis vertegus
9. Ficus gracilis
10. Plicacularia pullus
11. Fasciolaria trapezium
12. Oliva reticulata
13. Mitra mitra

14. Trisodos tortuosa
15. Anadara maculosa
16. Chicoreus brunneus
17. Pinna sp.
18. Cypreae annulus
19. Cypreae tigris
20. Cypreae zebra
21. Cypreae vitellus
22. Aulicina vespertilio
23. Cypreae annulus
24. Strombus luhuanus
25. Strombus mutabilis
26. Tonna galea
27. Littorina sp.
28. Mytilus sp.
29. Conus sp.
30. Glycemeris sp.
31. Trochus maculates
32. Bulla ampulla
33. Protoreaster sp.
34. Archaster typicus
35. Linckia lavigata
36. Clypeaster sp.
37. Cerithium aluc
38. Diadema setosum
39. Echinotrix sp.
40. Tripneustes sp.
41. Holothuria sp.
42. Oreaster albeolatus
43. Ophiaracna incrasala
44. Echinocardium caudatum
45. Diadema setosum
46. Laganum laganum
47. Dolobella sp.
48. Several species of sponges