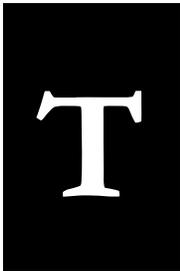


Chapter 2

PHYSICAL FEATURES



This chapter provides background information on the geography, hydrology, land uses and climatic condition along the northwestern coastline of Bohol province.

LAND AREA AND TOPOGRAPHY

The profile areas cover 60,499.5 ha and have a coastline of approximately 85 km (Table 2.1). The topographic characteristics of the municipalities are: active tidal flats, alluvial plains, karst plains, high rolling hills, river terraces and undulating terrain. According to the Bureau of Soil and Water Management (BSWM), 40 percent of the land in the profile area is considered to be non-susceptible or moderately susceptible to erosion, while 60 percent is very susceptible to erosion. The estimated rate of land erosion is 10 m³/ha annually (PPDO 1997). This is attributed to the lack of sufficient vegetative cover in the upland areas. Improper upland farming practices and deforestation are identified as the major causes of this problem.

Mangrove areas and seagrass beds fringe the entire northwestern coastline of Bohol. There are a multitude of small islands within the 15-km municipal waters radius. The Danajon Bank at the northernmost tip of Getafe is a well-defined structure that lies 7 km offshore. The outer barrier, Caubyan Reef, is composed of several units, up to 14 km long. The inner barrier, Calituban Reef, is 1.5 km wide and separated from the littoral by an inshore channel approximately 28 m deep.

Ebb currents in the profile area run southwesterly, with speeds ranging from 0.174 to 0.430 m/sec. Ebb currents are stronger than flood currents which have speeds ranging from 0.046 to 0.155 m/sec. In general, flood currents maintain the same direction as ebb

Table 2.1. Municipal land areas of the profile area (PPDO 1993a).

| Municipality | Land area (in ha) |
|---------------------|--------------------------|
| Calape | 7,615.0 |
| Tubigon | 7,556.0 |
| Clarin | 6,279.0 |
| Inabanga | 13,166.0 |
| Buenavista | 8,300.0 |
| Getafe | 6,386.0 |
| Loon | 11,197.5 |
| Total | 60,499.5 |

currents, except for the northernmost end of the area, where the flood current reverses to a northeasterly direction (SUMML 1997). This suggests that ebb currents are a significant water mass transport along the northwestern coast.

HYDROLOGY

Temperate in climate and rainfall, Bohol has lush watersheds which affect the present and future conditions of the coastal zone. As mentioned earlier, there are 3 major watershed systems covering the profile area, including the Inabanga river system in the north (PPDO 1993a). Unfortunately, the watershed areas are currently experiencing 26-83 percent erosion due to uncontrolled human encroachment into protected upland forest areas (MTDP 1997).

Currently, there are 7.8 km of irrigation canals being designed along Getafe's Campao creek, and 7.3 km in Taytay creek. A 13.3-km canal is being developed on Talenseras creek in Tubigon. Calape has 2 canal systems being developed along the Calunasan (10.2 km) and Mandaug creeks (7 km). Buenavista has 5 km along the Bunotbunot river. These projects, totalling 50.6 km, began in 1996 under the Small Reservoir Irrigation Project (PPDO 1993a). There are additional projects scheduled for Clarin and Inabanga.

Five major waterways lie in the profile area. These are the Iwahig, Daet, Mualong, Baogo and Haligue rivers. A number of smaller rivers are used for hydroelectric power and irrigation projects. Table 2.2 provides a complete list of rivers and creeks in the profile area.

SOIL

On the average, soil depth is relatively shallow, ranging from a minimum depth of 24 cm to a maximum of 60 cm (Table 2.3). Of the 4 major soil types in the area, the most prevalent is clay. The soils are divided among: Bolinao clay, clay loam, Bantug clay and hydrosol (regosols). Since clay soil has an extremely fine texture, it has the ability to retain large amounts of water and store plant nutrients at the surface. This makes clay, and especially organic clay loam, highly suited to agriculture. Due to the shallow soil depth, however, agricultural practices must be carefully managed to limit soil erosion and depletion. Of the 7 municipalities, only Tubigon is well suited to support a strong agricultural base.

Table 2.2. List of rivers, springs and creeks in the profile area (PPDO 1992).

| Municipality | River | Spring | Creek |
|--------------|---------------------------------------|---|--|
| Loon | Mualong | Tubig-Loon Bagacay | Lapay Pondol |
| Calape | Batuan Abucayan | Banlasan Binogawan Cabayugan Cabudburan Camias Canguka Sokotong Tinibgan | Talisay Bato Bolokbolok Calunasan Mandaug Boho |
| Tubigon | Cahayag Bunacan | Cawayanan | Banlasan Ilihan Ubojan Talenserias Buacao Libertad Dapanas |
| Clarín | Bacani Cabog | | Cantuyod Poblacion Caboy Candahik Tangaran Binaliw |
| Inabanga | Iwahig Nahawan Baogo Cawayan | | Ilihan Magkaya Gatusan Cramian |
| Buenavista | Bunotbunot Daet Maubid | | Matubig Bugaong |
| Getafe | Montegarcia | | Campao Taytay |

Table 2.3. Average soil depth per municipality (PPDO 1993a).

| Municipality | Soil depth (in cm) | Classification |
|--------------|--------------------|-----------------|
| Buenavista | 25 | shallow |
| Calape | 24 | very shallow |
| Clarín | 24 | very shallow |
| Inabanga | 24 | very shallow |
| Getafe | 25 | shallow |
| Tubigon | 60 | moderately deep |
| Loon | 28 | shallow |

LAND USES

Land use refers to the manner in which an area of land is actually being put to use. Land suitability is a classification of land into categories based on the degree to which the characteristics of the land can satisfy the environmental requirements of settlements, forestry, agriculture and industry without deterioration.

Under the classification system designed by the Department of Environment and Natural Resources (DENR) and the Department Agriculture (DA), land classified under sustainable land use is utilized in accordance with its suitability. Development opportunity land is utilized at a level of intensity that is below the suitable intensity. Land that is not sustainable is utilized at a level of intensity that is in excess of its suitability (AusAID 1995).

Much of the land within the profile area is classified as being either sustainably utilized, or underutilized (development opportunity land). The entire coastline of the profile area is currently classified as development opportunity land. This means that the land is currently being utilized at a level of intensity that is below the suitable intensity (as defined by the DA and DENR). Much of this development opportunity coastline is classified as being suitable for forestry plantation. The implication of this classification is that agro-forestry projects (such as community-based mangrove stewardship) in the area can be stepped up to meet the livelihood needs of the coastal population.

As of now, mangroves and marshes are the predominant feature in this underutilized area. Inland from the development opportunity fringe, there are vast areas classified as sustainably used areas. This implies that the land is being utilized in accordance with its suitability. In this case, the majority of sustainable land is currently utilized for rice farming or fishpond development.

Since a high percentage of the profile area's population is rural, the impact of human settlements upon the land is not considered to be high by local government officials. Currently, the majority of municipal urban centers sprawl across rice land and mangrove areas. This means that future urban growth (due to population pressure) will infringe upon the wetlands, causing sustainability to decrease as a result of human waste and pollution. The resulting loss of sustainability may cause drops in agricultural productivity, and further degrade the coastline.

CLIMATE

The climate of Bohol is characterized by 2 distinct seasons. The dry season occurs from late January to May, while the wet season is from June to December. Average annual precipitation is 200 cm per year. Temperature typically ranges from 26 to 29°C, depending upon the season (PPDO 1993a; DOT 1997). Due to the slight variations in temperature, Bohol is able to produce agricultural crops year-round, rather than being restricted only to specific growing seasons.

Relative to the suitability of the profile area's climate to agricultural production, the BSWM identified 2 agro-climatic zones within the profile area. Calape and Tubigon are under the moist zone, in which annual rainfall ranges from 1,500 to 2,500 mm and occurs mostly on upland areas. The moisture deficit during the dry season is moderate. The

municipalities of Clarin, Inabanga, Buenavista and Getafe fall within the dry zone, where annual rainfall is less than 1,500 mm and occurs mainly on the lowlands (PPDO 1993a). These areas experience significant moisture deficit during the dry season.

As a result, agriculture in Calape and Tubigon is naturally able to sustain a greater variety of crops as compared to the other 4 municipalities, which must place greater dependence upon irrigation schemes. In addition, since Tubigon has a deeper soil base, agricultural schemes in that municipality have greater potential for successful diversification.

SUMMARY

Northwestern Bohol should be able to sustain year-round agricultural crop production because of its favorable agroclimatic situation. Also, its coastline is classified as development opportunity land thus suitable for livelihood activities. As long as sustained agricultural practices do not deplete soil fertility or topsoil, agricultural production in the profile area is encouraged. The relatively shallow soil base, however, will limit the longevity and effectiveness of the soil when used for sustained agricultural purposes. This concern calls for careful attention to soil management practices especially as farmers attempt to increase production for a rapidly expanding population. On the other hand, if current trends in soil erosion continue, the problem of siltation and sedimentation of coastal and marine areas will increase.

