

## C. ECOSYSTEM ANALYSIS

### FOREST LAND USE

Table RM-3 shows the areas under production and protection forests. Production forest consists of timber production, agro-forests, pasture/grazing land, watershed areas and Community-Based Forest Management (CBFM) areas. National Integrated Protected Areas System (NIPAS) and non-NIPAS areas that need to be conserved and protected belong to protection areas. Total forest land area is 9,026.54 hectares or 32.20% of the total municipal land area.

Of the total land cover of the municipality, the mixed perennial forest occupy the largest tract while.

Table RM-3. Land Classification

Land classification	Area (ha)	% to total area
<b>Total Forest Zone</b>		
<b>A. PRODUCTION FORESTS*</b>		
1. Timber Production (natural)		
2. Timber Production (plantation)		
3. Agro-forests	552.00	1.97%
4. Pasture/Grazing Land	181.00	0.65%
5. Mineral Areas		
6. Watershed Areas	1,014.66	3.62%
7. CBFM	677.71	2.42%
8. Other Special Uses		
<b>B. Protection Forests</b>		
1. NIPAS Areas	3,294.00	11.75%
2. Non-NIPAS Areas	5,202.13	18.56%
<b>Total Land Area</b>	17,107.50	61.03%
<b>Total</b>	28,029.00	100.00%
Notes:		
• Land classification: alienable & disposable land, forest/timber land, mineral land, national park		

Source: DENR-CENRO

Land Cover	Total Area Covered	% Total
Natural Forest (Open Forest)	5,603.55	19.99%
Mixed Perennial Forest (Perennial Crop)	11,163.03	39.83%
Tree Plantation (Brush/Shrubs)	1,288.52	4.60%
Mangrove	12.26	0.04%
Annual Crop	4,223.06	15.07%
Built-Up	653	2.33%
Fishpond	7.25	0.02%
Grassland	4,406.43	15.72%
Inland Water	467.83	1.67%
Open/Barren	156.85	0.56%
Mineral Areas (Quarry)	47.22	0.17%
TOTAL	28,029.00	100.00%
Notes:		
• Land cover: mangrove, open canopy, closed canopy, fishpond, built-up area, shrubland, grassland, marsh, quarry, barren land, plantation, cropland, etc.		

## FOREST LAND TENURE

Table FO-20. Types of Tenure or Ownership Rights in Forestlands

Tenure/Ownership Rights	Area Covered	Tenure Holder/Name of Organization	No. of Members
CBFM/CSC	473.82	Malayong Upland Farmers Association (MUFA)	
	208.44	Manguyang Agrarian Reform Beneficiaries Cooperative (MARBECO)	
	161.99	Marayos Farmers Association (MFA)	
CADC 125	4,432.57	Tao-Buid Mangyan	
CADC 52	1,137.21	Tadyawan Mangyan	
CADC 53	2,641.19	Tadyawan Mangyan	

Based on the types of tenure or ownership rights in forestlands, there are 4,432.57 hectares under Certificate of Ancestral Domain Claim 125 that belong to Tao-Buid Mangyan tribe, while 1,137.21 hectares under CADC 52 and 2,641.19 under CADC 53 both belong to Tadyawan tribe.

The forest cover will eventually diminish if it will not be protected and conserved. The Forest Land Use Plan should be strengthened to ensure the forest's continued productivity. Forest clean-up as well as

river clean-up are great help in maintaining the life of the species depending on it. The number of Forest Rangers or “Bantay Gubat” should be increased so that cases of illegal tree-cutting will be monitored as well as hunting of animals in no hunting zone areas. The watershed is also vital for the maintenance of lush forest cover, and vice versa. The PULA watershed plans should be strictly implemented.

Landslide is also one of the main problems of the municipality in terms of diminishing forest cover. More trees should be planted and afforestation should be adapted to increase the number of forests in the future. Substitute crop plantation that can endure higher temperature will also be ideal to be done where PAGASA have predicted an increase of a degree of temperature in the next thirty years. If disaster happens, safe evacuation sites should be designated and are readily available. For those families who depend on merchandising forest products as source of their income, they should learn about alternative livelihoods so that when worst case scenarios happen, they will be prepared financially.

Illegal logging, shifting cultivation (kaingin), forest fires, presence of informal settlers/squatters, rural population expansion, conversion of forest to agricultural use, insurgency problems, unclear delineation of forest land (boundary issues) are some problems determined in forest land use.

By year 2019, with an accomplished Forest Land Use Plan formulation, there will be production of thematic maps of the local government unit indicating the available forestry assets or resources. These materials will give summary information of forestry assets or resources of the LGU with corresponding area and quantity. This plan will also provide proposed forest land uses, policies, programs and projects that will promote the protection of the existing forest area in the municipality.

For the protection and management of our forest (upland and coastal) there must be proper and regular coordination with national agencies like Department of Environment and Natural Resources (DENR), Department of Agrarian Reform (DAR) and other concerned agencies. There must be also strict implementation and enforcement of municipal and national laws and ordinances regarding forest regulations. Bantay Gubat Team should be reorganized and strengthened. A Bantay Gubat Officer or Municipal Forester should be designate or be given plantilla position.

### ***Coastal Resources***

The Municipality of Gloria has nine (9) coastal barangays thus, it is imperative to identify areas susceptible to coastal erosion and accretion through field mapping and assessment. It is also useful for establishment of a set of beach profiles from which to collect baseline data to serve as reference for future resurveying of profiles that can be the basis for studies on shoreline changes.

Technical team from the Geosciences Division of the Mines and Geosciences Bureau (MGB) MIMAROPA conducted shoreline mapping and coastal geologic hazard/geohazard survey along the coastal portions of Gloria in June 2018 in line with the Geohazard Mapping and Assessment Program, and Coastal Geohazard and Impact of Climate Change Study of the national government. The rating and criteria used in the assessment for coastal erosion are:

**VERY HIGH** - Alluvial deposits/beach sand. The coast is composed of unconsolidated alluvial deposits especially non-cohesive materials, largely sand, granules and pebbles that are easily carried away by waves and currents even at calm sea conditions. Presence of severely damaged hard engineering coastal protection structures and dwelling units at or very near the shoreline; line of permanent vegetation is approximately 1-2 meters away from the existing shoreline. Unprotected areas with long term net erosion of >50 meters.

**HIGH** - Alluvial deposits/mud and silt. The coast is composed of cohesive materials, largely mud and silt that are not easily carried away by waves and currents even at moderate sea conditions. Absence of

engineering coastal protection structures and dwelling units near the shoreline; line of permanent vegetation is approximately 3-5 meters away from the existing shoreline. Unprotected areas with long-term net erosion of 30-50 meters.

MODERATE - Alluvial deposits/gravel, cobbles and boulders. Geological materials at the coast are essentially gravel, cobbles and boulders where coastal protection structures are slightly damaged; houses far from the existing shoreline. Line of permanent vegetation is about 5-10 meters away from the existing shoreline. Unprotected areas with long-term net erosion of 20-30 meters.

Result of the coastal geohazard assessment shows the following remarks and coastal erosion rating of each barangay:

1. Agsalin (Moderate) – the sandy shores of the barangay experience coastal erosion which has caused the land to retreat up to one (1) meter per year. It was validated by some barangay officials who observed this occurrence through the years
2. Maragooc (Moderate) – This barangay generally experiences sustained periods of erosion induced by constant sea wave action and strong currents from the Tablas Strait. The said coastal hazard even intensifies during the passage of typhoons. According to the residents, the shoreline has retreated up to 10 meters already.
3. Guimbonan (Low) – Similar to Brgy. Maragooc, it experiences coastal erosion brought by waves coming from the Tablas Strait. A seawall, with a length of around 160 meters, was constructed to prevent further erosion along the shoreline north of Guimbonan River to the south of the barangay proper of Sta. Theresa where residential buildings are situated.
4. Balete, San Antonio, Narra and Balete (Low) – The long and extensive beach of these barangays, characterized to be gently sloping and composed mainly of granule to pebble-sized sediments, was observed to undergo coastal erosion.

The rating and criteria used in the assessment for coastal accretion are:

HIGH - River mouths, shoals, longshore ridge, existing sand bars. Mouths of large river systems where propagated deltas have developed. Foreshore beds have low seaward slope ( $0^{\circ}$  to  $3^{\circ}$ ) and blanketed with relatively thick sand; shallow water depth up to about 100 meters seaward of the existing shoreline. Line of permanent vegetation about 50 meters distance from the existing shoreline. Areas with long-term accretion of  $\geq 50$  meters.

MODERATE - Updrift of groins/solid-based piers. Foreshore bed has gentle to moderate slope of  $4^{\circ}$  to  $10^{\circ}$ . It usually occurs towards the downdrift ends of coastal sediment cells with abundant sediment supply. Areas with long-term accretion of 20 to 50 meters.

LOW - Sheltered areas; downdrift of groins/solid-based piers. Areas with long-term accretion of  $\leq 20$  meters. Foreshore bed has steep seaward slope of more than  $30^{\circ}$ . Sediments supply inadequate.

The only barangay in the municipality which experiences coastal accretion is Brgy. Sta. Theresa. Coastal accretion transpires along the beaches beside the nearest river delta of the barangay. This is due to the deposition of sediments brought by the nearby streams. The accretion along the shore was also detected when GPS Track Data was overlain on the coastline of 1950's NAMRIA 1:50,000 scale topographic map. A split-like landform sand bar was also observed on the shore of Sitio Bougainville. This coastal geomorphic structure may have formed near the river delta due to the effects of a southward trending longshore current

Mangroves in the municipality is located in coastal areas of Tambong, Kawit, Balete, Sta. Theresa, Guimbonan, Maragooc and Agsalin. It covers an area of approximately 22.41258 hectares.

During the mangrove assessment in 2008 by the DENR-CMMD 4-B and MENRO staff in the municipality's 9 coastal areas, twenty-four (24) species of mangroves were identified. Bungalon (*Avicennia marina*), Bakauan lalaki (*Rhizophora apiculata*) and Api-api (*Avicennia officinalis*) are the three most dominant species. Other species present include: Bakauan babae (*Rhizophora mucronata*), Pagatpat (*Sonneratia alba*), Gapas-gapas (*Camptostemon philippinense*), Bakauan Bankau (*Rhizophora stylosa*), Saging-saging (*Aegiceras corniculatum*), Tabigi (*Xylocarpus granatum*), Tui (*Dolicahndrone spathacea*), Tualis (*Osbornia octodonta*), Busain (*Bruguiera gymnorhiza*), Tinduk- tinkdukan (*Aegiceras floridum*), Langarai (*Bruguiera parviflora*), Pototan lalaki (*Bruguiera cylindrical*), Piapi (*Avicennia lanata*), Bungalon puti (*Avicennia alba*), Buta-buta (*Excoecaria agalloche*), Bantige (*Pemphis acidula*), Piagau (*Xylocarpus mollucensis*), Alipata, Nigi, Pangkalan, and Buia-lipata. (Note: We could identify the last four of that list by local names only.) Agsalin is the most diverse area with 15 species, followed by Maragooc with 10. The assessment result showed that there were no mangrove areas in excellent condition. They were determined to be in either poor, fair to good condition.

The assessment resulted in the conduct of mangrove rehabilitation activities by various sectors of the municipality such as propagules planting particularly in poor and denuded areas. The municipality has declared a 9-hectare Municipal Mangrove Plantation in Brgy. Balete in 2008 through Sangguniang Bayan Resolution No. 113. At present it is jointly maintained by municipal government through the MENRO and Barangay Balete. More than half of the plantation has been planted with mangrove propagules, mostly Bakauan Lalaki and Bakauan Babae and is now a productive forest as compared before that only vine plants and a few mangroves can be found in the area. Mangrove species in other coastal areas in the municipality also increased due to rehabilitation and enforcement of laws on mangrove cutting.

Table CO-7. Mangrove habitat assessment, 2008

Barangay	Species Diversity	Ave. Height (m)	Percent Crown Cover (%)	Regeneration Rate	Observations (disturbance, threats, uses, cuttings, garbage, fauna)	Condition
Tambong	8	7.4	7.2	3.0	Fresh cuttings, some trash	Good
Kawit	7	4.6	49.3	1.8	Many cuttings, some trash	Fair
San Antonio	7	6.9	42.4	0.0	-do-	Poor
Balete	4	6.0	0.03	0.2	Lots of debris, trash	Poor
Sta. Theresa	7	5.7	63.5	4.2	Some trash, Some cuttings	Good
Guimbonan	9	6.0	52.7	1.2	Many cuttings	Fair
Maragooc	10	5.8	57.0	0.5	-do-	Fair
Agsalin	15	6.4	64.4	1.2	Some cuttings	Good

Source: Municipal Environment and Natural Resources Office, 2008

The municipality of Gloria is surrounded on the east by the ocean, making the barangays along the shore vulnerable to changing tidal pattern. Sea walls and break water structures have been adapted to mitigate the effects of sea level rise but these should be maintained and expanded. If salt water intrusion will happen on the coastal communities, relocation and evacuation sites should be prepared and ready to be used anytime. Information campaign about water conservation will also be helpful in times when salt water intrusion happens and contaminate their potable water. The community can also help themselves to reduce the impacts of sea level rise by planting more mangroves, beach forest trees and dwarf coconuts along the sea shore. In terms of protecting the coastal resources, marine protected areas should be expanded and the marine zone regulations be strictly implemented. The corals are very important not only for the fishes but also for the municipality for they value these corals as part of their tourism campaigns. Fish catch will also not be a problem anymore if fish open and close seasons

especially for spawning grounds will be adapted by the fishermen as well as expanding the no fishing zones. Designated areas should only be the fishing grounds during the open season. The fishermen should be informed about alternative livelihood so that they will still earn money even though it is fish holiday or when the sea current is very strong.

Policies and regulations governing the marine protected area lies on the two (2) basic laws, such as the Republic Act 7160, otherwise known as the Local Government Code of 1991 and Republic Act 8550, or the Philippines Fishery Code of 1998, amended by Republic Act 10654.

RA 7160 mandates all local chief executives to adopt measures, to safeguard and conserve land, mineral, marine, forest and other resources. Under the same law, specifically, Section 447(a)(1)(vi), Section 458(1)(vi) and Section 468(a)(1)(vi), authority was given to the local Sanggunian to enact ordinances and resolutions to safeguards= the environment degradation. Authority of the local government units over coastal, marine, inland water resources management is also embodied in the applicable provision of RA 8550.

The establishment of the sanctuary is legally supported by Sangguniang Bayan Resolution No. 3051-A and Municipal Ordinance No.4, series of 2005 providing for the development, conservation and management of the fisheries and aquatic resources in the Municipality of Gloria, Or. Mindoro. Essentially, it officially declared the Agsalin Reef as the fishery reserve or sanctuary of the municipality. The said municipal ordinance was accordingly approved by the Sangguniang Panlalawigan through Resolution No. 150-2006 dated May 8, 2006.

It is also supported by the Provincial Ordinance No. 004-2004 otherwise known as the Provincial Coastal Marine and Inland Water Resources Management Code of 2004, particularly in Sections 1 and 2.

Cutting of mangroves along the coastal areas for firewood and charcoal purposes were not prevented and properly monitored by barangay officials and fisherfolks organizations. Some mangrove areas were affected by infrastructure construction for coastal tourism development, some portion of mangrove areas are converted into aquaculture business and portion of mangrove areas in Brgy. Agsalin, Kawit and Guimbonan are private properties or have Certificate of Land Title.

### ***Biodiversity***

The Mts. Iglit-Baco National Park (MIBNP) covering an estimated area of 75,445 hectares and which lies between Oriental and Occidental Mindoro traverses through the westernmost part of the municipality of Gloria. The municipality covers an area of 3,294.0 hectares only. It was formerly a Game Refuge and Bird Sanctuary declared under Proclamation No.557 of 1969. The following year, it was declared as National Park by virtue of RA 6148. In 1992, the National Integrated Protected Areas System Act (RA 7586) came into passage, by which MIBNP was considered as an Initial Component. Areas which have been proclaimed, designated or set aside as national parks, game refuge and wildlife sanctuary, wilderness area, strict nature reserve, watershed, mangrove areas, fish sanctuary, natural and historical landmarks, protected and managed landscape and seascape and those which were identified as virgin forests pursuant to law, presidential decree, presidential proclamation or executive order were considered initial components under RA 7586.

There are also locally-declared areas in the municipality through Sangguniang Bayan resolutions or ordinances. These areas which are now being promoted as eco-tourism sites include the Walang Langit Waterfalls, Agsalin Fish Sanctuary, Sta. Theresa Fish Sanctuary and Tambong Fishery Reserve. Agsalin Fish Sanctuary which is located in brgy. Agsalin is a multi-awarded Marine Protected Area (MPA). It was adjudged as the Best Marine Protected Area in the Philippines during the 2017 Para El Mar Awards held

in Iloilo City. The Para El Mar awards, which means “For the Sea”, gives recognition to best practices in the management of marine protected areas. It is organized by the Marine Protected Areas Support Network (MSN) with the support of the University of the Philippines (UP) - Marine Science Institute and in cooperation with the Department of Environment and Natural Resources (DENR) - Coastal and Marine Ecosystems Management Program.

There are other areas in the municipality that need to be declared as protected areas such as the mangrove forests along the coastlines of Gloria and the Twin Pantan Cave in Brgy. Malubay.

The municipality of Gloria is home to diverse life. Its ecosystems range from ridge to reef or from mountains down to the sea. Each ecosystem has its share of areas considered as environmentally critical. First is the terrestrial ecosystem which is home to forest species and native plants and with altitude ranging from sea level to the tip of the highest mountain located in the westernmost part of the municipality. This ecosystem includes the beach and mangrove forests, grasslands and other upland and lowland forests and greeneries.

Second, the freshwater ecosystem consists of rivers, streams, creeks and other inland bodies of water which are also habitat to important species. The municipality has two major rivers namely Balete and Banus rivers. Third is the brackish/estuarine ecosystem located along the shoreline and extending seaward. It includes coastal wetlands where fresh water and sea water mix. In eight (8) coastal barangays of Gloria, mangrove and nipa swamps are present. Fourth, marine ecosystem is where seagrasses and coral reefs can be found. The eastern part of Gloria is the municipal waters fronting the Tablas Strait.

The municipality has caves which are considered as special ecosystems. The popular cave in Gloria is the Twin Pantan cave which became habitat of swiftlets, “balinsasayaw” in local term, and bats which produce the organic guano. Although not declared formally, it is assumed that upon enactment of Proclamation No. 2146 (Proclaiming Certain Areas and Types of Projects as Environmentally Critical and Within the Scope of the Environmental Impact Statement System Established under Presidential Decree No. 1586), these areas as described are considered environmentally critical.

Problem occurs in biodiversity ecosystem are loss or displacement due to habitat conversion to other use, unsustainable use or consumption of natural resources, introduction of exotic and invasive species (e.g. golden cohol) that affects production rate of agricultural products.

Mitigating measure to prevent identified problems are, protection of endemic or native flora and fauna, establishment of database for existing biodiversity in the municipality, awareness of the community on the importance of biodiversity.