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WATERSHED HYDROLOGY ASSESSMENT[1]

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WATERSHED HYDROLOGY ASSESSMENT[1]

by

REX VICTOR O. CRUZ[2]
Watershed Assessment Specialist

November 2000

Samar Island Biodiversity Study (SAMBIO)
Resources, Environment and Economics Center for Studies, Inc. (REECS)

In association with
Orient Integrated Development Consultants, Inc. (OIDCI)
Department of Environment and Natural Resources - Region 8 (DENR-8)

[1] This publication was made possible through support provided by the U. S. Agency for International Development (USAID) under the terms of Grant No. 492-G-00-00-00001-00. The opinions expressed herein are those of the author and do not necessarily reflect the views of the U. S. Agency for International Development.

[2] The author, Dr. Rex Victor O Cruz, is the Watershed Specialist of SAMBIO, REECS.

B

TABLE OF CONTENTS

List of Tables

List of Figures

Executive Summary vi

1. OBJECTIVES OF THE STUDY 1

2. METHODOLOGY 1
   - 2.1 Unit of Analysis 1
   - 2.2 Framework of Analysis 1
   - 2.3 Key Activities Performed 2
     - 2.3.1 Collection of secondary data 3
     - 2.3.2 Collection of primary data 3
     - 2.3.3 Watershed characterization 3
     - 2.3.4 Map analysis 3
     - 2.3.5 Evaluation of soil erosion potential 3
     - 2.3.6 Evaluation of the potential impacts of management and land use on streamflow 4
     - 2.3.7 Identification of areas critical to the protection and conservation of soil and water 4
     - 2.3.8 Identification of appropriate management strategies and land uses 4

3. RESULTS AND DISCUSSION 4
   - 3.1 The Watersheds of Samar Island 4
     - 3.1.1 Climate 5
     - 3.1.2 Topography 6
     - 3.1.3 Soil 6
     - 3.1.4 Existing Land Uses 7
     - 3.1.5 The SINP and SIFR 8
     - 3.1.6 Water Resources 8
     - 3.1.7 Population 9
     - 3.1.8 Water Use 9
   - 3.2 The Influence of Land Use on Soil and Water Resource 9
   - 3.3 Impacts on Water Resources 10
   - 3.4 Water Supply Sufficiency 12
   - 3.5 Impacts on Soil 12
   - 3.6 Delineation of Protected Areas 14

4. SALIENT FINDINGS AND RECOMMENDATIONS 15

References

Appendix A Sample Climatic Data for December 1999 from 3 PAGASA Stations

LIST OF TABLES

Table 1	Framework of Analysis for Determining the Best Land Use Combinations
Table 2	Selected Geomorphic Characteristics of Various Watersheds in Samar Island
Table 3	Municipalities Located Inside the Different Watersheds of Samar Island
Table 4a	Average Monthly Temperature for Eastern Samar
Table 4b	Average Monthly Temperature for Western Samar
Table 4c	Average Monthly Temperature for Northern Samar
Table 5a	Average Monthly Rainfall for Eastern Samar
Table 5b	Average Monthly Rainfall for Western Samar
Table 6	Average Monthly Rainfall for Northern Samar
Table 7	Slope Class Area Distribution (ha) in Each Watershed Municipality
Table 8	Soil Type Distribution by Watershed and by Municipality (ha)
Table 9	Characterization of Selected Mountain Soils in Samar Island
Table 10	Land Use and Forest Cover Types (ha) by Watershed and by Municipality
Table 11	Areas within the SINP and SIFR in the Different Watersheds
Table 12	Dry Year Water Budget for Basey Watershed Under Current Land Uses
Table 13	Wet Year Water Budget for Basey Watershed Under Current Land Uses
Table 13a	Water Budget for Basey Watershed Under 10% Reduction in Forest Cover
Table 13b	Water Budget for Basey Watershed Under 20% Reduction in Forest Cover
Table 13c	Water Budget for Basey Watershed Under 10% Increase in Forest Cover
Table 13d	Water Budget for Basey Watershed Under 20% Increase in Forest Cover
Table 14	Dry Year Water Budget for Can-Avid Watershed Under Current Land Uses
Table 15	Wet Year Water Budget for Can-Avid Watershed Under Current Land Uses

Table 15a Water Budget for Can-Avid Watershed Under 10% Reduction in Forest Cover

Table 15b Water Budget for Can-Avid Watershed Under 20% Reduction in Forest Cover

Table 15c Water Budget for Can-Avid Watershed Under 10% Increase in Forest Cover

Table 15d Water Budget for Can-Avid Watershed Under 20% Increase in Forest Cover

Table 16 Dry Year Water Budget for Sulat Watershed Under Current Land Uses

Table 17 Wet Year Water Budget for Sulat Watershed Under Current Land Uses

Table 17a Water Budget for Sulat Watershed Under 10% Reduction in Forest Cover

Table 17b Water Budget for Sulat Watershed Under 20% Reduction in Forest Cover

Table 17c Water Budget for Sulat Watershed Under 10% Increase in Forest Cover

Table 17d Water Budget for Sulat Watershed Under 20% Increase in Forest Cover

Table 18 Estimated Water Resources for Samar Island Watersheds Under Various Land Use Scenarios

Table 19 Population Distribution by Watershed and Municipality

Table 20 Water Requirement (MCM) by Sector in the Island of Samar

Table 21 Irrigation Facilities in the Different Watersheds of Samar Island

Table 22 Estimated Domestic Water Requirements by Watershed and Municipality

Table 23 Basic Information on Selected Water Districts of Samar Island

Table 24 Average Runoff Coefficient for Samar Island

Table 25 Runoff Averages for Basey, Can-Avid and Sulat Watersheds

Table 26 Runoff for Basey Watershed Under Different Land Use Scenarios (mm)

Table 27 Runoff for Can-Avid Watershed Under Different Land Use Scenarios (mm)

Table 28 Runoff for Sulat Watershed Under Different Land Use Scenarios (mm)

Table 29 Land Use Cover (ha) of Basey, Can-Avid and Sulat Watersheds

Table 30a Area Distribution (ha) of Potential Soil Erosion by Slope Class in Basey Watershed

Table 30b Area Distribution (ha) of Potential Soil Erosion by Slope Class in Can-Avid Watershed

Table 30c Area Distribution (ha) of Potential Soil Erosion by Slope Class in Sulat Watershed

Table 31a Area Distribution (ha) of Potential Soil Erosion Class by Land Use in Basey Watershed

Table 31b Area Distribution (ha) of Potential Soil Erosion Class by Land Use in Can-Avid Watershed

Table 31c Area Distribution (ha) of Potential Soil Erosion Class by Land Use in Sulat Watershed

Table 32 Potential Annual Soil Erosion Under Current Land Uses in Different Watersheds of Samar Island

Table 33 Potential Annual Soil Erosion Under Various Land Use Scenarios in Different Watersheds of Samar Island

Table 34a Total Potential Annual Soil Erosion Under Various Land Use Scenarios in Different Watersheds of Samar Island

Table 34b Estimated Sediment Yield for Each Watershed in Samar Island

Table 35 Area Distribution of Critical Areas (in ha) by Watershed Within and Outside SINP

LIST OF FIGURES

Figure 1	Schematic Illustration of the Interplay of Various Factors that Influence Streamflow
Figure 2	Watershed Map of Samar Island
Figure 3	Climatic Map of Samar Island
Figure 4a	Maximum, Minimum and Mean Monthly Temperature for Eastern Samar
Figure 4b	Maximum, Minimum and Mean Monthly Temperature for Western Samar
Figure 4c	Maximum, Minimum and Mean Monthly Temperature for Northern Samar
Figure 5	Isohyetal Map of Samar Island
Figure 6	Maximum, Minimum and Mean Monthly Total Rainfall for Eastern Samar
Figure 7	Maximum, Minimum and Mean Monthly Total Rainfall for Western Samar
Figure 8	Maximum, Minimum and Mean Monthly Total Rainfall for Northern Samar
Figure 9	Slope Map of Samar Island
Figure 10	Soil Map of Samar Island
Figure 11	Soil Sampling Sites
Figure 12	Land Use Map of Samar Island
Figure 13	Samar Island Forest Reserve (SIFR)
Figure 14	Proposed Samar Island National Park (SINP)
Figure 15	Runoff for Basey Watershed Under Different Land Use Scenarios (mm)
Figure 16	Runoff for Can-Avid Watershed Under Different Land Use Scenarios (mm)
Figure 17	Runoff for Sulat Watershed Under Different Land Use Scenarios (mm)
Figure 18	Soil Erosion Potential of Basey, Can-Avid and Sulat
Figure 19	Soil Erosion Potential of Samar Island
Figure 20	Critical Areas in Samar Island Watersheds

EXECUTIVE SUMMARY

This study assesses the impacts of current and prospective land uses primarily on soil and water resources in 29 of the 39 watersheds of Samar Island. Two simple prediction tools were used: the BROOK5 hydrologic model to estimate runoff; and the USLE to estimate the soil erosion potential of watersheds as affected by land use and forest cover.

The potential impacts of land use and forest cover on water resources were assessed under five (5) land use scenarios, namely; current land use, 10% and 20% reductions in forest cover, and 10% and 20% increases in forest cover. The results of this assessment showed that (please see ***Table 18***):

- Runoff tends to increase when the forest cover is decreased by 10% of the current stand. But when the reduction in forest cover is increased to 20%, the increase in runoff becomes smaller. This could be used as an imposition in land allocation providing that the decrease in forest cover in any watershed should not be allowed to go beyond 20% of the current forest cover as doing so could result in the deterioration of the streamflows.

- Under a 10% increase in forest cover, runoff increases compared with current land use runoff and tends to increase some more when the forest cover is further increased to 20%.

- In 2 watersheds (Basey and Sulat), the increase in runoff after the 10% reduction in forest cover is estimated to be very small compared to large increase in one watershed (Can-Avid) as would normally be expected. This is likely attributable to the already diminished forest cover of the 2 watersheds beyond the threshold such that any further reduction in forest cover will no longer cause higher runoff.

- In 3 watersheds (Basey, Can-Avid and Sulat), a 20% increase in forest cover did not result to significantly large increase in runoff as noted under a 10% increase in forest cover. This could also be explained by the theory that the 20% increase in forest cover could have placed the forest cover of the watersheds at the level where the maximum runoff has been attained, thus no amount of additional forest cover can bring about a significant increase in runoff.

- Samar will be able to remain sufficient in water for domestic, commercial, industrial and agricultural purposes. It was further noted that the maximum amount of potential water resources was estimated under the 20% forest cover increase scenario and the least amount of water resources was estimated under the 20% decrease in forest cover scenario. These observations were based on the projection of the total potential surface runoff resources of Samar using the runoff coefficients generated from the Brook5 model estimates for the 3 focal watersheds.

The major observations from the evaluation of the soil erosion potential of the different Samar watersheds are listed below (please see ***Table 34a***):

- High soil erosion potential areas are not necessarily found in steep slopes. Most of the areas with high erosion potential are located in areas with slope not exceeding 18%. On the contrary, the areas with low soil erosion potential are concentrated in steeper slopes. These observations are indications that along with slope, there are other soil erosion factors that can significantly influence the magnitude of erosion.

- Areas with high erosion potential are found often in areas that are cultivated and mixed with grasslands and brushlands. These are the same areas that are found in the almost flat areas where the erosion potential is also high. The mountainous areas that are covered with forest vegetation were noted to have low erosion potential.

- The potential soil erosion of watersheds rises with lower forest cover due to increasing vulnerability of the soil to raindrop impact and surface runoff. Reduction in forest cover exposes the soil to raindrop that can prematurely retard infiltration and cause large volume of soil scouring surface runoff.

- The increase in forest cover on the contrary, decreases the potential soil erosion due to enhanced soil cover, soil fertility and consequently, high infiltration capacity and low surface runoff.

As far as critical areas are concerned, following are the key observations:

- The critical areas that need to be set aside as protected areas include all closed canopy forests, all open canopy forests within 100 meters of the perimeter of closed canopy forests, all areas within 50 meters of both banks of streams, and all areas with erosion potential greater than 12 tons per hectare per year and slope steeper than 25%.

- The critical areas in Samar Island watersheds range from 4.5 to 60 percent of the watershed area. For the whole of Samar Island, the ratio of critical to non-critical areas is around 40 to 60 (please see ***Table 35***).

- About 40% of the study area is considered critical of which half (i.e., 201,500 hectares) is found inside the proposed SINP. Of the areas considered non-critical, around 204,000 hectares are found inside the proposed SINP.

WATERSHED HYDROLOGY ASSESSMENT

1. OBJECTIVES OF THE STUDY

The general objective of the study is to assess the impacts of the current and prospective management and land uses at the Samar Island Forest Reserve (SIFR). Specifically, the study aims to:

- Estimate the soil erosion potential of the SIFR vis-a-vis the current and prospective land uses and practices;
- Quantify discharge of selected streams in SIFR under various management scenarios and land uses;
- Identify areas that are critically important in the protection and conservation of soil and water resources; and
- Generate information such as type and degree of current and future uses of soil and water that are essential in the estimation of costs and benefits associated with such uses.

2. METHODOLOGY

2.1 Unit of Analysis

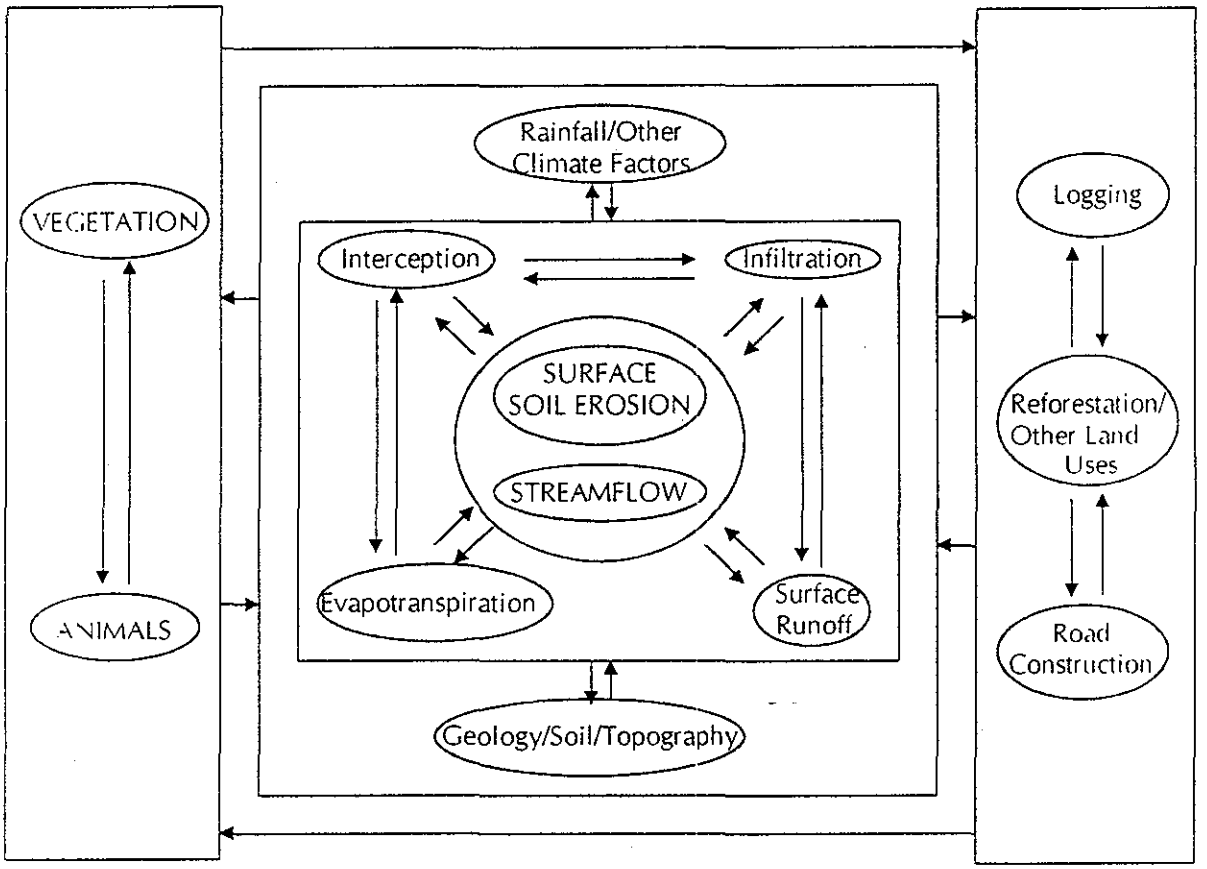
The assessment of impacts of various management and land use options on soil and water resources at the SIFR was done generally at the watershed level. The whole Samar Island was subdivided into 29 watersheds following the existing classification by the Department of Environment and Natural Resources (DENR). This is consistent with the watershed approach to planning and management of forests as mandated by the DENR through the Department Administrative Order (DAO) No. 1 of 1999. However, by virtue of limitations in time and logistics, the detailed and more specific assessment was focused only on 3 representative watersheds. These are Basey, Can-Avid, and Sulat Watersheds. The results of the assessment were used as bases for making management and land use recommendations for the selected watersheds. Recommendations for the other watersheds within the SIFR were based on the results and recommendations generated from the 3 representative watersheds by applying the general principles of regional analysis.

2.2 Framework of Analysis

The state of soil, water, and biodiversity resources in a watershed at any given time is the product of the influences of various biophysical and socioeconomic elements and processes in a watershed (***Figure 1***). Aside from being factors that influence each other, soil, water and biodiversity are also highly affected by climate, land use and management practices. The assessment of how soil, water and biodiversity change over time and space can provide a holistic and integrated view of the synergistic influences of the different physical and biological factors in the watershed on soil and water. More importantly, such an assessment lead to a better understanding on how biodiversity conservation can be

combined with other resource uses at the SIFR without unreasonably compromising the long-term sustainability of the various watershed resources.

Figure 1
Schematic Illustration of the Interplay of Various Factors that Influence Streamflow



2.3 *Key Activities Performed*

The key activities performed to realize the objectives of this study are enumerated and discussed below. The outputs of this study along with the outputs of other studies of SAMBIO, form the information base for determining the most appropriate management schemes and land uses that can be recommended for SIFR.

Table 1 shows how the best land use options are determined in this project. Basically, the process of determination involves the assessment of both the positive and negative impacts (benefits and costs) of each land use combination option within the context of a set of environmental and socioeconomic objectives and constraints. The combination of land uses that leads to the highest level of objective achievement within the limits of constraints is rated as the best option.

In this study, the impacts of each land use combination on soil erosion and water (specifically, streamflow) are assessed to determine which of the various options are the most superior in minimizing soil erosion and maintaining reliable flow of usable water. In doing this, the following activities were done:

2.3.1 Collection of secondary data

Available data from various sources (e.g. DENR, NIA, NAMRIA, BSWM, water districts, and LGUs) were collected. Various maps on topography, soil, vegetation, drainage, land use, and other themes were from the DENR and other relevant offices. Information on irrigation and domestic water users, demography, plans of various local governments, and historical streamflow data were also gathered.

2.3.2 Collection of primary data

Limited primary data on soil (texture, organic matter content/organic carbon content, pH, and bulk density), and selected watershed geomorphic features were collected. Information on water use were also gathered through interview of key informants from NIA, water districts and local governments.

2.3.3 Watershed characterization

The common biophysical features of the different watersheds were described using the standard procedures. Among the watershed features measured are the area, axial length, length of the streams, drainage density, slope, soil (texture, pH, organic matter content, phosphorus, potassium, and bulk density), population, irrigation facilities, land use and forest cover, areas within SIFR and the proposed Samar Island National Park (SINP), and the various municipalities within each watershed.

2.3.4 Map analysis

Maps are indispensable in the conduct of this study. Particularly, digital analyses of various maps were made in characterizing the different watersheds in terms of its biophysical and selected social features. Map analysis was also performed in the assessment of the soil erosion potential of the SIFR under various management and land use scenarios. GIS software (i.e., ARC VIEW and IDRISI) were used in analyzing the different maps.

2.3.5 Evaluation of soil erosion potential

The soil erosion potential associated with the current and alternative management and land use options is evaluated using the Universal Soil Loss Equation (USLE). For each watershed, the soil erosion is calculated using the USLE on a cell to cell basis. The computed erosion is then translated to streamflow sediment yield by using a sediment delivery factor of 15%.

2.3.6 *Evaluation of the potential impacts of management and land use on streamflow*

To the extent allowed by available data, the streamflow as affected by the existing and future management strategies and land uses is estimated using a simple watershed hydrologic model such as the BROOK model. This model uses commonly available data like rainfall, temperature, land use and vegetation cover.

2.3.7 *Identification of areas critical to the protection and conservation of soil and water*

Based on the results of 2.3.4 and 2.3.5 and considering the information on present and future demands for soil and water, the various areas that are critical to the protection and conservation of soil and water in each watershed are identified. The critical areas include those areas that are highly vulnerable to soil erosion, areas along the stream banks and within the headwaters, and other areas that have high hydrologic significance. The use of critical areas for intensive production activities usually have impacts that are either extremely costly or hardly reversible or both. Hence, critical areas are oftentimes designated as protected areas in this study.

2.3.8 *Identification of appropriate management strategies and land uses*

Consistent with the outputs in 2.3.4, 2.3.5, and 2.3.6, the most appropriate management approaches and land uses were determined. The output of this activity are subsequently used as input to the overall determination of the best management and land use options that will be recommended for SIFR.

3. RESULTS AND DISCUSSION

3.1 *The Watersheds of Samar Island*

Samar Island is the third largest island in the country with a total land area of 1.34 M hectares (ha). It is subdivided into three provinces, namely, Northern, Eastern and Western Samar. It is located between 10°45′ and 12°45′ North latitude and 124°15′ and 125°45′ East Longitude, more than 550 kilometers southeast of Manila.

There are 39 watersheds in the main island of Samar, ranging from 3,000 ha to more than 111,900 ha in area (***Table 2***). The largest watershed is Gandara in West Samar and the smallest is Tangkip in East Samar. There are 6 small watersheds with not more than 10,000 ha in area. Nine (9) watersheds have an area between 10,000 ha and 20,000 ha, 7 watersheds with areas between 20,000 and 50,000 and 7 watersheds with areas of more than 50,000 ha.

For the purpose of this study, the analysis and discussion of results are focused only on the 25 watersheds that are located or have portions located inside the proposed SINP, plus 4 other watersheds that are strategically adjacent to the SIFR and SINP (***Figure 2***). The extra

detailed assessments were limited to 3 watersheds of varying sizes, namely, Basey, Can-Avid and Sulat.

Table 3 shows the different municipalities located inside the various watersheds in Samar. It can be noted that most of the watersheds in Samar Island have more than one municipality found inside their boundaries. Pambujan, which is one of the largest watersheds in Samar Island, has 11 municipalities within its boundaries. On the other hand, Lo-om, which is one of the smallest watersheds, is fully within the town of Borongan.

3.1.1 Climate

Samar Island has 2 climatic types according to the Corona Classification: Type II and Type IV (***Figure 3***). Type IV falls over the northwestern part of the island covering the areas of Catbalogan and Calbayog City all the way up to San Isidro. Type IV is characterized by an even distribution of rainfall throughout the year. The rest of Western Samar together with the entire Eastern and Northern Samar belongs to Climatic Type II. This type has no dry season and has a very pronounced maximum rainfall period between the months of December and January.

Tables 4a to ***4c*** show the temperature records of three PAGASA Stations in Catbalogan, Catarman and Borongan between 1990 and 2000. The temperature in Samar Island averages at around 26.8^{0}C annually. January is the coldest month in Catbalogan (26.8 °C), Catarman (26.1^{0}C) and Borongan (26.2^{0}C). The warmest month in Catbalogan (29.1°C) and in Borongan (28.7^{0}C) is May. In Catarman, May and August are the warmest months with an average temperature of 28.7^{0}C. ***Figures 4a*** to ***4c*** show the maximum, minimum and mean temperatures for each station.

Rainfall records from 1950-1975 show that the mean annual rainfall for Borongan is 3,634.11 mm; for Catarman, it is 3,330.04 mm and for Catbalogan, it is 2,222.05 mm. These translate to about 3,085 mm of mean annual rainfall for the entire island. This is distributed from a low of 2,200 mm along the coastline of Sta. Rita, Basey and Sta. Clara rising eastward to a maximum of more than 3,400 mm along the Pacific coast of Eastern Samar (***Figure 5***). However, based on the rainfall records from 1990 to 2000, the mean annual rainfall for the same stations are: 2,661.2 mm for Borongan, 3,160.0 mm for Catarman and 2,533.9 mm for Catbalogan (***Tables 5a, 5b*** and ***6***). These correspond to a mean annual rainfall of only 2,796.3 mm for Samar Island. ***Figures 6-8*** show the maximum, minimum and mean monthly rainfall in the three PAGASA stations. Catarman received the highest monthly amount of rainfall during the last decade (1,236 mm in February 2000) while Borongan did not receive any rainfall in September of 1994. From 1990 to 2000, the driest month on the average in Catbalogan is February (101.3 mm), and May (118.6 mm) for both Catarman and Borongan. The wettest month in Catbalogan is November (327.9 mm) while it is December for Catarman (511.1 mm) and Borongan (423.3 mm). It is worth noting that the rainfall during the last decade (1990-2000) as recorded in Borongan, Catarman and Catbalogan is much lower than the rainfall recorded from 1950 to 1975. This drastic reduction in rainfall, especially in Borongan, is likely due to the increasing frequency of El Niño events. Between 1990 and 2000, a total of 63 months were affected by El Niño events compared to only 84 months between 1950 and

1975 (Cruz, et al., 2000). Decisions concerning the present and future use of watersheds in Samar should, therefore, factor in the potential decline in rainfall and thus, reduction in available water due to El Niño events.

Sample climatic data recorded during the month of December 1999 in three (3) stations are found in ***Appendix A***.

3.1.2 Topography

Most of the watersheds are circular rather than elongated except for Gulganti, Oras and Pambujan watersheds, which are elongated (with an elongation ratio of less than 0.5). In general terms, runoff velocity in circular watersheds is less, due to relatively gentler topography. Hence, circular watersheds are less prone to surface soil erosion compared to elongated watersheds.

Samar Island watersheds are generally well drained. Except for Catubig, Mauo, Sulat and Taft, Samar Island watersheds have at least 5 m of drainage channel per ha. Gandara, with a total stream length of more than 3,600 km, is the best-drained watershed with a drainage density of 33 m per ha. The least drained watershed is Mauo with a drainage density of only 3 m per ha.

Samar Island watersheds typically consist of narrow bands of coastal lowlands and usually wide mountainous uplands. Around 42% of Samar Island has slopes of at most 25%, 20% of which have slopes between 15-25%. The rest of Samar Island has slopes greater than 25%. ***Figure 9*** and ***Table 7*** show the slope distribution in the different watersheds of Samar Island (NWRC, 1970).

3.1.3 Soil

There are 33 known soil types in Samar Island (***Figure 10*** and ***Table 8***). However, there are only 7 major soil types, namely, Batho clay loam, Catbalogan clay loam, Faraon clay, Bolinao clay loam, La Castillana clay, Luisiana clay and the mountain soil. The mountain soil, which occupies more than 25% of Samar Island, has not been fully described. Limited soil sampling and analysis were made in this study to determine the pH, organic matter content, phosphorus and potassium content of the surface soil at various locations (***Figure 11***).

Most of the mountain soils have more or less sufficient amount of organic matter, phosphorus and potassium content for either tree farming or upland cropping (***Table 9***). In particular, the soil samples collected from residual forests in San Julian Transect within Sulat watershed are clayey to silty clay in texture with pH ranging from 5.5 to 5.9 and are mostly sufficient in organic matter, phosphorus and potassium. In Basey Transect, the soil is clay to silty clay loam with pH between 4.6 to 6.0. The soil in this residual forest is, in general, fertile for the production of most common agricultural and tree crops.

Most of the low mountain soil samples are either clay to clay loam or loamy. The pH ranges from 5.1 to 7.5 with organic matter content ranging between 4.18 to 6.95%. The high mountain soil samples are either clay loam or silty clay loam with pH between 4.8 to

6.25. The organic matter content can be as low as 4.45% in some areas and can be as high as 13.8% in other areas.

Catbalogan clay loam samples vary in texture from sandy to clay loam with the predominance of sandy clay loam and clay loam. The pH ranges between 4.85 to 6.25 that, along with the mostly sufficient amount of organic matter and other macronutrients, make this soil suitable for various crops. The Luisiana clay samples are either loam or silty clay loam with pH between 5.3 to 6.65 and with relatively good amounts of organic matter, phosphorus and potassium. The three (3) samples of Bolinao clay are silty clay loam to clay loam in texture. The pH is between 5.12 to 7.5 with sufficient amounts of organic matter, phosphorus and potassium.

3.1.4 Existing Land Uses

There are more than ten (10) land uses currently found in Samar Island watersheds. The extent and distribution of current land uses by watersheds are shown in ***Figure 12*** and ***Table 10***. In terms of area coverage, six (6) land uses can be considered major with at least 30,000 ha covered. The most dominant land use is cultivated areas with brushes and grasses covering almost 600,000 ha of land from the coast to the limits of forest areas. In some watersheds, cultivated areas are also present inside the residual forest. This land use is most prevalent in Catarman, Catubig, Gandara and Pan-as Hayiban watersheds, covering at least 30,000 ha.

The second most dominant land use is the open canopy or the residual forest. It covers more than 260,000 ha of Samar Island mostly along Mt. Zamal Range that divides the 3 provinces. The residual forest of Samar Island is the product of the commercial logging that flourished in the 60's, 70's and early 80's. The depletion of the primary forest was exacerbated by widespread small-scale illegal logging of the surrounding communities. Based on limited inventory data, the average tree volume in residual forest ranges from 275 m^3/ha in the northern end of the remaining forest, to 111.8 m^3/ha in the central portion, to 191 m^3/ha in the southwestern end. Open canopy residual forest is most extensive in Can-Avid watershed covering at least 33,600 ha. Pambujan, Suribao and Dolores watersheds have no less than 22,000 ha of residual forest located mostly in the upland areas.

The closed canopy forest or the old growth forest is the third most dominant land use in Samar Island with a total area of 128,000 ha. This is only around 10% of the total land area of Samar Island. The remaining old growth forests are concentrated in the higher altitude and mostly in headwaters of many watersheds in Eastern and Western Samar. Dolores watershed has the most area covered by old growth forest (22,400 ha) followed by Suribao (22,200 ha), Catubig (19,800 ha), and Can-Avid (14,000 ha). According to existing law, remaining old growth forests are not allowed for harvesting and are supposed to be strictly restricted to biodiversity conservation, ecotourism and similar non-extractive uses.

Approximately 75,500 ha of Samar Island are currently devoted for crops mixed with coconut. This land use is most dominant in Dolores watershed (9,900 ha), Catubig watershed (6,600 ha) and Pan-as Hayiban watershed (5,700 ha). Cropland mixed with

coconut is normally found along coastal areas that tend to spread up to the perimeter of cultivated brush and grassland areas and the adjoining remaining forests.

Pure coconut plantation remains a dominant land use in Samar Island occupying at least 32,000 ha. It is also found mostly along the coastal areas but are not rare in uplands either, especially those areas close to adjacent cultivated farms and residual forest. Few watersheds such as Basey, Marabut, Mauo and Suribao have considerable areas planted to pure coconut stands.

3.1.5 The SINP and SIFR

There are 25 watersheds with at least their headwaters found inside the proposed SINP. Suribao watershed has the largest area inside SINP (60,145 ha), followed by Can-Avid (58,653 ha), Dolores (48,033 ha), Catubig (43,050 ha), Gandara (39,943 ha), and Taft (37,127 ha). ***Table 11*** and ***Figures 13*** and ***14*** show the detailed distribution of watershed areas inside SIFR and SINP, respectively. It is important to note that the larger the area of one watershed included in the SINP, the easier it becomes to meet environmental objectives but the more difficult it is to meet economic targets.

3.1.6 Water Resources

Samar Island receives on the average, not less than 3,000 mm of rain annually. Theoretically, Samar Island should have all the water it needs for domestic, agricultural and industrial/commercial uses. In reality, however, abundant rain does not necessarily translate into abundant water usable for various purposes. There are pathways and processes that rainwater have to go through and, depending on the state of several watershed attributes such as physiography, topography and land use, it may or may not flow into utilizable quality and quantity at the right time.

The BROOK5 hydrologic model was used to generate the baseline surface runoff data for 3 selected watersheds: Basey, Can-Avid and Sulat. The results of simulation runs of BROOK5 show that the average annual runoff coefficient for Basey is about 27% based on the average of dry and wet year runoff estimates for the watershed. For Can-Avid, the average annual runoff coefficient is about 29% and for Sulat it is 33% (***Tables 12-17***). The runoff resources for all other watersheds are estimated by using the appropriate runoff coefficients as shown in ***Table 18***.

The groundwater storage of the entire Samar Island was estimated at 29,207 MCM (NWRC, 1979). To attain a sustainable use of the groundwater reserve, the amount of extraction should not exceed the amount of recharge. The amount of recharge into the groundwater storage is assumed to be somewhere around 10% of the total rainwater that could either increase or decrease depending on the condition of the forest cover. As shown in ***Table 18***, the total estimated available groundwater for the entire Samar Island is 2,607.2 MCM per year.

The average annual total evaporation for Basey watershed is around 1,473.6 mm while for Can-Avid, it is 1,499.5 mm and for Sulat, it is 1,419.7 mm. These model estimates are

slightly lower than the estimates of NWRC (1979) based on their evaporation pan recorded data, which is about 1,700 mm in Catbalogan and 1,530 mm in Catarman.

3.1.7 Population

Based on the census of 1995, the population of the different watersheds in Samar Island is shown in ***Table 19***. Population for each watershed was estimated by multiplying the population density of each municipality within a watershed by the area of each municipality that falls within the boundary of the watershed. In terms of population the largest watershed is Gandara with more than 380,000 inhabitants. It is followed by Catubig , Dolores, Catarman, Pan-as Hayiban, Catbalogan, Pambujan, Can-Avid, Suribao and Llorente.

3.1.8 Water Use

Traditionally, the agricultural sector accounts for most of the water consumption in Samar Island just like in many other agricultural areas (***Table 20***). From 1975 up to the present, more than 90% of the total water consumption (350 MCM) of Samar Island goes to irrigation of mostly rice paddies, corn, sugar and tobacco plantations. Rice farms account for more than 40% of the total irrigation water consumption in 1975 and are expected to use close to 45% by the end of this year. Livestock production used up only about 2 MCM of water in 1975 and almost 5.5 MCM this year. In the next 25 years, it is very likely that the agricultural sector will remain on top of the list of water consumers in Samar Island as there are still more potential irrigated lands to develop and the NIA continues in developing more irrigation systems. The irrigation facilities located within the different watersheds in Samar Island are shown in ***Table 21***.

Households account for approximately 5% of the total water consumption in 1975. This year, it is estimated to only consume less than 3% of the total annual water usage of the entire Island based on the projected population for the year 2000 (***Table 22***). Expectedly, the bigger watersheds with the most population (i.e., Gandara, Catubig, Dolores, Catarman, and Pan-as Hayiban) are leading in the domestic use of water in Samar Island. Limited primary data on domestic water consumption were gathered in this study (***Table 23***). The average per capita water consumption generated from the survey ranges from 0.017 cmd (cubic meters per day) to 0.121 cmd. In the projection of future domestic water requirements of Samar Island, however, a much higher value of 0.15 cmd was used to cover for such factors as uncertainty and inefficiency in water use.

Manufacturing, mining, electricity generation and construction consume a lot less volume of water compared to the agriculture and domestic sectors but nonetheless are critically dependent on water like any other water user groups. Even in 2025, the consumption of these said sectors is estimated not to exceed 1% of the total water requirement of all sectors in Samar Island combined, given the low rate of economic growth in the island.

3.2 The Influence of Land Use on Soil and Water Resource

The sustainability of soil, water and biodiversity is a vital key to the sustained ability of the watersheds to provide goods and services to the society. There are numerous factors that

influence soil, water and biodiversity but perhaps none of these factors are as influential as land use and forest cover change. It is even recognized as more phenomenal than climate change as a driver of global change. The changing climate has significantly accelerated over the last few centuries and has caused noticeable alterations in key attributes and processes of many terrestrial and aquatic ecosystems. But a lot of the changes in these ecosystems are recent and brought about by the rapidly changing modes of utilizing land and natural resources to fuel industrialization and urbanization. Thus, the assessment of impacts of land use and forest cover change particularly on soil, water and biodiversity is always a necessary element of good natural resource management planning.

In the case of SIFR, land use and forest cover has and will continue to be a significant driver of change in biodiversity. Over the next few years, the commonly accepted goal for SIFR is to have better control in keeping the magnitude and direction of change in land use and forest cover within the limits that will allow the achievement of socioeconomic as well as ecological objectives. To realize this, it is essential to understand well how the current and prospective uses of the SIFR influence key resources such as soil, water, and biodiversity. With such an understanding, the best judgment can then be made as to what land use or land use combination is most appropriate to realize set targets and objectives.

This study focuses on the assessment of impacts of land use and forest cover change on soil and water within the context of watershed units. The expectation is that such a watershed-based analysis can facilitate an improved appreciation of how land use and forest cover change affect soil and water inasmuch as soil and water are governed by factors and processes that operate within the boundaries of a watershed.

Considering the amount and quality of information available to this study, the popular Universal Soil Loss Equation (USLE) was used to generate an indication of soil erosion potential of an area as influenced by land use. To assess the impacts of land use on water resources, the BROOK5 hydrologic model was adopted. The results that are presented below are by no means a substitute to more precise and accurate estimates that are possible only with a good database. It should be acknowledged here that there were limited means by which this assessment and the entire SAMBIO study could have substantially augmented and improved the quality and volume of information that were used as basis of the various assessment studies. Specifically, the land use map, forest cover map, topographic map and other basic thematic maps either badly need to be updated or are altogether missing or unavailable.

3.3 Impacts on Water Resources

The detailed assessment of land use impacts on water resources was limited to three watersheds, namely: Basey, Can-Avid and Sulat. These watersheds were selected primarily for the purpose of synchronizing the activities of this study with the activities of concurrent assessments of forest resources, mineral resources and SIFR communities. To the extent permitted by time and database, this watershed hydrology assessment attempted to assess the impacts on runoff, groundwater and evaporation.

As presented earlier, the estimated water budget under existing land uses for Basey, Can-Avid and Sulat Watershed is illustrated in ***Tables 12-17***. Based on these results, the runoff

coefficient (or the runoff efficiency defined as the percentage ratio of the estimated runoff to rainfall over a given time period) during the dry year lies between 30 to 36% for Basey, Can-Avid and Sulat Watersheds (***Table 24***). These values represent an annual runoff of 161.9 MCM, 585.6 MCM, and 173.2 MCM for Basey, Can-Avid and Sulat, respectively (***Table 25***).

The total evaporation and groundwater were also estimated by BROOK5 for the three watersheds. The average yearly evaporation in Basey, Can-Avid and Sulat as mentioned previously, are within reasonable range of the average actual evaporation of 1.615 mm observed in Catbalogan and Catarman.

The water budgets under various forest cover scenarios for the Basey, Can-Avid and Sulat Watersheds were also estimated to get an idea of how the runoff resources would behave in the event that such changes occurred in the future. Forest cover changes of 10% and 20% reduction and 10% and 20% increase in forest cover for the 3 watersheds were assessed as to its effects on runoff, mainly.

Results show that under a 10% reduction in forest cover, the volume of runoff for the three watersheds increases versus the current land use and forest cover scenario. Basey and Sulat runoff increases modestly by not more than 6%, but Can-Avid runoff increases by more than 100% (***Tables 26-28, Figures 15-17***). Under the 20% reduction in forest cover, both the Basey and Sulat runoff increases by a small degree while the Can-Avid runoff increases by a little less than 100%. Under the 10% increase in forest cover, the runoff for Basey and Sulat increases by 85% and 96%, respectively while that of Can-Avid increases by only 9%. Under the 20% forest cover increase, the runoff for all watersheds does not result in a significant increase from that of the 10 % increase in forest cover, except for Basey where runoff decreases.

What is most apparent in the above results is the fact that it is not easy to generalize the behavior of runoff of different watersheds as it is affected by changes in land use and forest cover. The main reason is that watershed behaviors, such as runoff patterns, are the combined results of a set of dynamically interacting factors and processes, of which land use and forest cover are just subsets. In addition, practically no two watersheds have exactly the same set of factors and processes. Nonetheless, it can be shown from the results that the decrease in forest cover does not necessarily lead to a decrease in runoff but in fact, in most cases, will result to an increase due to a number of reasons. For one, the decrease in forest cover leads to a decrease in the number of plants consuming water, which increases the loss of water otherwise available for runoff. Another reason is the increase in surface runoff as a result of the decrease of surface roughness with the removal of some trees and other plant cover.

In particular, the smaller increase in runoff of Basey and Sulat could be due to the fact that the 10% reduction in forest cover is already within the threshold that appears to be close to the 20% decrease in forest cover. In other words, the 10% decrease in forest cover in Basey and Sulat could have already brought down the forest cover of these 2 watersheds within the threshold forest cover limit beyond which there is not much additional increase in runoff that can be realized in reducing the forest cover. ***Table 29*** shows that the forest cover of Basey and Sulat is below 60% while that of Can-Avid is more than 70%. It could

be that the threshold limit of forest cover for the 3 watersheds lies somewhere between 50 and 60 percent forest cover.

Similarly, an increase in forest cover does not automatically lead to an higher runoff, and in certain instances, may even lead to a smaller increments in runoff compared to the increase arising from the reduction in forest cover. This is largely explained by the increase in the number of the transpiring agents as the forest cover increases. For Basey Watershed, the 20% increase in forest cover did not result in an increase in runoff larger than the increase due to 10% higher forest cover, which is not the case for the Can-Avid and Sulat Watersheds, though the increase for the latter two is almost insignificant. One possible explanation for this is that somewhere close to the 10% increase in forest cover, the forest cover for maximum runoff is already achieved and beyond that additional forest cover does not significantly increase the watershed runoff any longer.

3.4 Water Supply Sufficiency

The amount of water available for various purposes in the different watersheds of Samar Island is an important concern in planning for the use of the land and other resources in the watersheds found inside the SIFR. Based on the water budget estimates made for Basey, Can-Avid and Sulat Watersheds, the amount of runoff resources that can more or less be expected from the other watersheds of SIFR was calculated. In particular, the runoff coefficients derived for the 3 watersheds were used as the average runoff coefficient for the other watersheds (***Table 18***). The groundwater available for safe extraction without mining the groundwater reserve is estimated at 2,607.2 MCM for the entire Samar Island.

Under the various land use scenarios, the estimated potentially available runoff and groundwater resources are always above the projected aggregate water required by the different water user groups from this year up to the year 2025. The largest amount of potential water available to various users is under the 20% increase in forest cover scenario where the total runoff available is 12,775.1 MCM per year, which is way over the projected 2025 water demand of 7,786.2 MCM without even counting the groundwater. The smallest amount of potentially available water for Samar Island is under the 20% reduction in forest cover scenario where the estimated runoff is only 9,125 MCM per year, but which is still more than sufficient to meet the water requirements of Samar Island in 2025.

Obviously, if water supply sufficiency is the only consideration and assuming that the sediment yield is held at the desirable level, any of the land use scenarios is a valid choice since the demand for water could be met under all the scenarios. However, aside from water sufficiency, there are other equally vital considerations to bear in mind, such as the conservation of biodiversity.

3.5 Impacts On Soil

The assessment of impacts of various land uses on soil in the SIFR watersheds was focused on how land uses affect the erosion potential of the different areas in the watersheds. The erosion potential of the watersheds was evaluated using the USLE aided by GIS (***Figures 18*** and ***19***). Two levels of assessment were made, one at the watershed level using Basey,

Can-Avid and Sulat Watersheds as the units of analysis and at the island level, considering the entire Island of Samar.

Tables 30a to ***30c*** show the distribution of potential soil erosion under various slope classes for each of the Basey, Can-Avid and Sulat Watersheds. The results in these tables indicate that the concentration of areas with high erosion potential is not necessarily on steep slopes. In Basey Watershed, more than 50% of the total area has erosion potential of more than 20 tons/ha per year of which 5 % is accounted for areas with slope of not steeper than 18%. A similar trend can be observed in Can-Avid Watershed where 40% of the total area has erosion potential of greater than 20 tons/ha per year of which around 50% is also found in areas with slope of not more than 18%. In Sulat Watershed, however, about 75% of the areas with potential soil erosion of more than 20 tons/ha per year are found in areas with slope greater than 35%.

In general, it is expected that the erosion is higher in steeper areas than in gentler slopes assuming that all other factors of soil erosion are uniform. However in reality, the condition in a watershed is so diverse that it becomes even more complicated when viewed across time and space. Slope has been shown to be a dominant factor of soil erosion that, in many cases, it has been used as a single most important determinant of land capability. A good example of this is the Philippine system of delineating the forestland from the alienable and disposable land using slope as the major criterion. Upon close examination of the slope-based land capability classification, one can see that with sincere implementation, it can effectively minimize soil loss in a rugged country like the Philippines where there are more sloping lands than arable plains. The downside of course, is the tendency of the slope-based classification scheme to become very restrictive, offering less land for intensive production purposes than what is demanded by an expanding population. It tends to limit the use of the land to very conservative uses simply because of its slope. But when other considerations such as soil cover, soil type, rainfall and improved land use practices are factored into the capability assessment, it is possible that even lands with steep gradient may be found able to support intensive uses not allowed by the slope-based scheme of land evaluation.

The results above support the claim that while slope is a major soil erosion factor, it cannot by itself fully account for the soil erosion potential of an area. The highly erosion-prone areas in the watersheds above, which are found in almost flat areas, are those that are devoted to intensive uses such as cultivation and are not protected by permanent vegetation cover. In contrast, the steeper slopes that are covered with forest account for most of the areas least prone to soil erosion.

As shown in ***Tables 31a*** to ***31c***, most of the areas with potential erosion of greater than 20 tons/ha annually are commonly found in cultivated areas mixed with grasslands and brushlands. About 80% of the areas with high erosion potential are found in cultivated areas of Basey Watershed while more than 90% and 95% of the same areas are found in Can-Avid and Sulat Watersheds, respectively. Almost all areas in the 3 watersheds that are currently under forest cover have an estimated erosion potential of not more than 20 tons/ha yearly.

The soil erosion potential of the entire Samar Island was also estimated using the same procedure for the three watersheds. It can be shown from the results that the areas with high potential for soil erosion for most watersheds are those areas currently used for cultivation or covered with brushes or grasses (***Table 32*** and ***Figure 19***). These areas are not necessarily steeply sloping but in fact are found mostly in gentle terrain. As in Basey, Can-Avid and Sulat watersheds, the areas covered with forest vegetation were estimated to have low erosion potential.

The potential soil erosion of the different watersheds was also estimated for 4 land cover scenarios, namely, 10% forest cover decrease, 20% forest cover decrease, 10 % forest cover increase and 20% forest cover increase, using the current land use as the baseline. ***Tables 33*** and ***34a*** show the erosion potential of the different watersheds under various land use scenarios. ***Table 34b*** shows the equivalent sediment yield calculated as 10% of the estimated soil erosion potential of each watershed. The key observation on the various estimates is the notable increase in the potential soil erosion and sediment yield as the forest cover is depleted. This increase is a normal expectation whenever the watershed forest cover is reduced by either human activities or natural forces that tend to expose and disturb the soil, retard infiltration, and increase surface runoff.

It can also be observed that the increase in forest cover resulted in the decrease in potential soil erosion and sediment yield in all the watersheds of Samar Island. Increase in forest cover provides additional protection to the soil against raindrop erosion, enhances the physical and chemical properties of the soil that heightens infiltration, and reduces surface runoff. The decrease in surface runoff usually leads to the reduction in the amount of surface soil erosion.

3.6 Delineation of Protected Areas

In deciding how the lands within the SIFR should be used, it is critically essential that the areas that must be protected at all costs be determined first and set aside before land resources are allocated for various production purposes. These areas become non-negotiable, so to speak, during the process of land allocation and are assumed to yield the maximum net benefits when these areas are kept under protected status. In this study, the areas considered critical and hence, non-negotiable are:

- All closed canopy forest (old growth forest) including mossy forest
- All open canopy forest within 100 meters of the perimeter of closed canopy forest and within other critical areas
- All areas with soil erosion potential greater than 12 tons per ha per year with slope steeper than 25% within the SINP, and
- All areas within 20 meters of both banks of streams

The different critical areas were delineated in the maps separately and later on, consolidated into a single category of critical areas (***Figure 20***). ***Table 35*** shows the critical areas delineated for each watershed in SIFR. Based on the scheme of classifying critical areas for this study, it can be noted that the proportion of critical areas to the non-critical areas in the various SIFR watersheds ranges from 4.5% to 60%. For the whole of Samar Island, the ratio of critical to non-critical areas is 40 to 60. Intuitively, these extreme

proportional values of critical areas to be declared as non-negotiable are far from being ideal, more so, practical. A very low value of 6.5% of protected area in a watershed could put so much stress on the watershed when most of its lands will be opened up for intensive production uses. On the other hand, a very high value could be so taxing on the watershed-dependent population if most of its lands will be closed to production uses. However, if the bases for determining critical areas accurately represent the true land requirements of conserving the soil, water, biodiversity and other ecological concerns, then it matters little if the proportion of watershed area declared as critical is too small or too large. Either way, the result should be the conservation of watershed resources.

If indeed the scheme for delineating the critical areas is sound and the result is accepted as valid, what can be done is to integrate the land allocation for all watersheds in the SIFR. This way, those watersheds with small areas available for production purposes due to large critical areas, can find available production areas in the other watersheds to meet surplus demand.

4. SALIENT FINDINGS AND RECOMMENDATIONS

The main question to answer in planning for the future of the SIFR is how much of the remaining forest should be maintained as strictly protected areas, considering the primary objective of conserving biodiversity without precluding the realization of socioeconomic objectives of the Island of Samar. To answer the question, the influence of land use and forest cover change on soil, water and biodiversity must be adequately evaluated. This will facilitate the evaluation of the negative as well as positive impacts of any land use or land use combination option that should ultimately lead to the selection of the most appropriate option.

This study focused on the assessment of the impacts of current and prospective land uses primarily on soil and water resources. Two simple prediction tools were used in this study: the BROOK5 hydrologic model to estimate runoff, and the USLE to estimate the soil erosion potential of watersheds as affected by land use and forest cover.

The assessment of impacts of land use and forest cover on water resources was made under five (5) land use scenarios, namely, current land use, 10% and 20% reductions in forest cover, and 10% and 20% increases in forest cover. The results of this assessment showed that:

- Runoff tends to increase when the forest cover is decreased by 10% of the current stand. But when the reduction in forest cover is increased to 20%, the increase in runoff becomes smaller. This could be used as an imposition in land allocation provided that the decrease in forest cover in any watershed should not be allowed to go beyond 20% of the current forest cover as doing so could result in the deterioration of the streamflows.
- Under a 10% increase in forest cover, runoff increases compared with current land use runoff and tends to increase some more when the forest cover is further increased to 20%.

- In two watersheds, the increase in runoff, after the 10% reduction in forest cover, is very small compared to the large increase in one watershed as would normally be expected. This is likely attributable to the already diminished forest cover of the two watersheds beyond the threshold, such that any further reduction in forest cover will no longer cause higher runoff.
- In three watersheds, a 20% increase in forest cover did not result in a significantly large increase in runoff as noted under a 10% increase in forest cover. This could also be explained by the theory that the 20% increase in forest cover could have placed the forest cover of the watersheds at the level where the maximum runoff has been attained, thus no amount of additional forest cover can bring about a significant increase in runoff.
- Samar will be able to remain sufficient in water for domestic, commercial, industrial and agricultural purposes. It was further noted that the maximum amount of potential water resources was estimated under the 20% forest cover increase scenario and the least amount of water resources was estimated under the 20% decrease in forest cover scenario. These observations were based on the projection of the total potential surface runoff resources of Samar using the runoff coefficients generated from the BROOK5 model estimates for the three focal watersheds.

The major observations from the evaluation of the soil erosion potential of the different Samar watersheds are listed below:

- High soil erosion potential areas are not necessarily found in steep slopes. Most of the areas with high erosion potential are located in areas with slope not exceeding 18%. On the contrary, the areas with low soil erosion potential are concentrated in steeper slopes. These observations are indications that, along with slope, there are other soil erosion factors that can significantly influence the magnitude of erosion.
- Areas with high erosion potential are found often in areas that are cultivated and mixed with grasslands and brushlands. These are the same areas that are found in the almost flat areas where the erosion potential is also high. The mountainous areas that are covered with forest vegetation were noted to have low erosion potential.
- The potential soil erosion of watersheds rises with lower forest cover due to increasing vulnerability of the soil to raindrop impact and surface runoff. Reduction in forest cover exposes the soil to raindrop that can prematurely retard infiltration and cause large volumes of soil scouring surface runoff.
- The increase in forest cover on the contrary, decreases the potential soil erosion due to enhanced soil cover, soil fertility and consequently, high infiltration capacity and low surface runoff.

As far as critical areas are concerned, following are the key observations:

- The critical areas that need to be set aside as protected areas include all closed canopy forests, all open canopy forests within 100 meters of the perimeter of closed canopy forests, all areas within 50 meters of both banks of streams, and all areas with erosion potential of greater than 12 tons per hectare per year and slope steeper than 25%.
- The critical areas in Samar Island watersheds range from 4.5 to 60 percent of the watershed area. For the whole of Samar Island, the ratio of critical to non-critical areas is around 40 to 60.

- About 40% of the study area is considered critical of which half (i.e., 201,500 ha) is found inside the proposed SINP. Of the areas considered non-critical, around 204,000 ha are found inside the proposed SINP.

The findings of this study are the products of an exercise that thrived mostly on available secondary information. Though extremely constrained by time and logistics, all possible efforts were made to obtain new information, to update existing databases and to reformat and recycle inconsistent data. However, there is only so much that can be done to come up with a good database using second hand information, and add to this, the absence of sufficient resources dedicated to collect fresh information that are essential to good natural resource management planning and decision making.

In the ensuing project that will flesh out and implement the detailed management plan for the SIFR, it is highly suggested that enough resources should be allocated for the establishment of a truly good database. Existing agencies in Samar Island that now have some degree of capability to manage the natural resource database or better still, an information system for SIFR, should be tapped and strengthened.

The numbers generated in this study are by no means accurate estimates of the real world. Extreme care was nonetheless observed in the process of deriving these numbers so that they can at least provide good indications of what the order of magnitude and direction will characterize a particular event. These numbers also made some comparative analyses possible. In sum, the estimates presented above served the purpose of this study. Beyond such purpose, it is suggested that application of the numbers generated in this study should be made extra judiciously and if possible must be challenged using other approaches and with new information.

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Table 1
Framework of Analysis for Determining the Best Land Use Combinations

Land Use Configuration	Impacts On							Target	Under/Over Achievement
	Q	SS	BOD	E. coli	Soil Erosion	Bio-diversity	Household Income		
Wilderness								$\leq Y_1$	
Ecotourism								$\leq Y_2$	
Timber Plantation								$\leq Y_3$	
Agroforestry								$\leq Y_4$	
Mining								$\leq Y_5$	
Residential								$\leq Y_6$	
Agricultural								$\leq Y_7$	
Total									
Target	$\leq X_1$	$\leq X_2$	$\leq X_3$	$\leq X_4$	$\leq X_5$	$\leq X_6$	$\leq X_7$		
Under/Over Achievement									

Table 2
Selected Geomorphic Characteristics of Various Watersheds in Samar Island

Watershed	Basin Area (ha)	Basin Perimeter (km)	Basin Length (km)	Basin Width (km)	Elongation Ratio	Total Length of Streams (km)	Drainage Density (km/ha)
Balangiga	13,287.68	62.87	21.50	6.18	0.60	163.93	0.012
Bantayan	10,492.01	78.27	22.00	4.77	0.53	55.63	0.005
Basey	34,716.50	118.41	34.50	10.06	0.61	211.27	0.006
Borongan	14,058.32	66.56	19.50	7.21	0.69	87.59	0.006
Bugko	17,278.79	64.67	22.50	7.68	0.66	110.57	0.006
Bulosao	4,276.97	29.14	9.00	4.75	0.82	57.55	0.013
Calbiga	19,851.56	77.01	21.00	9.45	0.76	135.79	0.007
Can-Avid	86,599.84	169.55	57.50	15.06	0.58	521.49	0.006
Catarman	59,380.77	107.63	35.50	16.73	0.77	443.09	0.007
Catbalogan	13,540.56	77.08	24.00	5.64	0.55	95.43	0.007
Catubig	94,201.22	181.77	51.00	18.47	0.68	392.80	0.004
Dolores	84,560.81	178.48	51.50	16.42	0.64	517.06	0.006
Gandara	111,907.81	252.31	47.50	23.56	0.79	3,644.09	0.033
Culganti	10,512.00	71.25	28.50	3.69	0.41	61.21	0.006
Linal-an	7,647.36	41.87	14.50	5.27	0.68	55.22	0.007
Llorente	35,297.22	111.13	35.00	10.08	0.61	302.28	0.009
Lo-om	4,689.77	39.31	13.50	3.47	0.57	53.64	0.011
Marabut	15,006.87	72.34	24.50	6.13	0.56	109.68	0.007
Mauo	26,390.46	84.09	28.50	9.26	0.64	86.00	0.003
Mondragon	6,048.13	35.43	12.00	5.04	0.73	45.59	0.008
Oras	28,333.53	124.28	38.50	7.36	0.49	215.47	0.008
Pabanog	8,890.77	50.29	12.00	7.41	0.89	47.64	0.005
Pambujan	59,039.94	141.32	58.50	10.09	0.47	424.87	0.007
Pan-as Hayiban	45,173.53	105.52	32.50	13.90	0.74	304.99	0.007
Silaga	22,010.54	70.79	19.00	11.58	0.88	154.97	0.007
Sulat	16,791.02	71.44	24.00	7.00	0.61	71.05	0.004
Suribao	69,359.03	152.91	37.50	18.50	0.79	499.01	0.007
Taft	41,688.18	146.18	46.00	9.06	0.50	181.43	0.004
Tangkip	3,223.47	28.45	9.50	3.39	0.67	30.78	0.010

Table 3
Municipalities Located Inside the Different Watersheds of Samar Island

Watershed	Municipality	Area (ha)
	Balangiga	5,788
	Marabut	122
	Lawaan	6,963
	Sta. Rita	415
Balangiga		13,288
	San Roque	9,340
	Mondragon	869
	Pambujan	183
Bantayan		10,392
	Marabut	1,181
	Llorente	570
	Basey	32,965
Basey		34,716
	San Julian	1,056
	Borongan	13,002
Borongan		14,058
	San Roque	316
	Catarman	2,494
	Mondragon	14,048
	Silvino Lobos	421
Bugko		17,279
	Marabut	883
	Lawaan	3,394
Bulasao		4,277
	Calbiga	8,918
	Pinabacdao	8,693
	Villareal	2,149
Calbiga		19,760

Watershed	Municipality	Area (ha)
	Paranas	38,241
	Jiabong	5,269
	Maslog	1,668
	Can Avid	18,043
	Catbalogan	1,538
	San Jose De Buan	2,420
	Dolores	81
	Gandara	2,182
	Taft	4,907
	Motiong	11,813
Can Avid		86,162
	Catarman	47,660
	San Isidro	339
	San Jose	34
	Calbayog	4,542
	Bobon	5,947
	Mondragon	39
	Silvino Lobos	1
	Victoria	819
Catarman		59,381
	Paranas	2,286
	Jiabong	2,658
	Catbalogan	7,578
	San Sebastian	26
	Motiong	993
Catbalogan		13,541
	Matuguinao	5,098
	Maslog	2,135
	Laoang	16,935
	San Jose de Buan	9,112
	Palapag	302
	Pambujan	3,801
	Silvino Lobos	2,295
	Jipapad	9,785
	Catubig	44,487
	Mapanas	174
Catubig		94,124

Watershed	Municipality	Area (ha)
	Maslog	25,722
	Can Avid	8,174
	Oras	14,366
	San Jose de Buan	13,537
	Dolores	20,100
	Arteche	2,662
Dolores		84,561
	Tarangnan	10,251
	Sta. Margarita	8,944
	Matuguinao	8,006
	Calbayog	3,859
	Catbalogan	8,841
	San Jose de Buan	13,392
	Gandara	51,786
	Pagsanghan	5,243
Gandara		110,322
	Catarman	31
	San Isidro	798
	San Jose	2,766
	Bobon	4,091
	Victoria	2,827
Gulganti		10,513
	Maydolong	22
	Borongan	7,625
Linal-an		7,647
	Balangiga	2,778
	Quinapondan	1,369
	Gen. Mac. Arthur	3,673
	Lawaan	593
	Sta. Rita	21,973
	Giporlos	4,839
Llorente		35,225
	Borongan	4,690
Lo-om		4,690

Watershed	Municipality	Area (ha)
	Marabut	13,375
	Lawaan	520
	Basey	1,112
Marabut		15,007
	Allen	1,239
	San Isidro	8,865
	San Jose	108
	Lavezares	4,510
	Calbayog	478
	Victoria	11,173
Mano		26,373
	Catarman	252
	Mondragon	5,796
Mondragon		6,048
	San Policarpio	2,077
	Maslog	233
	Gamay	109
	Oras	5,242
	Lapinig	1,571
	Iipapad	10,764
	Arteche	7,478
	Catubig	731
Oras		28,205
	Calbiga	2,087
	Paranas	438
	Hinabangan	4,293
	San Sebastian	2,073
Pabanog		8,891
	San Roque	6,011
	Catarman	1,884
	Sta. Margarita	47
	Matuguinao	2,926
	Laong	536
	Calbayog	11,607
	Mondragon	526
	Pambujan	11,112
	Silvino Lobos	22,874
	Gandara	557
	Catubig	916
Pambujan		58,996

Watershed	Municipality	Area (ha)
	San Isidro	2,855
	Calbayog	42,319
Pan-as Hayiban		45,174
	Calbiga	223
	Pinabacdao	2,590
	Llorente	14,418
	Villareal	8
	Basey	4,772
Silaga		22,011
	San Julian	4,619
	Hinabangan	616
	Taft	17
	Sulat	11,540
Sulat		16,792
	Balangkayan	4,655
	Calbiga	5,373
	Marabut	2,074
	Maydolong	22,562
	Hinabangan	2
	Sta. Rita	11,845
	Borongan	15,530
	Basey	6,910
Suribao		68,951
	Calbiga	2
	San Julian	1,684
	Paranas	1,498
	Hinabangan	18,375
	Borongan	7,041
	Taft	10,050
	Sulat	3,038
Taft		41,688
	Gen. Mac. Arthur	609
	Sta. Rita	2,615
Tangkip		3,224

Table 4a
Average Monthly Temperature for Eastern Samar

YEAR/MO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
1990	26.2	26.2	26.6	28.1	27.9	27.8	27.8	28.2	27.9	27.0	26.9	26.2	326.7
1991	26.4	26.1	26.0	27.2	27.4	27.4	27.6	27.9	28.0	27.2	26.1	26.4	323.7
1992	26.4	26.5	27.1	28.8	29.7	28.5	27.5	28.3	28.6	27.4	26.7	26.2	331.6
1993	25.9	25.8	26.6	27.6	28.9	29.0	28.1	27.5	27.8	27.5	27.3	26.4	328.5
1994	26.1	26.5	26.6	27.2	28.6	27.0	27.2	28.0	27.4	27.6	26.8	24.5	323.6
1995	26.3	26.2	26.2	27.2	27.8	28.1	26.7	27.3	27.2	26.8	26.5	25.6	321.7
1996	25.1	25.2	25.7	27.2	28.0	27.8	28.2	28.6	28.8	28.5	27.5	26.2	326.8
1997	25.8	26.2	26.5	28.3	29.1	28.9	28.1	28.8	28.9	28.7	27.9	27.3	334.4
1998	26.9	28.0	28.0	29.1	29.8	29.9	29.3	29.1	29.2	28.2	28.0	27.9	343.5
1999	26.8	26.4	28.1	27.9	28.9	27.9	28.3	27.6	28.4	28.1	26.6	26.9	331.9
2000	26.8	26.7	27.4	28.7	29.4	28.2	28.1						195.4
AVE	**26.2**	**26.3**	**26.8**	**27.9**	**28.7**	**28.2**	**27.9**	**28.1**	**28.2**	**27.7**	**27.0**	**26.4**	**329.6**

Table 4b
Average Monthly Temperature for Western Samar

YEAR/MO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
1990	26.9	27.6	27.7	30.0	29.6	28.9	29.3	29.4	28.8	28.1	27.5	27.2	341.0
1991	26.7	27.0	27.1	28.5	29.0	29.1	28.6	29.3	29.4	28.3	28.7	28.9	340.6
1992										28.4	26.4	26.7	81.5
1993	26.3	22.6	26.7	27.9	29.2	28.8	28.0	28.1	27.9	27.4	28.0	27.3	328.2
1994	27.1	27.2	28.1	28.4	29.0	28.3	28.2	28.7	27.8	27.7	26.9	26.7	334.2
1995	26.3	27.2	27.1	28.9	29.4	29.3							168.2
1996	27.4	28.6	28.3	28.1	29.3	29.0	29.1	29.2	28.8	28.9	27.7	26.3	340.8
1997	26.5	27.0	27.0	28.2	29.3	28.7	28.2	29.3	28.4	28.2	27.8	27.2	336.0
1998	27.3	27.7	28.2	29.3	30.3	29.5	29.2	29.0	29.0	28.3	27.9	27.3	343.1
1999	26.7	26.2	27.8	27.2	27.0	28.1	29.0	28.2	28.3	28.2	27.0	27.0	330.6
AVE	**26.8**	**26.8**	**27.6**	**28.5**	**29.1**	**28.9**	**28.7**	**28.9**	**28.6**	**28.2**	**27.5**	**27.2**	**336.7**

Table 4c
Average Monthly Temperature for Northern Samar

YEAR/MO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
1990	26.5	26.2	26.9	28.0	28.6	28.2	28.6	29.1	28.3	27.6	27.1	26.5	331.7
1991	26.2	26.4	26.1	27.3	28.1	28.5	28.5	28.9	29.4	27.8	26.5	26.1	329.9
1992	26.6	26.0	26.3	28.2	29.0	28.9	28.0	28.7	29.4	27.6	26.7	26.6	332.1
1993	26.1	26.3	26.7	28.0	29.1	29.5	28.8	28.6	28.4	27.8	27.2	26.5	332.8
1994	26.3	26.8	27.5	28.1	29.5	28.5	28.3	29.4	28.1	28.0	26.9	26.3	333.8
1995	25.8	26.1	26.3	27.5	28.8	29.1	28.2	28.5	27.9	26.8	26.4	24.8	326.3
1996	25.0	25.4	26.0	26.6	28.5	27.4	27.8	28.5	28.6	27.7	26.8	25.8	324.2
1997	25.2	25.9	26.1	27.9	28.7	28.6	28.3	29.7	27.8	28.1	27.6	27.7	331.8
1998	26.6	26.7	27.3	27.9	29.1	29.2	28.9	28.6	29.2	28.0	27.5	27.0	336.0
1999	26.5	26.3	27.0	27.3	27.9	27.3	27.7	27.4	27.8	27.3	26.7	26.6	325.7
2000	26.3	25.9	26.9	27.5									106.6
AVE	**26.1**	**26.2**	**26.6**	**27.7**	**28.7**	**28.5**	**28.3**	**28.7**	**28.5**	**27.7**	**26.9**	**26.4**	**330.4**

Table 5a
Average Monthly Rainfall for Eastern Samar

YEAR/MO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
1990	197.8	169.2	42.1	115.9	338.1	224	110.3	83.8	146.6	313.9	255.5	214.1	2211.3
1991	190.8	155	287.8	76.6	120.6	258.8	174.1	107.3	66.3	301.7	403.4	190.5	2332.9
1992	156.4	81.7	58.4	21.0	32.5	174.3	307.3	86.5	102.9	154.9	100.9	219.4	1496.2
1993	181.1	204.0	173.6	46.2	34.6	155.2	125.2	294.2	197.2	139.2	412.4	531.8	2494.7
1994	201.9	85.0	165.9	156.4	125.0	217.5	66.1	85.3	180.7	98.8	221.1	222.1	1825.8
1995	122.9	76.3	135.3	96.1	102.9	100.5	252.0	300.2	430.1	418.2	428.8	1018.3	3481.6
1996	755.3	629.4	292.7	312.2	126.6	381.8	142.7	142.0	163.9	258.5	423.0	502.3	4130.4
1997	280.5	259.6	237.0	76.9	82.2	178.1	166.6	34.5	99.1	286.4	147.6	208.7	2057.2
1998	150.1	26.2	73.8	82.1	72.1	137.6	241.1	131.8	183.1	234.8	332.0	526.3	2191.0
1999	439.6	365.7	326.6	316.7	85.3	150.1	65.8	231.0	120.0	368.7	831.3	659.2	3960.0
2000	267.8	533.0	470.4	104.0	116.8	312.8	125.5						1930.3
AVE	**267.7**	**235.0**	**205.8**	**127.6**	**112.4**	**208.2**	**161.5**	**149.7**	**169.0**	**257.5**	**355.6**	**429.3**	**2679.3**

Table 5b
Average Monthly Rainfall for Western Samar

YEAR/MO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
1990	214.3	39.2	4.9	44.0	319.5	599.6	103.0	184.2	203.4	286.7	349.5	94.5	2442.8
1991	74.4	171.1	266.0	179.2	136.2	229.6	309.7	289.6	79.2	220.6	467.0	333.2	2755.8
1992	77.2	11.6	10.6	22.8	39.5	311.9	408.7	131.3	110.9	320.8	326.3	104.5	1876.1
1993	46.8	152.2	210.6	24.0	22.7	141.8	424.6	187.1	154.6	169.0	251.8	381.8	2167.0
1994	176.7	37.0	90.5	216.1	263.4	290.7	375.7	188.7	508.9	204.3	145.2	240.9	2738.1
1995	160.3	72.9	132.2	111.3	88.3	190.5	226.6	373.4	440.5	289.3	463.8	450.4	2999.5
1996	291.7	210.0	341.4	331.0	136.7	0.0	161.6	116.4	272.9	202.2	268.1	486.1	2818.1
1997	210.6	87.6	53.2	89.6	142.7	181.9	380.7	56.4	269.2	246.3	178.8	130.2	2027.2
1998	72.0	77.0	40.6	30.4	74.2	123.0	85.4	172.1	354.3	416.2	234.0	480.3	2159.5
1999	336.2	314.2	260.7	174.3	175.3	162.4	253.4	227.8	207.0	224.9	594.3	424.0	3354.5
AVE	**166.0**	**117.3**	**141.1**	**122.3**	**139.9**	**223.1**	**272.9**	**192.7**	**260.1**	**258.0**	**327.9**	**312.6**	**2533.9**

Table 6
Average Monthly Rainfall for Northern Samar

YEAR/MO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
1990	377.3	57.6	33.7	54.4	227.4	369.6	109	103.6	176.4	276.4	501.6	377.3	2664.3
1991													
1992	286.9	66.4	104.6	10.6	103.2	147.6	202.9	189.3	36.2	311.5	348.2	286.9	2094.3
1993	285.7	180.4	171.2	50.4	28.3	90.5	306.8	178.5	82.0	226.4	441.8	805.9	2847.9
1994	459.0	96.3	235.2	240.5	57.9	420.5	174.3	65.3	204.3	191.6	461.2	360.6	2966.7
1995	267.5	133.1	114.4	61.6	126.7	262.1	156.8	185.5	466.8	413.6	619.7	882.3	3690.1
1996	612.4	330.4	984.0	622.3	192.1	148.2	150.1	124.5	157.3	189.2	476.3	792.3	4779.1
1997	243.6	314.4	103.2	35.6	106.4	239.3	203.2	41.2	326.7	132.7	74.2	80.9	1901.4
1998	174.9	26.8	80.3	30.0	102.2	118.8	46.9	210.0	108.4	518.8	292.1	708.5	2417.7
1999	585.3	406.4	442.3	247.1	123.0	330.7	108.1	390.9	209.6	330.6	1059.8	845.1	5078.9
2000	556.9	1236.0	514.0	139.3									2446.2
AVE	**385.0**	**284.8**	**278.3**	**149.2**	**118.6**	**236.4**	**162.0**	**165.4**	**196.4**	**287.9**	**475.0**	**571.1**	**3160.0**

Table 7
Slope Class Area Distribution (ha) in Each Watershed by Municipality

Watershed	Municipality	Slope Class				
		0-8 %	8-18 %	18-35 %	35-50 %	> 50 %
	Balangiga	-	-	676	-	10,151
	Marabut	-	-	-	118	4
	Lawaan	-	-	-	534	648
	Sta. Rita	-	-	-	120	763
Balangiga		-	-	676	772	11,566
	San Roque	-	-	273	299	1,503
	Mondragon	-	-	-	7	655
	Pambujan	-	1,017	721	-	4,286
Bantayan		-	1,017	994	306	6,444
	Marabut	-	-	-	-	1,370
	Llorente	-	-	958	1,738	148
	Basey	-	-	-	63	994
Basey		-	-	958	1,801	2,512
	San Julian	-	-	-	594	4,027
	Borongan	-	-	-	-	1,685
Borongan		-	-	-	594	5,712
	San Roque	-	2,752	4,178	25	-
	Catarman	-	-	565	1,513	-
	Mondragon	487	2,090	5,473	785	29,424
	Silvino Lobos	1,949	76	-	262	-
Bugko		2,436	4,918	10,216	2,585	29,424
	Marabut	435	-	-	3	-
	Lawaan	-	-	-	-	1,499
Bulasao		435	-	-	3	1,499
	Calbiga	-	1,822	90	2,455	905
	Pinabacdao	-	254	-	2,204	201
	Villareal	-	-	-	-	5,100
Calbiga		-	2,076	90	4,659	6,206

Watershed	Municipality	Slope Class				
		0-8 %	8-18 %	18-35 %	35-50 %	> 50 %
	Paranas	-	-	-	-	2,927
	Jiabong	-	-	-	68	1,601
	Maslog	-	-	-	-	2,136
	Can Avid	-	1,204	-	7,169	17,361
	Catbalogan	-	-	-	-	233
	San Jose De Bua	332	-	-	30	88
	Dolores	7,642	-	1,549	4,151	3,593
	Gandara	-	-	-	376	160
	Taft	2,361	-	3,175	-	2,200
	Motiong	-	-	98	-	11
Can Avid		10,335	1,204	4,822	11,794	30,310
	Catarman	-	-	3,995	4,841	2,859
	San Isidro	-	-	-	1,710	2,802
	San Jose	191	-	7,288	1,774	7,251
	Calbayog	-	-	-	-	4,544
	Bobon	-	-	69	-	3,792
	Mondragon	-	-	-	209	269
	Silvino Lobos	-	-	-	-	11,613
	Victoria	-	-	5,685	8,961	27,688
Catarman		191	-	17,037	17,495	60,818
	Paranas	42	-	-	4	-
	Jiabong	139	-	21	3,084	2,706
	Catbalogan	923	-	677	2,449	44
	San Sebastian	10	-	984	-	450
	Motiong	32	-	89	76	672
Catbalogan		1,146	-	1,771	5,613	3,872
	Matuguinao	7	-	32	-	-
	Maslog	-	-	1,640	1,481	2,678
	Laoang	-	-	-	-	526
	San Jose de Buan	-	-	-	523	-
	Palapag	-	-	-	-	22
	Pambujan	-	-	-	1,032	21,303
	Silvino Lobos	408	540	-	2,451	8,202
	Jipapad	-	-	-	23	3,652
	Catubig	-	-	-	609	-
	Mapanas	-	-	-	18	27
Catubig		415	540	1,672	6,137	36,410

Watershed	Municipality	Slope Class				
		0-8 %	8-18 %	18-35 %	35-50 %	> 50 %
	Maslog	262	-	2,434	3,908	1,886
	Can Avid	-	-	300	1,016	1,275
	Oras	-	-	-	-	276
	San Jose de Buan	-	-	-	1,308	1,411
	Dolores	-	-	-	427	6,539
	Arteche	-	-	-	254	3,142
Dolores		262	-	2,734	6,913	14,529
	Tarangnan	-	-	-	146	374
	Sta. Margarita	-	215	-	3,451	3,589
	Matuguinao	418	-	1,483	-	192
	Calbayog	1,172	-	2,106	4,234	10,532
	Catbalogan	823	1,080	655	3,631	1,989
	San Jose de Buan	-	150	215	-	-
	Gandara	-	793	6,682	-	6,537
	Pagsanghan	-	1,271	2,505	1,108	360
Gandara		2,413	3,509	13,646	12,570	23,573
	Catarman	17	-	-	-	-
	San Isidro	1,048	-	40	1,435	1,772
	San Jose	-	-	-	-	616
	Bobon	-	-	-	-	2
	Victoria	-	-	-	-	18,384
Gulganti		1,065	-	40	1,435	20,774
	Maydolong	-	-	-	392	12,012
	Borongan	-	-	-	538	1,001
Linal-an		-	-	-	930	13,013
	Balangiga	-	-	38	1,353	7,454
	Quinapondan	-	160	-	8	2,253
	Gen. Mac. Arthu	-	-	-	1,243	7,873
	Lawaan	-	-	-	4,483	9,060
	Sta. Rita	-	-	-	2,238	11,160
	Giporlos	3,607	-	154	3,012	6,218
Llorente		3,607	160	192	12,337	44,018
	Borongan	-	-	-	49	253
Lo-om		-	-	-	49	253

Watershed	Municipality	Slope Class				
		0-8 %	8-18 %	18-35 %	35-50 %	> 50 %
	Marabut	43	-	-	-	-
	Lawaan	500	-	1,368	1,268	536
	Basey	1,247	-	241	5,115	4,497
Marabut		1,790	-	1,609	6,383	5,033
	Allen	-	-	611	215	746
	San Isidro	-	-	-	-	421
	San Jose	-	-	-	-	1
	Lavezares	-	-	162	276	1,858
	Calbayog	-	-	-	5,167	17,718
	Victoria	-	5,055	-	899	4,711
Mano		-	5,055	773	6,557	25,455
	Catarman	-	-	-	163	407
	Mondragon	-	4,565	3,810	2,238	3,810
Mondragon		-	4,565	3,810	2,401	4,217
	San Policarpio	-	-	-	45	370
	Maslog	228	31	2,947	410	18,093
	Gamay	-	-	671	457	10,723
	Oras	-	-	393	2,037	42
	Lapinig	-	-	2,400	4,461	316
	Jipapad	-	-	-	2,474	10,534
	Arteche	-	-	-	843	6,316
	Catubig	-	-	-	2,171	2,454
Oras		228	31	6,411	12,898	48,848
	Calbiga	-	-	-	123	15,414
	Paranas	-	-	-	-	7,044
	Hinabangan	218	-	-	8	-
	San Sebastian	-	-	-	-	81
Pabanog		218	-	-	131	22,539

Watershed	Municipality	Slope Class				
		0-8 %	8-18 %	18-35 %	35-50 %	> 50 %
	San Roque	-	-	1	132	943
	Catarman	-	-	-	267	9,523
	Sta. Margarita	-	-	272	1,448	9,049
	Matuguinao	-	-	78	-	3
	Laong	-	1	-	-	2,182
	Calbayog	673	-	6,858	12,811	31,469
	Mondragon	-	-	-	-	557
	Pambujan	56	-	-	-	-
	Silvino Lobos	26	-	-	-	-
	Gandara	1,510	-	155	-	-
	Catubig	91	251	3,632	-	208
Pambujan		2,356	252	10,996	14,658	53,934
	San Isidro	-	-	28	1,061	3,820
	Calbayog	-	-	-	-	17
Pan-as Hayiban		-	-	28	1,061	3,837
	Calbiga	-	1,274	496	3,714	4,422
	Pinabacdao	-	-	470	137	31
	Llorente	-	-	-	-	819
	Villareal	-	-	-	394	2,434
	Basey	-	-	3,390	1,522	6,066
Silaga		-	1,274	4,356	5,767	13,772
	San Julian	764	936	2,034	-	3,063
	Hinabangan	1,141	-	486	-	138
	Taft	-	-	-	-	8
	Sulat	-	1,107	-	1	-
Sulat		1,905	2,043	2,520	1	3,209
	Balangkayan	586	-	-	509	18
	Calbiga	-	-	1,132	-	3,642
	Marabut	-	-	4,219	-	2,694
	Maydolong	-	-	-	-	2,796
	Hinabangan	-	-	970	14	42
	Sta. Rita	-	758	1,244	1,121	8,116
	Borongan	-	456	-	325	2,118
	Basey	-	-	3,288	851	-
Suribao		586	1,214	10,853	2,820	19,426

Watershed	Municipality	Slope Class				
		0-8 %	8-18 %	18-35 %	35-50 %	> 50 %
	Calbiga	-	33	499	-	2,131
	San Julian	-	1,143	3,678	1,411	1,250
	Paranas	-	-	-	109	739
	Hinabangan	10,387	-	3,842	11,413	18,866
	Borongan	-	-	-	-	731
	Taft	-	-	-	299	617
	Sulat	-	710	1,211	2,812	7,086
Taft		10,387	1,886	9,230	16,044	31,420
	Gen. Mac. Arthu	-	140	-	853	-
	Sta. Rita	-	-	1,071	2,215	2,406
Tangkip		-	140	1,071	3,068	2,406

Table 8
Soil Type Distribution by Watershed and by Municipality (ha)

Watershed	Municipality	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
	Balangiga	-	-	3,503	-	1,774	5,544	-	-	-	-	-	-	-	-	-	-
	Marabut	-	-	122	-	-	-	-	-	-	-	-	-	-	-	-	-
	Lawaan	-	-	1,181	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sta. Rita	-	-	390	-	-	-	-	-	-	-	-	-	-	-	-	-
Balangiga																	
	San Roque	-	-	2,074	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mondragon	-	-	-	-	-	-	-	956	-	-	-	-	-	-	53	-
	Pambujan	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	265
Bantayan																	
	Marabut	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Llorente	-	-	32	-	3,015	-	-	-	-	-	-	-	-	-	-	-
	Basey	-	-	762	-	295	-	-	-	-	-	-	-	-	-	-	-
Basey																	
	San Julian	-	-	3,032	-	1,569	-	-	-	-	-	-	-	-	-	-	-
	Borongan	-	-	1,684	-	-	-	-	-	-	-	-	-	-	-	-	-
Borongan																	
	San Roque	-	-	-	-	7,379	-	-	-	-	-	-	-	-	-	-	75
	Catarman	-	-	-	-	2,023	-	-	-	-	-	-	-	-	-	-	54
	Mondragon	-	-	21,120	-	4,521	10,786	-	-	-	-	1,102	-	-	-	-	-
	Silvino Lobos	219	-	-	-	1,644	-	-	-	-	-	-	-	-	-	-	-
Bugko																	

Watershed	Municipality	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
	Marabut	191	-	-	-	22	-	-	-	-	-	-	-	-	-	-	-
	Lawaan	-	-	929	-	-	570	-	-	-	-	-	-	-	-	-	-
Bulasao																	
	Calbiga	-	-	-	-	-	5,015	-	-	-	-	-	-	-	-	-	-
	Pinabacdao	-	-	-	-	729	1,929	-	-	-	-	-	-	-	-	-	-
	Villareal	-	-	-	-	2,323	2,775	-	-	-	-	-	-	-	-	-	-
Calbiga																	
	Paranas	-	-	-	-	2,926	-	-	-	-	-	-	-	-	-	-	-
	Jiabong	-	-	1,668	-	-	-	-	-	-	-	-	-	-	-	-	-
	Maslog	-	-	2,135	-	-	-	-	-	-	-	-	-	-	-	-	-
	Can Avid	-	-	23,538	-	1,677	-	-	-	-	-	-	-	-	507	-	-
	Catbalogan	-	-	233	-	-	-	-	-	-	-	-	-	-	-	-	-
	San Jose De Buan	51	-	-	-	141	-	-	-	-	-	-	12	-	-	-	-
	Dolores	1,571	-	-	-	7,606	-	-	-	-	-	-	6,083	986	-	-	-
	Gandara	-	-	-	-	536	-	-	-	-	-	-	-	-	-	-	-
	Taft	-	-	3,918	-	360	-	3,760	-	-	-	-	-	-	-	-	-
	Motiong	-	-	99	-	10	-	-	-	-	-	-	-	-	-	-	-
Can-Avid																	

Watershed	Municipality	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
	Catarman	562	5,922	-	-	-	-	-	-	3,096	-	610	-	-	-	-	-
	San Isidro	-	3,897	-	-	-	-	-	-	613	-	-	-	-	-	-	-
	San Jose	54	-	-	-	2,216	-	-	-	12,481	-	-	-	-	306	-	-
	Calbayog	-	-	132	-	4,367	-	-	-	-	-	-	-	-	-	-	-
	Bobon	-	-	-	-	3,859	-	-	-	-	-	-	-	-	-	-	-
	Mondragon	-	-	146	-	-	-	-	-	332	-	-	-	-	-	-	-
	Silvino Lobos	-	-	-	-	11,607	-	-	-	-	-	-	-	-	-	-	-
	Victoria	51	-	373	-	24,635	-	-	-	10,414	-	-	-	-	3,496	-	-
Catarman																	
	Paranas	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-
	Jiabong	-	-	2,217	1,053	-	-	-	-	1,537	-	1,088	-	51	-	-	-
	Catbalogan	-	-	44	49	-	-	-	-	1,202	-	1,473	-	868	-	-	-
	San Sebastian	-	-	-	213	-	-	-	-	-	-	585	-	219	12	-	-
	Motiong	-	-	-	581	-	-	-	-	-	-	-	-	49	-	-	-
Catbalogan																	

Watershed	Municipality	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
	Matuguinao	-	-	-	-	-	-	-	-	-	-	9	-	24	-	-	-
	Maslog	-	-	-	2,369	-	-	-	-	-	-	1,145	92	890	-	-	-
	Laoang	-	-	-	519	-	-	-	-	-	-	-	-	-	-	-	-
	San Jose de Buan	-	-	-	-	-	-	-	809	-	-	-	-	-	-	51	-
	Palapag	-	-	-	-	-	-	-	22	-	-	-	-	-	-	-	-
	Pambujan	-	-	16,686	-	-	-	-	5,711	-	-	-	-	-	-	-	-
	Silvino Lobos	-	-	-	-	-	-	-	6,129	-	-	-	-	-	-	-	-
	Jipapad	-	-	575	-	-	-	-	252	-	-	-	-	-	-	-	-
	Catubig	-	-	-	-	-	-	-	550	-	-	-	-	-	-	-	-
	Mapanas	-	-	-	-	45	-	-	-	-	-	-	-	-	-	-	-
Catubig																	
	Maslog	996	-	-	-	6,181	-	-	-	-	-	-	-	-	-	-	-
	Can Avid	-	-	-	-	2,175	339	-	-	-	-	-	-	-	-	-	-
	Oras	-	-	-	-	86	190	-	-	-	-	-	-	-	-	-	-
	San Jose de Buan	-	-	632	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dolores	-	-	6,723	-	-	-	-	-	-	-	-	-	-	-	-	-
	Arteche	-	-	2,509	-	-	-	-	-	-	-	-	-	-	-	-	-
Dolores																	

Watershed	Municipality	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
	Tarangnan	-	-	287	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sta. Margarita	41	-	-	-	-	-	-	2,602	-	-	-	-	-	-	375	56
	Matuguinao	-	-	-	-	1,692	-	-	-	-	-	-	-	-	271	-	111
	Calbayog	-	-	8,221	-	8,265	-	-	-	-	-	48	-	-	848	-	596
	Catbalogan	-	-	1,746	-	3,713	-	-	-	-	-	1,535	-	-	-	-	1,101
	San Jose de Buan	-	-	-	-	71	-	-	-	-	-	-	-	-	-	-	294
	Gandara	-	-	-	-	12,921	-	-	-	-	-	232	-	-	-	-	687
	Pagsanghan	-	-	-	-	4,195	-	-	-	-	-	-	-	-	-	-	1,047
Gandara																	
	Catarman	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	San Isidro	1,839	-	-	-	864	1,041	-	-	-	-	-	-	-	-	-	-
	San Jose	-	-	616	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bobon	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
	Victoria	-	-	14,568	-	-	3,807	-	-	-	-	-	-	-	-	-	-
Gulganti																	
	Maydolong	-	-	4,353	-	70	7,975	-	-	-	-	-	-	-	-	-	-
	Borongan	-	-	-	-	-	1,538	-	-	-	-	-	-	-	-	-	-
Linal-an																	

Watershed	Municipality	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
	Balangiga	151	-	-	-	7,520	993	-	-	-	-	-	-	-	-	-	-
	Quinapondan	-	-	2,110	-	-	-	-	-	-	-	-	-	-	-	-	-
	Gen. Mac. Arthur	-	-	7,961	-	-	1,150	-	-	-	-	-	-	-	-	-	-
	Lawaan	-	-	13,537	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sta. Rita	-	-	11,004	-	-	2,063	-	-	-	-	-	-	-	-	-	-
	Giporlos	439	-	-	-	9,170	-	-	-	-	-	-	200	873	-	-	-
Llorente																	
	Borongan	-	-	-	-	302	-	-	-	-	-	-	-	-	-	-	-
Lo-om																	
	Marabut	-	-	-	-	-	-	-	-	-	-	-	-	19	-	-	-
	Lawaan	-	-	-	-	903	-	-	-	-	-	-	1,222	848	-	-	-
	Basey	-	-	-	-	8,733	-	-	-	-	-	-	1,187	658	-	-	-
Marabut																	
	Allen	-	-	834	-	738	-	-	-	-	-	-	-	-	-	-	-
	San Isidro	-	-	-	421	-	-	-	-	-	-	-	-	-	-	-	-
	San Jose	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
	Lavezares	-	-	-	-	2,295	-	-	-	-	-	-	-	-	-	-	-
	Calbayog	-	-	-	7,770	15,047	-	-	-	-	-	-	-	-	-	-	-
	Victoria	275	-	-	-	4,997	-	-	-	-	1,188	-	-	-	-	-	-
Mauo																	

Watershed	Municipality	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
	Catarman	-	-	-	-	285	-	-	-	-	-	-	-	-	-	-	-
	Mondragon	668	-	-	-	12,023	-	-	-	-	-	-	-	-	-	-	-
Mondragon																	
	San Policarpio	-	-	415	-	-	-	-	-	-	-	-	-	-	-	-	-
	Maslog	-	-	9,447	-	-	-	-	7,983	-	-	-	-	-	-	-	-
	Gamay	-	-	9,988	-	-	-	-	1,857	-	-	-	-	-	-	-	-
	Oras	-	-	-	-	-	-	-	2,068	-	-	-	-	-	-	84	-
	Lapinig	321	-	-	-	5,746	-	-	574	-	-	-	-	-	494	-	409
	Jipapad	-	-	6,154	-	6,829	-	-	-	-	-	-	-	-	-	-	-
	Arteche	-	-	1,386	-	1,417	-	-	3,846	-	-	-	-	-	-	-	-
	Catubig	-	-	2,115	-	2,445	-	-	2	-	-	-	-	-	-	-	-
Oras																	
	Calbiga	-	-	14,831	-	-	-	-	491	-	-	-	-	-	-	-	-
	Paranas	-	-	7,041	-	-	-	-	-	-	-	-	-	-	-	-	-
	Hinabangan	-	-	-	-	74	-	-	-	-	-	-	-	-	-	-	110
	San Sebastian	-	-	81	-	-	-	-	-	-	-	-	-	-	-	-	-
Pabanog																	

Watershed	Municipality	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
	San Roque	-	-	920	-	156	-	-	-	-	-	-	-	-	-	-	-
	Catarman	-	-	9,006	-	614	21	-	-	-	-	-	140	-	-	-	-
	Sta. Margarita	-	-	7,401	-	2,969	-	-	-	-	-	-	88	-	-	-	306
	Matuguinao	-	-	-	-	81	-	-	-	-	-	-	-	-	-	-	-
	Laong	-	-	189	-	-	1,993	-	-	-	-	-	-	-	-	-	-
	Calbayog	-	-	49	-	38,637	8,921	-	-	-	-	1,233	-	-	570	-	-
	Mondragon	-	-	-	-	557	-	-	-	-	-	-	-	-	-	-	-
	Pambujan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Silvino Lobos	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Gandara	110	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
	Catubig	-	-	-	-	4,064	-	-	-	-	-	-	-	-	260	-	-
Pambujan																	
	San Isidro	-	-	4,140	-	767	-	-	-	-	-	-	-	-	-	-	-
	Calbayog	-	-	-	-	17	-	-	-	-	-	-	-	-	-	-	-
Pan-as Hayiban																	
	Calbiga	-	-	2,107	-	4,582	1,738	-	817	-	-	-	-	-	-	-	-
	Pinabacdao	14	42	95	-	-	-	-	-	257	-	-	-	-	-	112	-
	Llorente	-	-	819	-	-	-	-	-	-	-	-	-	-	-	-	-
	Villareal	-	7	2,820	-	-	-	-	-	-	-	-	-	-	-	-	-
	Basey	217	5,140	3,755	-	-	-	-	-	1,508	-	-	-	-	-	309	-
Silaga																	

Watershed	Municipality	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
	San Julian	180	-	-	-	3,871	-	-	-	-	113	-	-	-	-	-	-
	Hinabangan	190	-	-	-	419	-	-	-	-	-	-	-	-	-	-	-
	Taft	-	-	-	-	8	-	-	-	-	-	-	-	-	-	-	-
	Sulat	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulat																	
	Balangkayan	-	-	83	-	-	440	-	-	-	-	-	-	-	-	-	-
	Calbiga	-	-	195	-	1,529	2,952	-	-	-	-	-	-	-	-	-	-
	Marabut	-	-	6,910	-	-	-	-	-	-	-	-	-	-	-	-	-
	Maydolong	-	-	2,745	-	-	50	-	-	-	-	-	-	-	-	-	-
	Hinabangan	-	-	-	-	450	-	-	-	-	-	-	-	-	-	-	-
	Sta. Rita	-	-	3,768	-	5,531	528	-	626	-	-	-	-	-	-	-	-
	Borongan	-	-	146	-	966	1,469	-	296	-	-	-	-	-	-	-	-
	Basey	-	-	-	-	2,764	-	-	-	-	-	-	-	-	-	-	-
Suribao																	
	Calbiga	-	-	3	-	2,319	-	-	-	-	-	-	-	-	-	-	340
	San Julian	-	-	214	-	6,753	-	-	-	-	-	-	-	-	-	-	505
	Paranas	-	-	671	-	177	-	-	-	-	-	-	-	-	-	-	-
	Hinabangan	-	-	3,267	-	27,294	6,683	-	-	-	-	-	4,492	-	-	-	-
	Borongan	-	-	627	-	104	-	-	-	-	-	-	-	-	-	-	-
	Taft	-	-	-	-	916	-	-	-	-	-	-	-	-	-	-	-
	Sulat	-	-	6,145	-	278	4,639	-	-	-	-	-	-	-	-	-	-
Taft																	
	Gen. Mac. Arthur	-	-	-	-	233	760	-	-	-	-	-	-	-	-	-	-
	Sta. Rita	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tangkip																	

Watershed	Municipality	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32	s33
	Balangiga	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Marabut	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Lawaan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sta. Rita	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Balangiga																		
	San Roque	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mondragon	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-
	Pambujan	-	-	-	-	-	10	-	-	-	-	-	6,107	-	-	-	-	-
Bantayan																		
	Marabut	-	-	-	-	-	-	-	-	-	-	-	1,369	-	-	-	-	-
	Llorente	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Basey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Basey																		
	San Julian	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Borongan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Borongan																		
	San Roque	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Catarman	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mondragon	-	-	-	-	-	50	660	-	-	-	-	-	-	-	-	-	-
	Silvino Lobos	-	-	-	-	-	67	-	-	-	-	-	-	-	-	-	-	-
Bugko																		

Watershed	Municipality	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32	s33
	Marabut	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-
	Lawaan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bulasao																		
	Calbiga	-	-	-	-	-	-	255	-	-	-	-	-	-	-	-	-	-
	Pinabacdao	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Villareal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calbiga																		
	Paranas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Jiabong	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Maslog	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Can Avid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Catbalogan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	San Jose De Buan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dolores	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Gandara	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Taft	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Motiong	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Can-Avid																		

Watershed	Municipality	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32	s33
	Catarman	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	San Isidro	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	San Jose	-	-	-	-	623	-	-	-	-	-	-	-	-	-	-	-	-
	Calbayog	-	-	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bobon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mondragon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Silvino Lobos	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Victoria	-	-	2,705	-	525	-	-	-	-	-	-	-	-	-	-	-	-
Catarman																		
	Paranas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Jiabong	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Catbalogan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	San Sebastian	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Motiong	-	202	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Catbalogan																		

Watershed	Municipality	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32	s33
	Matuguinao	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Maslog	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Laoang	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	San Jose de Buan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Palapag	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pambujan	-	-	-	-	-	-	-	-	-	-	165	-	-	-	-	-	-
	Silvino Lobos	-	-	-	-	-	-	-	-	-	-	3	5,767	-	-	-	-	-
	Jipapad	-	-	-	-	-	-	-	-	-	-	-	2,847	-	-	-	-	-
	Catubig	-	-	-	-	-	-	-	-	-	-	59	-	-	-	-	-	-
	Mapanas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Catubig																		
	Maslog	-	-	-	-	-	-	-	390	-	-	-	-	-	-	-	-	-
	Can Avid	-	-	-	-	-	-	-	76	-	-	-	-	-	-	-	-	-
	Oras	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	San Jose de Buan	-	-	-	-	-	-	-	-	-	-	-	2,086	-	-	-	-	-
	Dolores	-	-	-	-	-	-	-	-	-	-	-	240	-	-	-	-	-
	Arteche	-	-	-	-	-	-	-	-	-	-	-	283	-	-	-	-	-
Dolores																		

Watershed	Municipality	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32	s33
	Tarangnan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sta. Margarita	-	-	-	-	-	235	-	-	-	-	-	2,927	-	-	-	-	-
	Matuguinao	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Calbayog	61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Catbalogan	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	San Jose de Buan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Gandara	265	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pagsanghan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gandara																		
	Catarman	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	San Isidro	-	-	-	-	-	41	-	-	-	-	-	-	-	-	-	-	-
	San Jose	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bobon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Victoria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gulganti																		
	Maydolong	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Borongan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Linal-an																		

Watershed	Municipality	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32	s33
	Balangiga	-	133	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Quinapondan	-	-	-	-	-	-	310	-	-	-	-	-	-	-	-	-	-
	Gen. Mac. Arthur	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Lawaan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sta. Rita	-	-	-	-	-	-	325	-	-	-	-	-	-	-	-	-	-
	Giporlos	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	387	-
Llorente																		
	Borongan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lo-om																		
	Marabut	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Lawaan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Basey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Marabut																		
	Allen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	San Isidro	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	San Jose	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Lavezares	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Calbayog	-	57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Victoria	-	-	-	-	-	-	-	-	-	-	-	-	-	1,251	-	-	-
Mauo																		

Watershed	Municipality	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32	s33
	Catarman	-	-	-	-	-	-	-	-	-	-	-	-	-	285	-	-	-
	Mondragon	-	-	-	-	-	-	-	1,556	-	-	-	-	-	-	-	-	-
Mondragon																		
	San Policarpio	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Maslog	-	-	-	-	-	-	-	-	-	-	-	4,543	-	-	-	-	-
	Gamay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Oras	-	-	-	-	-	-	-	-	-	-	463	-	-	-	-	-	-
	Lapinig	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
	Jipapad	-	-	-	-	-	-	-	-	-	-	19	-	-	-	-	-	-
	Arteche	-	-	-	-	-	-	-	-	-	-	542	-	-	-	-	-	-
	Catubig	-	-	-	-	-	-	-	-	-	-	127	-	-	-	-	-	-
Oras																		
	Calbiga	-	-	-	-	-	-	-	-	-	-	208	-	-	-	-	-	-
	Paranas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Hinabangan	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	San Sebastian	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pabanog																		

Watershed	Municipality	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32	s33
	San Roque	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Catarman	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sta. Margarita	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Matuguinao	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Laong	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Calbayog	-	2,377	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mondragon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pambujan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Silvino Lobos	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Gandara	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Catubig	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pambujan																		
	San Isidro	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Calbayog	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pan-as Hayiban																		
	Calbiga	1	806	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pinabacdao	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Llorente	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Villareal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Basey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silaga																		

Watershed	Municipality	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32	s33
	San Julian	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Hinabangan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Taft	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sulat	-	-	-	-	-	-	-	-	-	-	-	-	-	558	-	-	-
Sulat																		
	Balangkayan	-	-	-	-	-	-	-	590	-	-	-	-	-	-	-	-	-
	Calbiga	-	-	-	-	-	-	-	96	-	-	-	-	-	-	-	-	-
	Marabut	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Maydolong	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Hinabangan	633	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sta. Rita	857	225	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Borongan	70	91	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Basey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Suribao																		
	Calbiga	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	San Julian	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Paranas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Hinabangan	-	-	-	-	-	-	-	-	-	2,751	-	-	-	-	-	-	-
	Borongan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Taft	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sulat	-	-	-	-	-	-	751	-	-	-	-	-	-	-	-	-	-
Taft																		
	Gen. Mac. Arthur	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sta. Rita	-	-	-	-	-	-	-	-	-	-	1	5,688	-	-	-	-	-
Tangkip																		

Table 9
Characterization of Selected Mountain Soils in Samar Island

Code	Site Description	pH (1:1 soil-water)	OM (%) LOI	Total N (%)	P (mg/kg) (olsen)	% Sand	% Silt	% Clay	Texture
	Low Mountain Soil								
1288	Mountain soil Sohoton, Low undisturbed	6.60	6.72	0.09	1.02	60.08	22.59	17.33	sandy loam
1307	Site 1 Mountain Soil Jicontol, Dolores, E.Samar undisturbed	5.45	6.13	0.14	ND	20.15	42.77	37.08	clay loam
1309	Site 2 Low Mountain Soil, Balagon, Can-avid, E.Samar	6.95	6.01	0.13	1.21	35.38	40.86	23.76	loam
1318	Undisturbed Mountain Soil High (Sohoton)	6.05	5.54	0.16	1.05	58.43	25.76	15.81	sandy loam
1330	Site 1 Low Mountain soil A-Et, Sulat, E.Samar	5.80	4.18	0.11	1.42	30.33	40.05	25.62	loam
1335	Site 2 Low Mountain soil Balagon, Can-avid, E.Samar	7.05	5.09	0.17	2.17	28.62	49.15	22.23	loam
	High Mountain Soil								
1285	Site 2 Mountain soil Mabini, Sulat, E.Samar High undisturbed	5.80	5.80	5.80	5.80	16.99	47.19	35.82	silty clay
1290	Mountain soil High (Sohoton) undisturbed	6.05	6.05	6.05	6.05	61.63	21.71	16.66	sandy loam
1296	Site 1 High mountain soil, Boco, Can-avid, E. Samar undisturbed	5.65	4.45	0.16	1.08	23.34	46.92	29.74	clay loam
1312	Site 1 Mountain soil High A-ET, Sulat, E.Samar undisturbed	6.25	4.48	0.09	0.64	49.07	33.69	17.24	loam
1316	Site 2 High Mountain Soil Osmeña, Dolores, E.Samar undisturbed	5.25	4.95	0.13	ND	41.46	31.73	26.81	loam
1327	Site 1 Mountain soil Jicontol, Dolores, E.Samar	5.35	6.23	0.21	1.60	18.62	52.05	29.33	silty clay
1328	Mountain soil Mabini, Sulat, E.Samar Site 2 - High	5.90	6.43	0.27	3.41	15.86	50.25	33.89	silty clay
1331	Site 1 High Mountain soil, Boco, Can-avid, E.Samar	5.55	5.70	0.20	1.42	23.37	38.09	38.54	clay loam
1332	Site 2 Mountain soil Osmeña, Dolores, E.Samar	5.20	4.54	0.16	1.09	41.83	34.66	23.51	loam

Code	Site Description	pH (1:1 soil-water)	OM (%) LOI	Total N (%)	P (mg/kg) (olsen)	% Sand	% Silt	% Clay	Texture
	Catbalogan Clay Loam								
1294	Site 2 Catbalogan clay loam Magsaysay, Dolores, E.Samar undisturbed	5.85	6.37	0.08	3.47	69.56	18.01	12.43	sandy loam
1297	Site 1 Catbalogan clay Hiparayan, Catubig, N. Samar undisturbed	5.95	5.08	0.14	1.42	37.49	33.88	28.63	clay loam
1300	Site 2 Catbalogan clay loam Binalaan, Taft E.Samar undisturbed	6.20	7.53	0.17	ND	26.77	56.02	17.21	silt loam
1301	Site 1 Catbalogan clay loam Polangi, Taft E.Samar undisturbed	5.45	3.73	0.20	1.51	84.42	10.15	5.43	loamy sand
1302	Site 1 Catbalogan clay loam Sitio Hamurawon, Sulat E.Samar undisturbed	4.85	4.40	0.13	0.69	60.70	16.68	22.62	sandy clay
1303	Site 2 Catbalogan clay loam Deit, Matuginao, W.Samar undisturbed	6.60	6.47	0.16	4.36	21.35	44.72	33.93	clay loam
1304	Site 2 Catbalogan clay Irawahan, Catubig, N.Samar undisturbed	5.20	5.71	0.18	ND	21.88	38.86	39.26	clay loam
1305	Site 2 Catbalogan clay loam Camantang, Can-avid, E.Samar undisturbed	5.70	5.11	0.17	1.01	20.16	48.87	30.97	clay loam
1308	Site 1 Catbalogan clay loam Can-ilay, Can-avid, E.Samar undisturbed	5.05	5.36	0.14	ND	10.67	50.03	39.30	silty clay
1310	Site 2 Catbalogan clay loam Sitio Linokbo-an, Sulat, E.Samar undisturbed	6.00	4.72	0.07	ND	53.00	23.29	23.71	sandy clay
1311	Site 1 Catbalogan clay loam Tarabucan, Matuguinao, W.Samar undisturbed	5.45	5.20	0.14	0.93	8.43	51.28	40.29	silty clay
1321	Site 1 Catbalogan clay loam Sn.Isidro, Dolores, E.Samar undisturbed	5.85	5.66	0.14	2.34	48.96	22.51	28.53	sandy clay
1325	Site 2 Catbalogan clay loam Tarabucan, Matuguinao, W.Samar	5.15	5.06	0.27	4.78	8.83	48.40	42.77	silty clay
1326	Site 1 Catbalogan clay Hiparayan, Catubig, N.Samar	5.00	5.31	0.22	1.57	24.41	28.92	46.67	clay
1329	Site 2 Catbalogan clay loam Binalo-an, Taft, E.Samar	6.15	6.99	0.21	1.04	29.72	44.44	25.84	loam
1336	Site 1 Catbalogan clay loam Sitio Hamurawon, Sulat, E.Samar	5.15	4.26	0.16	0.92	64.27	11.77	23.96	sandy clay
1337	Site 1 Catbalogan clay loam Polangi, Taft, E.Samar	5.65	3.29	0.19	2.68	89.28	5.18	5.54	sand
1340	Site 1 Catbalogan clay loam Deit, Matuguinao, W.Samar	6.25	7.84	0.29	12.30	18.67	43.56	37.77	silty clay
1341	Site 1 Catbalogan clay loam Can-ilay, Can-avid, E.Samar	5.70	6.38	0.28	21.73	10.46	53.47	36.07	silty clay
1342	Site 2 Catbalogan clay loam Magsaysay, Dolores, E.Samar	5.60	4.88	0.11	5.35	67.28	10.78	21.94	sandy clay
1343	Site 2 Catbalogan clay loam Sitio Linokboan, Sulat, E.Samar	5.85	3.88	0.07	1.17	51.06	24.26	24.68	sandy clay
1344	Site 1 Catbalogan clay loam Sn Isidro, Dolores, E.Samar	5.60	5.70	0.19	5.12	50.52	27.28	22.20	sandy clay
1345	Site 2 Catbalogan clay Irawahan, Catubig, N.Samar	5.60	4.82	0.19	3.54	34.51	43.41	22.08	loam
1346	Site 2 Catbalogan clay loam, Camanting, Can-avid, E.Samar	5.30	6.13	0.27	2.82	16.51	55.40	28.09	silty clay

Code	Site Description	pH (1:1 soil-water)	OM (%) LOI	Total N (%)	P (mg/kg) (olsen)	% Sand	% Silt	% Clay	Texture
	Luisiana Clay Loam								
1282	Luisiana clay Candoros, E.S. Low-2 undisturbed	6.45	5.33	0.15	0.70	28.88	47.14	23.98	loam
1292	Luisiana clay Candoros, L.E.S 1 High undisturbed	5.30	6.13	0.09	ND	14.43	51.10	34.47	silty clay
1320	Luisiana clay Candoros, L.E.Samar Low-2 composite	6.65	6.27	0.17	1.75	27.19	44.57	28.24	clay loam
1323	Luisiana clay Candoros, L.E.S. 1 High composite	5.40	4.41	0.19	0.94	17.09	47.14	35.77	silty clay
1283	Bolinao clay Site 2: Antipolo, L.E. Samar- composite	5.25	8.58	0.25	ND	18.15	46.54	35.31	silty clay
1287	Site 1 Bolinao clay Barubo, L.E.S. undisturbed	5.15	6.12	0.16	ND	21.69	41.94	36.37	clay loam
1348	Bolinao clay Calipayon, Taft, E.Samar	7.50	9.32	0.24	1.06	32.61	33.50	33.89	clay loam
	Basey Transect Line								
	Transect Line 3 Plot no. 1	5.95	9.66	0.26	0.68	21.62	55.71	22.67	silt loam
	Transect Line 3 Plot no. 2	5.10	13.80	0.21	ND	6.52	31.04	62.44	clay
	Transect Line 3 Plot no. 3	4.85	13.50	0.29	0.45	5.07	34.84	60.09	clay
	Transect Line 3 Plot no. 4	4.80	10.34	0.19	0.31	2.40	17.15	80.45	clay
	Transect Line 3 Plot no. 5	4.75	8.67	0.21	0.46	3.83	22.53	73.64	clay
	Transect Line 3 Plot no. 6	4.85	8.39	0.19	0.38	6.13	41.56	52.31	silty clay
	Transect Line 3 Plot no. 7	5.70	9.51	0.22	0.47	17.15	60.47	22.38	silt loam
	Transect Line 3 Plot no. 8	5.20	11.12	0.13	ND	15.99	52.28	31.73	silty clay
	Transect Line 3 Plot no. 9	5.05	7.66	0.09	ND	6.30	40.81	52.89	silty clay
	Transect Line 3 Plot no. 10	6.20	7.77	0.16	0.88	54.64	22.48	22.88	sandy clay
	Transect Line 3 Plot no. 11	6.00	9.62	0.21	1.63	40.24	29.67	30.09	clay loam
	Transect Line 3 Plot no. 12	4.95	11.33	0.31	0.83	3.25	12.04	84.71	clay
	Transect Line 3 Plot no. 13	5.50	9.99	0.28	0.69	11.19	53.04	35.77	silty clay
	Transect Line 3 Plot no. 14	5.05	7.92	0.18	ND	3.07	22.71	74.22	clay
	Transect Line 3 Plot no. 15	5.30	5.46	0.14	ND	15.01	26.45	58.54	clay

Code	Site Description	pH (1:1 soil-water)	OM (%) LOI	Total N (%)	P (mg/kg) (olsen)	% Sand	% Silt	% Clay	Texture
Transect Line 3 Plot no. 16		4.95	11.10	0.32	0.39	8.64	51.17	40.19	silty clay
Transect Line 3 Plot no. 17		4.85	9.18	0.17	ND	4.95	36.82	58.23	clay
Transect Line 3 Plot no. 18		4.90	12.21	0.23	0.31	3.50	11.31	85.19	clay
Transect Line 3 Plot no. 19		4.70	11.13	0.22	ND	8.61	6.06	85.33	clay
Transect Line 3 Plot no. 20		4.80	6.96	0.15	ND	17.19	35.31	47.50	clay
Transect Line 3 Plot no. 21		5.25	13.47	0.35	0.45	29.01	43.45	27.54	clay loam
Transect Line 3 Plot no. 22		4.85	7.78	0.27	0.32	32.53	44.72	22.75	loam
Transect Line 3 Plot no. 23		4.80	14.19	0.42	0.64	31.30	34.20	34.50	clay loam
Transect Line 3 Plot no. 24		4.85	11.71	0.36	0.38	8.66	48.16	43.18	silty clay
Transect Line 3 Plot no. 25		5.50	8.20	0.18	0.67	41.55	29.02	29.43	clay loam
Transect Line 3 Plot no. 26		4.85	7.39	0.07	ND	54.07	17.07	28.86	sandy clay
Transect Line 3 Plot no. 27		5.00	12.30	0.22	ND	17.86	17.51	64.62	clay
Transect Line 3 Plot no. 28		5.80	8.25	0.20	0.39	33.83	27.37	38.70	clay loam
Transect Line 3 Plot no. 29		5.25	8.36	0.17	0.54	31.79	30.81	37.40	clay loam
Transect Line 3 Plot no. 30		5.75	7.01	0.09	0.68	47.84	17.25	34.91	sandy clay
Transect Line 3 Plot no. 31		4.85	9.28	0.25	0.62	21.87	29.89	48.24	clay
Transect Line 3 Plot no. 32		4.60	11.67	0.38	1.25	5.43	33.24	61.33	clay
Transect Line 3 Plot no. 33		4.70	9.51	0.20	0.32	26.53	31.33	42.14	clay
Transect Line 3 Plot no. 34		5.05	9.19	0.20	0.69	22.64	41.93	35.43	clay loam

Table 10
Land Use and Forest Cover Types (ha) by Watershed and Municipality

Watershed	Municipality	Area (ha)	Closed Canopy Forest	Open Canopy Forest	Cultivated Area/Grass Brush	Coconut	Cropland w/ Coconut	Crops Cereals Sugar	Mangrove	FDO2	FY
	Balangiga	5,788	-	268	4,319	1,173	-	-	-	-	-
	Marabut	122	-	122	-	-	-	-	-	-	-
	Lawaan	6,963	7	2,967	3,868	121	-	-	-	-	-
	Sta. Rita	415	-	415	-	-	-	-	-	-	-
Balangiga		13,288	7	3,772	8,187	1,294	-	-	-	-	-
	San Roque	9,340	-	1,524	5,405	-	-	1,356	-	-	-
	Mondragon	869	-	549	234	-	31	-	-	-	-
	Pambujan	183	-	-	-	-	-	157	-	-	-
Bantayan		10,392	-	2,073	5,639	-	31	1,513	-	-	-
	Marabut	1,181	-	246	936	-	-	-	-	-	-
	Llorente	570	-	8	539	5	18	-	-	-	-
	Basey	32,965	394	9,925	14,034	4,448	4,088	-	-	-	-
Basey		34,716	394	10,179	15,509	4,453	4,106	-	-	-	-
	San Julian	1,056	160	868	29	-	-	-	-	-	-
	Borongan	13,002	1,615	5,813	4,116	-	1,176	-	-	-	-
Borongan		14,058	1,775	6,681	4,145	-	1,176	-	-	-	-
	San Roque	316	-	-	114	-	-	-	-	-	-
	Catarman	2,494	-	531	1,963	-	-	-	-	-	-
	Mondragon	14,048	-	1,714	9,866	-	1,974	-	-	-	-
	Silvino Lobos	421	-	78	343	-	-	-	-	-	-
Bugko		17,279	-	2,323	12,286	-	1,974	-	-	-	-

Watershed	Municipality	Area (ha)	Closed Canopy Forest	Open Canopy Forest	Cultivated Area/Grass Brush	Coconut	Cropland w/ Coconut	Crops Cereals Sugar	Mangrove	FDO2	FY
	Marabut	883	-	447	436	-	-	-	-	-	-
	Lawaan	3,394	-	707	1,788	892	-	-	-	-	-
Bulasao		4,277	-	1,154	2,224	892	-	-	-	-	-
	Calbiga	8,918	-	1,484	5,092	-	-	-	-	-	-
	Pinabacdao	8,693	-	-	6,743	-	-	-	-	-	-
	Villareal	2,149	-	-	465	-	-	-	170	-	-
Calbiga		19,760									
	Paranas	38,241	8,900	21,293	7,396	-	401	-	-	-	-
	Jiabong	5,269	-	232	5,008	-	-	-	-	30	-
	Maslog	1,668	1,426	242	-	-	-	-	-	-	-
	Can Avid	18,043	540	5,836	8,327	-	2,254	-	-	-	-
	Catbalogan	1,538	-	-	852	-	-	-	-	687	-
	San Jose De Buan	2,420	520	216	1,682	-	-	-	-	-	-
	Dolores	81	81	-	-	-	-	-	-	-	-
	Gandara	2,182	-	-	784	-	-	-	-	1,398	-
	Taft	4,907	-	4,685	216	-	6	-	-	-	-
	Motiong	11,813	2,618	1,176	8,019	-	-	-	-	-	-
Can Avid		86,162	14,085	33,680	32,284	-	2,661	-	-	2,115	-
	Catarman	47,660	1,584	4,606	38,430	-	967	579	-	-	-
	San Isidro	339	-	105	234	-	-	-	-	-	-
	San Jose	34	-	-	34	-	-	-	-	-	-
	Calbayog	4,542	-	629	3,913	-	-	-	-	-	-
	Bobon	5,947	-	3	5,441	-	-	161	-	-	-
	Mondragon	39	-	-	39	-	-	-	-	-	-
	Silvino Lobos	1	-	1	-	-	-	-	-	-	-
	Victoria	819	-	7	812	-	-	-	-	-	-
Catarman		59,381	1,584	5,351	48,903	-	967	740	-	-	-

Watershed	Municipality	Area (ha)	Closed Canopy Forest	Open Canopy Forest	Cultivated Area/Grass Brush	Coconut	Cropland w/ Coconut	Crops Cereals Sugar	Mangrove	FDO2	FY
	Paranas	2,286	-	-	1,265	-	-	-	1	-	-
	Jiabong	2,658	-	-	2,491	-	-	-	-	-	-
	Catbalogan	7,578	-	-	4,615	-	-	-	-	1,987	-
	San Sebastian	26	-	-	-	-	-	-	-	-	-
	Motiong	993	-	-	763	-	-	-	-	-	-
Catbalogan		13,541	-	-	9,134	-	-	-	1	1,987	-
	Matuguinao	5,098	2,270	2,812	16	-	-	-	-	-	-
	Maslog	2,135	2,130	5	-	-	-	-	-	-	-
	Laoang	16,935	-	380	7,437	-	1,016	4,417	-	-	-
	San Jose de Buan	9,112	9,077	35	-	-	-	-	-	-	-
	Palapag	302	-	266	32	-	-	-	-	-	-
	Pambujan	3,801	-	399	724	-	1,111	805	-	-	-
	Silvino Lobos	2,295	-	993	1,302	-	-	-	-	-	-
	Jipapad	9,785	6,333	1,628	1,484	-	-	-	-	-	-
	Catubig	44,487	1,509	9,992	26,703	-	4,490	1,785	-	-	-
	Mapanas	174	-	161	13	-	-	-	-	-	-
Catubig		94,124	21,319	16,671	37,711	-	6,617	7,007	-	-	-
	Maslog	25,722	18,414	3,770	3,532	-	5	-	-	-	-
	Can Avid	8,174	21	493	5,796	-	1,599	-	-	-	-
	Oras	14,366	-	4,180	7,512	-	1,945	-	-	-	-
	San Jose de Buan	13,537	3,675	9,734	127	-	-	-	-	-	-
	Dolores	20,100	321	3,699	8,785	-	6,394	-	-	-	-
	Arteche	2,662	-	1,043	1,619	-	-	-	-	-	-
Dolores		84,561	22,431	22,919	27,371	-	9,943	-	-	-	-

Watershed	Municipality	Area (ha)	Closed Canopy Forest	Open Canopy' Forest	Cultivated Area/Grass Brush	Coconut	Cropland w/ Coconut	Crops Cereals Sugar	Mangrove	FDO2	FY
	Tarangnan	10,251	-	-	8,352	-	-	71	-	-	-
	Sta. Margarita	8,944	-	-	7,916	-	604	-	221	-	-
	Matuguinao	8,006	3,853	3,226	927	-	-	-	-	-	-
	Calbayog	3,859	-	88	3,771	-	-	-	-	-	-
	Catbalogan	8,841	-	-	5,893	-	-	-	189	2,726	-
	San Jose de Buan	13,392	2,072	3,765	7,551	-	-	-	-	-	-
	Gandara	51,786	5,020	4,958	34,207	-	636	2,435	2,375	2,156	-
	Pagsanghan	5,243	-	-	1,299	-	1,493	29	2,019	-	-
Gandara		110,322	10,945	12,037	69,916	-	2,733	2,535	4,804	4,882	-
	Catarman	31	-	-	-	-	-	-	-	-	-
	San Isidro	798	-	51	747	-	-	-	-	-	-
	San Jose	2,766	-	-	2,746	-	20	-	-	-	-
	Bobon	4,091	-	-	1,834	-	715	-	-	-	-
	Victoria	2,827	-	919	1,908	-	-	-	-	-	-
Gulganti		10,513	-	970	7,235	-	735	-	-	-	-
	Maydolong	22	-	18	4	-	-	-	-	-	-
	Borongan	7,625	971	1,386	4,340	349	350	-	-	-	-
Linal-an		7,647	971	1,404	4,344	349	350	-	-	-	-
	Balangiga	2,778	224	469	2,085	-	-	-	-	-	-
	Quinapondan	1,369	-	10	1,359	-	-	-	-	-	-
	Gen. Mac. Arthur	3,673	-	534	3,140	-	-	-	-	-	-
	Lawaan	593	177	177	239	-	-	-	-	-	-
	Sta. Rita	21,973	6,725	3,464	10,810	-	890	-	-	-	-
	Giporlos	4,839	-	1,744	3,095	-	-	-	-	-	-
Llorente		35,225	7,126	6,398	20,728	-	890	-	-	-	-

Watershed	Municipality	Area (ha)	Closed Canopy Forest	Open Canopy Forest	Cultivated Area/Grass Brush	Coconut	Cropland w/ Coconut	Crops Cereals Sugar	Mangrove	FDO2	FY
	Borongan	4,690	19	114	3,841	-	587	-	-	-	-
Lo-om		4,690	19	114	3,841	-	587	-	-	-	-
	Marabut	13,375	-	2,878	7,754	2,342	-	-	-	-	-
	Lawaan	520	-	287	46	182	-	-	-	-	-
	Basey	1,112	-	20	926	-	166	-	-	-	-
Marabut		15,007	-	3,185	8,726	2,524	166	-	-	-	-
	Allen	1,239	-	-	319	857	-	-	-	-	-
	San Isidro	8,865	-	5,451	3,404	-	9	-	-	-	-
	San Jose	108	-	44	64	-	-	-	-	-	-
	Lavezares	4,510	-	1,123	2,441	696	-	-	-	-	-
	Calbayog	478	-	364	114	-	-	-	-	-	-
	Victoria	11,173	-	5,338	5,192	472	163	-	-	-	-
Mano		26,373	-	12,320	11,534	2,025	172	-	-	-	-
	Catarman	252	-	18	234	-	-	-	-	-	-
	Mondragon	5,796	-	4	3,987	-	1,771	-	-	-	-
Mondragon		6,048	-	22	4,221	-	1,771	-	-	-	-
	San Policarpio	2,077	-	-	2,077	-	-	-	-	-	-
	Maslog	233	196	37	-	-	-	-	-	-	-
	Gamay	109	-	-	88	-	21	-	-	-	-
	Oras	5,242	-	-	3,507	-	1,600	-	-	-	-
	Lapinig	1,571	-	-	1,365	-	4	-	-	-	-
	Jipapad	10,764	693	679	8,970	-	-	-	-	-	-
	Arteche	7,478	1	662	4,042	-	-	-	-	-	-
	Catubig	731	-	-	731	-	-	-	-	-	-
Oras		28,205	890	1,378	20,780	-	1,625	-	-	-	-

Watershed	Municipality	Area (ha)	Closed Canopy Forest	Open Canopy' Forest	Cultivated Area/Grass Brush	Coconut	Cropland w/ Coconut	Crops Cereals Sugar	Mangrove	FDO2	FY
	Calbiga	2,087	-	1,000	87	-	-	-	-	-	-
	Paranas	438	-	-	384	-	-	-	29	-	-
	Hinabangan	4,293	-	424	2,877	-	-	-	425	-	-
	San Sebastian	2,073	-	-	-	-	-	-	1,056	-	-
Pabanog		8,891	-	1,424	3,348	-	-	-	1,510	-	-
	San Roque	6,011	-	3,118	1,743	-	-	762	-	-	-
	Catarman	1,884	52	1,774	58	-	-	-	-	-	-
	Sta. Margarita	47	-	-	47	-	-	-	-	-	-
	Matuguinao	2,926	-	2,926	-	-	-	-	-	-	-
	Laong	536	-	-	536	-	-	-	-	-	-
	Calbayog	11,607	-	5,474	6,133	-	-	-	-	-	-
	Mondragon	526	-	526	-	-	-	-	-	-	-
	Pambujan	11,112	-	2,426	5,376	-	132	1,985	-	-	-
	Silvino Lobos	22,874	-	9,072	13,802	-	-	-	-	-	-
	Gandara	557	-	297	260	-	-	-	-	-	-
	Catubig	916	-	189	727	-	-	-	-	-	-
Pambujan		58,996	52	25,802	28,682	-	132	2,747	-	-	-
	San Isidro	2,855	-	894	1,961	-	-	-	-	-	-
	Calbayog	42,319	-	2,556	33,738	-	5,714	309	-	-	-
Pan-as Haylban		45,174	-	3,450	35,699	-	5,714	309	-	-	-
	Calbiga	223	9	-	214	-	-	-	-	-	-
	Pinabacdao	2,590	-	-	2,590	-	-	-	-	-	-
	Llorente	14,418	-	980	11,713	-	1,179	-	-	-	-
	Villareal	8	-	-	8	-	-	-	-	-	-
	Basey	4,772	45	243	4,484	-	-	-	-	-	-
Silaga		22,011	54	1,223	19,009	-	1,179	-	-	-	-

Watershed	Municipality	Area (ha)	Closed Canopy Forest	Open Canopy Forest	Cultivated Area/Grass Brush	Coconut	Cropland w/ Coconut	Crops Cereals Sugar	Mangrove	FDO2	FY
	San Julian	4,619	941	2,133	1,333	1	210	-	-	-	-
	Hinabangan	616	609	7	-	-	-	-	-	-	-
	Taft	17	-	14	3	-	-	-	-	-	-
	Sulat	11,540	3,327	2,490	3,010	452	679	-	-	-	-
Sulat		16,792	4,877	4,644	4,346	453	889	-	-	-	-
	Balangkayan	4,655	-	1,113	3,540	-	-	-	-	-	-
	Calbiga	5,373	2,498	2,876	-	-	-	-	-	-	-
	Marabut	2,074	121	1,864	89	-	-	-	-	-	-
	Maydolong	22,562	4,652	6,957	9,149	1,159	-	-	-	-	388
	Hinabangan	2	-	2	-	-	-	-	-	-	-
	Sta. Rita	11,845	1,659	8,236	1,950	-	-	-	-	-	-
	Borongan	15,530	12,777	763	1,678	245	-	-	-	-	-
	Basey	6,910	516	5,657	737	-	-	-	-	-	-
Suribao		68,951	22,223	27,468	17,143	1,404	-	-	-	-	388
	Calbiga	2	-	2	-	-	-	-	-	-	-
	San Julian	1,684	1,684	-	-	-	-	-	-	-	-
	Paranas	1,498	-	909	590	-	-	-	-	-	-
	Hinabangan	18,375	6,616	10,490	534	-	-	-	-	-	-
	Borongan	7,041	6,679	362	-	-	-	-	-	-	-
	Taft	10,050	-	4,627	1,867	-	3,102	-	-	-	-
	Sulat	3,038	310	1,603	617	-	362	-	-	-	-
Taft		41,688	15,289	17,993	3,608	-	3,464	-	-	-	-
	Gen. Mac. Arthur	609	-	308	301	-	-	-	-	-	-
	Sta. Rita	2,615	-	1,047	1,107	-	386	-	-	-	-
Tangkip		3,224	-	1,355	1,408	-	386	-	-	-	-

Table 11
Areas within the SINP and SIFR in the Different Watersheds

Watershed	Basin Area (ha)	Area Within SINP (ha)	Area Within SINP % of Basin Area	Area Outside SINP (ha)	Area Outside SINP % of Total Area	Area Within SIFR (ha)	Area Within SIFR % of Total Area	Area Outside SIFR (ha)	Area Outside SIFR % of Total Area
Balangiga	13,294	5,786	43.52	7,508	56.48	3,513	26.43	9,781	73.57
Bantayan	10,497	-	0.00	10,497	100.00	-	0.00	10,497	100.00
Basey	34,733	14,342	41.29	20,391	58.71	8,464	24.37	26,269	75.63
Borongan	14,065	10,624	75.54	3,441	24.46	8,062	57.32	6,003	42.68
Bugko	17,287	-	0.00	17,287	100.00	-	0.00	17,287	100.00
Bulosao	4,279	1,978	46.23	2,301	53.77	1,114	26.03	3,165	73.97
Calbiga	19,861	2,601	13.10	17,260	86.90	1,545	7.78	18,316	92.22
Can-Avid	86,641	58,680	67.73	27,961	32.27	46,301	53.44	40,340	46.56
Catarman	59,409	7,083	11.92	52,326	88.08	2,697	4.54	56,712	95.46
Catbalogan	13,547	-	0.00	13,547	100.00	-	0.00	13,547	100.00
Catubig	94,246	43,070	45.70	51,176	54.30	33,186	35.21	61,060	64.79
Dolores	84,601	48,055	56.80	36,546	43.20	40,652	48.05	43,949	51.95
Gandara	111,961	39,962	35.69	71,999	64.31	25,048	22.37	86,913	77.63
Gulganti	10,517	-	0.00	10,517	100.00	-	0.00	10,517	100.00
Linal-an	7,651	4,541	59.35	3,110	40.65	1,450	18.95	6,201	81.05
Llorente	35,314	19,141	54.20	16,173	45.80	12,904	36.54	22,410	63.46
Lo-om	4,692	2,217	47.25	2,475	52.75	720	15.35	3,972	84.65

Watershed	Basin Area (ha)	Area Within SINP		Area Outside SINP		Area Within SIFR		Area Outside SIFR	
		(ha)	% of Basin Area	(ha)	% of Total Area	(ha)	% of Total Area	(ha)	% of Total Area
Marabut	15,014	4,036	26.88	10,978	73.12	2,136	14.23	12,878	85.77
Mauo	26,403	-	0.00	26,403	100.00	-	0.00	26,403	100.00
Mondragon	6,051	-	0.00	6,051	100.00	-	0.00	6,051	100.00
Oras	28,347	4,040	14.25	24,307	85.75	1,928	6.80	26,419	93.20
Pabanog	8,895	1,206	13.56	7,689	86.44	182	2.05	8,713	97.95
Pambujan	59,068	27,851	47.15	31,217	52.85	16,637	28.17	42,431	71.83
Pan-as Hayiban	45,195	92	0.20	45,103	99.80	-	0.00	45,195	100.00
Silaga	22,021	581	2.64	21,440	97.36	-	0.00	22,021	100.00
Sulat	16,799	12,381	73.70	4,418	26.30	10,775	64.14	6,024	35.86
Suribao	69,392	60,173	86.71	9,219	13.29	49,620	71.51	19,772	28.49
Taft	41,708	37,147	89.06	4,561	10.94	35,435	84.96	6,273	15.04
Tangkip	3,225	-	0.00	3,225	100.00	-	0.00	3,225	100.00

Table 12
Dry Year Water Budget for Basey Watershed Under Current Land Uses

Month	Rain	Estimated Runoff	Runoff Coefficient	Total Evaporation		Groundwater
	(mm)	(mm)	(%)	(mm)	% of Rain	(mm)
January	210.6	43.9	20.8	97.4	46.2	73.6
February	87.6	43.0	49.1	103.8	118.5	92.9
March	53.2	35.4	66.5	96.4	181.2	98.4
April	89.6	27.9	31.1	69.1	77.1	96.8
May	142.7	24.7	17.3	94.9	66.5	92.2
June	181.9	21.7	11.9	141.5	77.8	87.0
July	380.7	36.5	9.6	179.6	47.2	94.5
August	56.4	42.1	74.6	110.4	195.7	105.3
September	269.2	33.0	12.3	128.5	47.7	106.3
October	246.3	49.4	20.1	141.5	57.5	120.5
November	178.8	52.8	29.5	114.8	64.2	134.7
December	130.2	56.2	43.2	95.7	73.5	147.0

Table 13
Wet Year Water Budget for Basey Watershed Under Current Land Uses

Month	Rain	Estimated Runoff	Runoff Coefficient	Total Evaporation		Groundwater
	(mm)	(mm)	(%)	(mm)	% of Rain	(mm)
January	336.2	79.6	23.7	110.1	32.7	104.9
February	314.2	108.1	34.4	105.0	33.4	168.7
March	260.7	102.5	39.3	141.2	54.2	210.1
April	174.3	67.1	38.5	147.1	84.4	213.2
May	175.3	57.1	32.6	147.0	83.9	205.2
June	162.4	47.5	29.2	152.0	93.6	192.8
July	253.4	45.0	17.8	124.2	49.0	178.1
August	227.8	56.0	24.6	148.3	65.1	178.8
September	207.0	58.0	28.0	140.9	68.1	182.4
October	224.9	52.9	23.5	128.8	57.3	178.9
November	594.3	180.8	30.4	118.4	19.9	273.1
December	424.0	176.9	41.7	110.6	26.1	349.6

Table 13a
Water Budget for Basey Watershed Under 10% Reduction in Forest Cover

Month	Rain	Estimated Runoff	Runoff Coefficient	Total Evaporation		Groundwater
	(mm)	(mm)	(%)	(mm)	% of Rain	(mm)
January	336.2	77.8	23.1	104.3	31.0	103.2
February	314.2	112.4	35.8	101	32.1	170.7
March	260.7	105.2	40.4	137.0	52.6	213.8
April	174.3	68.7	39.4	143	82.0	217.2
May	175.3	59.2	33.8	143.7	82.0	209.9
June	162.4	49.1	30.2	147.5	90.8	197.7
July	253.4	48.3	19.1	123.5	48.7	183.2
August	227.8	61.5	27.0	143.9	63.2	187.2
September	207	63.4	30.6	136.9	66.1	193.3
October	224.9	57.1	25.4	123.2	54.8	190.5
November	594.3	195.6	32.9	113.2	19.0	294.4
December	424	185.7	43.8	104.7	24.7	372.5

Table 13b
Water Budget for Basey Watershed Under 20% Reduction in Forest Cover

Month	Rain	Estimated Runoff	Runoff Coefficient	Total Evaporation		Groundwater
	(mm)	(mm)	(%)	(mm)	% of Rain	(mm)
January	336.2	80.8	24.0	98.5	29.3	105.8
February	314.2	112.9	35.9	96.8	30.8	173.1
March	260.7	106.6	40.9	131.9	50.6	216.7
April	174.3	69.5	39.9	138.8	79.6	220.2
May	175.3	60.6	34.6	140.8	80.3	213.3
June	162.4	51.2	31.5	145.1	89.3	202
July	253.4	50.4	19.9	121.1	47.8	188
August	227.8	63.2	27.7	139.4	61.2	192.1
September	207	64	30.9	132	63.8	197.4
October	224.9	57.8	25.7	117.3	52.2	194.1
November	594.3	200.1	33.7	107.9	18.2	300.1
December	424	192.3	45.4	98.6	23.3	382.4

Table 13c
Water Budget for Basey Watershed Under 10% Increase in Forest Cover

Month	Rain	Estimated Runoff	Runoff Coefficient	Total Evaporation		Groundwater
	(mm)	(mm)	(%)	(mm)	% of Rain	(mm)
January	336.2	89.8	26.7	24.2	7.2	77.8
February	314.2	147.3	46.9	21.9	7.0	179.7
March	260.7	149.7	57.4	24.3	9.3	257.3
April	174.3	115.2	66.1	23.5	13.5	289.5
May	175.3	120.8	68.9	24.3	13.9	315.4
June	162.4	117.7	72.5	23.5	14.5	334.9
July	253.4	127.3	50.2	24.3	9.6	342.6
August	227.8	164.1	72.0	24.3	10.7	391.2
September	207	156.2	75.5	23.5	11.4	423.8
October	224.9	137.6	61.2	24.3	10.8	428.4
November	594.3	316.9	53.3	23.5	4.0	570
December	424	272.3	64.2	24.2	5.7	648.1

Table 13d
Water Budget for Basey Watershed Under 20% Increase in Forest Cover

Month	Rain	Estimated Runoff	Runoff Coefficient	Total Evaporation		Groundwater
	(mm)	(mm)	(%)	(mm)	% of Rain	(mm)
January	336.2	103.3	30.7	30.2	9.0	162.7
February	314.2	153.9	49.0	36.3	11.6	249.6
March	260.7	150.2	57.6	54	20.7	309.2
April	174.3	108.9	62.5	63.2	36.3	322.4
May	175.3	106	60.5	74.7	42.6	326.9
June	162.4	94.5	58.2	82.5	50.8	323.5
July	253.4	96.3	38.0	74.9	29.6	310.6
August	227.8	123.8	54.3	65.4	28.7	333.8
September	207	127.7	61.7	55.7	26.9	357
October	224.9	114.8	51.0	47.6	21.2	359.9
November	594.3	291.5	49.0	36.9	6.2	498.1
December	424	257.8	60.8	29	6.8	583.1

Table 14
Dry Year Water Budget for Can-Avid Watershed Under Current Land Uses

Month	Rain	Estimated Runoff	Runoff Coefficient	Total Evaporation		Groundwater
	(mm)	(mm)	(%)	(mm)	% of Rain	(mm)
January	181.2	42.4	23.4	112.3	62.0	71.0
February	204.2	44.4	21.7	109.7	53.7	90.9
March	174.0	60.3	34.7	124.5	71.6	116.4
April	46.2	39.9	86.4	103.3	223.6	120.3
May	34.9	33.0	94.6	65.1	186.5	116.3
June	155.2	28.0	18.0	90.4	58.2	109.3
July	125.3	25.5	20.4	119.9	95.7	101.3
August	294.3	25.7	8.7	156.9	53.3	94.2
September	197.7	27.8	14.1	144.7	73.2	92.2
October	139.3	28.7	20.6	141.4	101.5	91.4
November	412.5	38.6	9.4	130.0	31.5	93.5
December	532.1	172.0	32.3	120.4	22.6	204.7

Table 15
Wet Year Water Budget for Can-Avid Watershed Under Current Land Uses

Month	Rain	Estimated Runoff	Runoff Coefficient	Total Evaporation		Groundwater
	(mm)	(mm)	(%)	(mm)	% of Rain	(mm)
January	439.6	105.3	24.0	125.3	28.5	119.6
February	365.7	128.4	35.1	123.6	33.8	193.0
March	326.7	129.9	39.8	157.7	48.3	247.1
April	316.7	132.7	41.9	165.2	52.2	292.8
May	85.3	83.9	98.4	134.5	157.7	285.6
June	150.1	61.1	40.7	114.7	76.4	263.2
July	66.0	52.7	79.8	102.2	154.8	237.7
August	231.1	46.3	20.0	115.1	49.8	212.3
September	120.0	39.8	33.2	130.1	108.4	190.7
October	368.7	54.1	14.7	142.3	38.6	172.5
November	831.3	261.9	31.5	136.3	16.4	317.5
December	659.3	325.4	49.4	133.4	20.2	495.5

Table 15a
Water Budget for Can-Avid Watershed Under 10% Reduction in Forest Cover

Month	Rain	Estimated Runoff	Runoff Coefficient	Total Evaporation		Groundwater
	(mm)	(mm)	(%)	(mm)	% of Rain	(mm)
January	181.2	42.7	23.57	24.2	13.36	34.9
February	204.2	76	37.22	21.9	10.72	90.4
March	174.0	109.9	63.16	24.2	13.91	156.5
April	46.2	69.5	150.43	23.5	50.87	175.1
May	34.9	55.4	158.74	24.3	69.63	175.5
June	155.2	52.1	33.57	23.5	15.14	173.7
July	125.3	72.4	57.78	24.3	19.39	188.5
August	294.3	105	35.68	24.3	8.26	225
September	197.7	124	62.72	23.5	11.89	271.2
October	139.3	111.6	80.11	24.2	17.37	293.6
November	412.5	137.6	33.36	23.5	5.70	327
December	532.1	313.7	58.96	24.2	4.55	492.1

Table 15b
Water Budget for Can-Avid Watershed Under 20% Reduction in Forest Cover

Month	Rain	Estimated Runoff	Runoff Coefficient	Total Evaporation		Groundwater
	(mm)	(mm)	(%)	(mm)	% of Rain	(mm)
January	181.2	53.2	29.36	30.5	16.83	99.6
February	204.2	79.8	39.08	38.7	18.95	142.6
March	174.0	108.5	62.36	54.8	31.49	193.7
April	46.2	65.3	141.34	66.7	144.37	199.1
May	34.9	50.8	145.56	64.3	184.24	189.2
June	155.2	42.1	27.13	79.1	50.97	175.1
July	125.3	41.7	33.28	83.9	66.96	163.2
August	294.3	56.5	19.20	74.8	25.42	165
September	197.7	79.1	40.01	60.8	30.75	188.5
October	139.3	80.3	57.65	51.9	37.26	206.2
November	412.5	108.3	26.25	39.8	9.65	237.1
December	532.1	291.1	54.71	29.7	5.58	407.4

Table 15c
Water Budget for Can-Avid Watershed Under 10% Increase in Forest Cover

Month	Rain	Estimated Runoff	Runoff Coefficient	Total Evaporation		Groundwater
	(mm)	(mm)	(%)	(mm)	% of Rain	(mm)
January	181.2	38.2	21.08	63.3	34.93	31.4
February	204.2	55.1	26.98	61.4	30.07	70.0
March	174.0	85.6	49.20	72.6	41.72	121.4
April	46.2	50.5	109.31	76.6	165.80	132.9
May	34.9	39.4	112.89	64.1	183.67	130.9
June	155.2	32.9	21.20	79.4	51.16	124.1
July	125.3	32.3	25.78	91.7	73.18	117.8
August	294.3	44.8	15.22	89.6	30.45	121.8
September	197.7	64.1	32.42	79.3	40.11	143.7
October	139.3	64.6	46.37	77.2	55.42	159.9
November	412.5	86.7	21.02	71.5	17.33	184.4
December	532.1	253.1	47.57	66.6	12.52	337.4

Table 15d
Water Budget for Can-Avid Watershed Under 20% Increase in Forest Cover

Month	Rain	Estimated Runoff	Runoff Coefficient	Total Evaporation		Groundwater
	(mm)	(mm)	(%)	(mm)	% of Rain	(mm)
January	181.2	39.8	21.96	51.3	28.31	32.5
February	204.2	63.4	31.05	49.4	24.19	77.8
March	174.0	93.8	53.91	58.5	33.62	133.8
April	46.2	55.9	121.00	63.1	136.58	146.7
May	34.9	43.1	123.50	58.3	167.05	144.2
June	155.2	36.1	23.26	69.4	44.72	136.6
July	125.3	39.4	31.44	73	58.26	133.1
August	294.3	58.7	19.95	70.3	23.89	144.9
September	197.7	81.5	41.22	62.6	31.66	175.6
October	139.3	78.6	56.42	61.2	43.93	195.2
November	412.5	101.8	24.68	56.8	13.77	223.5
December	532.1	270.2	50.78	53.5	10.05	380.2

Table 16
Dry Year Water Budget for Sulat Watershed Under Current Land Uses

Month	Rain	Estimated Runoff	Runoff Coefficient	Total Evaporation		Groundwater
	(mm)	(mm)	(%)	(mm)	% of Rain	(mm)
January	181.2	54.3	30.0	108.7	60.0	70.0
February	204.2	53.6	26.2	106.2	52.0	85.6
March	174.0	65.8	37.8	118.4	68.0	106.1
April	46.2	38.8	84.0	98.3	212.8	109.9
May	34.9	32.8	94.0	55.5	159.0	106.7
June	155.2	36.5	23.5	83.4	53.7	100.8
July	125.3	31.8	25.4	112.2	89.5	93.8
August	294.3	46.4	15.8	146.7	49.8	87.5
September	197.7	39.7	20.1	138.7	70.2	85.5
October	139.3	34.9	25.1	135.1	97.0	83.7
November	412.5	64.9	15.7	121.8	29.5	83.9
December	532.1	176.7	33.2	116.2	21.8	169.3

Table 17
Wet Year Water Budget for Sulat Watershed Under Current Land Uses

Month	Rain	Estimated Runoff	Runoff Coefficient	Total Evaporation		Groundwater
	(mm)	(mm)	(%)	(mm)	% of Rain	(mm)
January	439.6	131.7	30.0	121.0	27.5	113.5
February	365.7	144.6	39.5	119.5	32.7	179.2
March	326.7	137.3	42.0	151.5	46.4	223.8
April	316.7	148.9	47.0	157.1	49.6	269.0
May	85.3	84.5	99.1	124.9	146.4	264.6
June	150.1	67.7	45.1	107.2	71.4	245.1
July	66.0	54.3	82.3	98.0	148.5	222.2
August	231.1	59.1	25.6	107.0	46.3	199.1
September	120.0	45.9	38.3	119.8	99.8	179.0
October	368.7	74.9	20.3	131.9	35.8	161.3
November	831.3	283.5	34.1	131.7	15.8	278.0
December	659.3	331.6	50.3	128.6	19.5	431.6

Table 17a
Water Budget for Sulat Watershed Under 10% Reduction in Forest Cover

Month	Rain	Estimated Runoff	Runoff Coefficient	Total Evaporation		Groundwater
	(mm)	(mm)	(%)	(mm)	% of Rain	(mm)
January	181.2	53.4	29.5	103.9	57.3	70.1
February	204.2	55.5	27.2	103.2	50.5	88.1
March	174.0	71.0	40.8	113.0	64.9	113.1
April	46.2	41.3	89.4	92.6	200.4	117.3
May	34.9	34.5	98.9	53.9	154.4	113.8
June	155.2	37.9	24.4	85.3	55.0	107.4
July	125.3	32.7	26.1	114.5	91.4	99.8
August	294.3	44.5	15.1	144.0	48.9	93.3
September	197.7	40.7	20.6	132.9	67.2	91.8
october	139.3	36.5	26.2	129.6	93.0	90.7
November	412.5	66.9	16.2	115.4	28.0	92.4
December	532.1	190.3	35.8	110.8	20.8	189.6

Table 17b
Water Budget for Sulat Watershed Under 20% Reduction in Forest Cover

Month	Rain	Estimated Runoff	Runoff Coefficient	Total Evaporation		Groundwater
	(mm)	(mm)	(%)	(mm)	% of Rain	(mm)
January	181.2	53.8	29.7	99.1	54.7	70.1
February	204.2	56.8	27.8	99.6	48.8	88.1
March	174.0	72.8	41.8	111.6	64.1	113.1
April	46.2	42.2	91.3	92.8	200.9	117.3
May	34.9	35.1	100.6	54.5	156.2	113.8
June	155.2	38.4	24.7	84.6	54.5	107.4
July	125.3	33.2	26.5	113.9	90.9	99.8
August	294.3	44.9	15.3	141.7	48.1	93.3
September	197.7	41.3	20.9	131.1	66.3	91.8
October	139.3	37.3	26.8	126.4	90.7	90.7
November	412.5	68.2	16.5	111.5	27.0	92.4
December	532.1	194.9	36.6	105.3	19.8	189.6

Table 17c
Water Budget for Sulat Watershed Under 10% Increase in Forest Cover

Month	Rain	Estimated Runoff	Runoff Coefficient	Total Evaporation		Groundwater
	(mm)	(mm)	(%)	(mm)	% of Rain	(mm)
January	181.2	74.3	41.00	26.7	14.74	148.3
February	204.2	100.4	49.17	28.7	14.05	184.0
March	174.0	123.8	71.15	36.8	21.15	226.7
April	46.2	75.5	163.42	42.2	91.34	229.3
May	34.9	60.0	171.92	45.1	129.23	216.9
June	155.2	59.7	38.47	51.4	33.12	201.2
July	125.3	63.1	50.36	49.8	39.74	193.3
August	294.3	93.8	31.87	45.3	15.39	202.4
September	197.7	108.2	54.73	38.8	19.63	229.6
October	139.3	102.9	73.87	35.5	25.48	246.8
November	412.5	144.2	34.96	30.0	7.27	273.1
December	532.1	319.1	59.97	26.4	4.96	426.4

Table 17d
Water Budget for Sulat Watershed Under 20% Increase in Forest Cover

Month	Rain	Estimated Runoff	Runoff Coefficient	Total Evaporation		Groundwater
	(mm)	(mm)	(%)	(mm)	% of Rain	(mm)
January	181.2	77.3	42.66	25.7	14.18	165.4
February	204.2	103.4	50.64	25.9	12.68	199.6
March	174.0	127.5	73.28	31.7	18.22	241.2
April	46.2	79.2	171.43	34.7	75.11	243.1
May	34.9	63.4	181.66	37.4	107.16	230.0
June	155.2	63.8	41.11	40.8	26.29	214.3
July	125.3	70.7	56.42	39.6	31.60	209.4
August	294.3	104.0	35.34	36.7	12.47	222.9
September	197.7	117.3	59.33	32.5	16.44	252.5
October	139.3	109.8	78.82	30.9	22.18	269.4
November	412.5	150.0	36.36	27.3	6.62	294.8
December	532.1	323.9	60.87	25.5	4.79	446.4

Table 18
Estimated Water Resources for Samar Island Watersheds Under Various Land Use Scenarios

Watershed	Area (ha)	Mean Annual Rain (mm)	Runoff MCM Current Landuse	Runoff MCM 10% Forest Reduction	Runoff MCM 20% Forest Reduction	Runoff MCM 10% Forest Increase	Runoff MCM 20% Forest Increase	Ground Water (MCM)
Balangiga	13,287.7	2,661.2	129.1	130.8	123.8	169.7	173.3	35.4
Bantayan	10,492.0	3,160.0	121.0	122.7	116.0	159.1	162.5	33.2
Basey	34,716.5	2,628.1	333.0	337.6	319.3	437.9	447.1	91.2
Borongan	14,058.3	2,661.2	136.6	138.4	130.9	179.6	183.3	37.4
Bugko	17,278.8	3,160.0	199.3	202.0	191.1	262.1	267.5	54.6
Bulosao	4,277.0	2,661.2	41.5	42.1	39.8	54.6	55.8	11.4
Calbiga	19,851.6	2,549.5	184.7	187.3	177.1	242.9	248.0	50.6
Can-Avid	86,599.8	2,577.3	814.7	825.8	781.2	1,071.3	1,093.6	223.2
Catarman	59,380.8	2,965.8	642.8	651.6	616.4	845.3	862.9	176.1
Catbalogan	13,540.6	2,533.0	125.2	126.9	120.0	164.6	168.1	34.3
Catubig	94,201.2	2,834.0	974.4	987.8	934.4	1,281.4	1,308.1	267.0
Dolores	84,560.8	2,599.8	802.4	813.4	769.4	1,055.2	1,077.2	219.8
Gandara	111,907.8	2,533.0	1,034.6	1,048.8	992.1	1,360.6	1,389.0	283.5
Gulganti	10,512.0	3,160.0	121.2	122.9	116.3	159.4	162.8	33.2
Linal-an	7,647.4	2,661.2	74.3	75.3	71.2	97.7	99.7	20.4
Llorente	35,297.2	2,661.2	342.9	347.6	328.8	450.9	460.3	93.9
Lo-om	4,689.8	2,661.2	45.6	46.2	43.7	59.9	61.2	12.5

Watershed	Area (ha)	Mean Annual Rain (mm)	Runoff MCM Current Landuse	Runoff MCM 10% Forest Reduction	Runoff MCM 20% Forest Reduction	Runoff MCM 10% Forest Increase	Runoff MCM 20% Forest Increase	Ground Water (MCM)
Marabut	15,006.9	2,661.2	145.8	147.8	139.8	191.7	195.7	39.9
Mauo	26,390.5	3,078.1	296.5	300.6	284.3	389.9	398.0	81.2
Mondragon	6,048.1	3,160.0	69.8	70.7	66.9	91.7	93.6	19.1
Oras	28,333.5	2,737.6	283.1	287.0	271.5	372.3	380.1	77.6
Pabanog	8,890.8	2,533.0	82.2	83.3	78.8	108.1	110.3	22.5
Pambujan	59,039.9	2,855.5	615.3	623.8	590.1	809.2	826.1	168.6
Pan-as Hayiban	45,173.5	2,563.2	422.6	428.4	405.3	555.8	567.4	115.8
Silaga	22,010.5	2,545.9	204.5	207.3	196.1	269.0	274.6	56.0
Sulat	16,791.0	2,661.2	163.1	165.3	156.4	214.5	219.0	44.7
Suribao	69,359.0	2,661.2	673.7	682.9	646.0	886.0	904.4	184.6
Taft	41,688.2	2,660.6	404.8	410.4	388.2	532.4	543.5	110.9
Tangkip	3,223.5	2,661.2	31.3	31.7	30.0	41.2	42.0	8.6
Total	**964,254.7**	**79,446.4**	**9,516.1**	**9,646.5**	**9,125.0**	**12,514.3**	**12,775.1**	**2,607.2**

Note:
1.) Mean annual rain is estimated as the weighted average using the Thiessen method.
2.) Runoff = Mean Annual Rain * Area * Mean Runoff Coefficient based on estimated wet and dry runoff values for the three (3) representative watersheds.
3.) Groundwater = Mean Annual Rain * Area * 0.10
4.) MCM = million cubic meters

Table 19
Population Distribution by Watershed and Municipality

Watershed	Municipality	Area (ha)	Population Density (person/ha)	1995 Population	2000 Population
	Balangiga	5,788	0.6	3,473	3,890
	Marabut	122	1.0	122	137
	Lawaan	6,963	0.6	4,178	4,679
	Sta. Rita	415	1.3	540	604
Balangiga		13,288	0.6	8,312	9,310
					0
	San Roque	9,340	1.0	9,340	10,461
	Mondragon	867	0.9	780	874
	Pambujan	183	1.4	256	287
Bantayan		10,390	1.0	10,377	11,622
					0
	Marabut	1,181	1.0	1,181	1,323
	Llorente	570	0.3	171	192
	Basey	32,965	0.7	23,076	25,845
Basey		34,716	0.7	24,428	27,359
					0
	San Julian	1,056	1.0	1,056	1,183
	Borongan	13,002	0.8	10,402	11,650
Borongan		14,058	0.8	11,458	12,833
					0
	San Roque	316	1.0	316	354
	Catarman	2,494	1.1	2,743	3,073
	Mondragon	14,048	0.9	12,643	14,160
	Silvino Lobos	421	0.5	211	236
Bugko		17,279	0.9	15,913	17,823
					0
	Marabut	883	1.0	883	989
	Lawaan	3,394	0.6	2,036	2,281
Bulasao		4,277	0.7	2,919	3,270
					0

Watershed	Municipality	Area (ha)	Population Density (person/ha)	1995 Population	2000 Population
	Calbiga	8,918	0.6	5,351	5,993
	Pinabacdao	8,693	1.4	12,170	13,631
	Villareal	2,149	0.9	1,934	2,166
Calbiga		19,760	1.0	19,455	21,790
					0
	Paranas	38,241	0.6	22,945	25,698
	Jiabong	5,269	2.1	11,065	12,393
	Maslog	1,668	0.2	334	374
	Can Avid	18,043	0.8	14,434	16,167
	Catbalogan	1583	6.4	10,131	11,347
	San Jose De Buan	2420	0.2	484	542
	Dolores	81	1.1	89	100
	Gandara	2182	0.1	218	244
	Taft	4307	1	4,307	4,824
	Motiong	11813	0.6	7,088	7,938
Can Avid		85,607	0.6	48,150	53,928
					0
	Catarman	47,660	1.1	52,426	58,717
	San Isidro	339	0.9	305	342
	San Jose	34	4.4	150	168
	Calbayog	4,542	1.4	6,359	7,122
	Bobon	5,947	1.2	7,136	7,993
	Mondragon	39	0.9	35	39
	Silvino Lobos	1	0.5	1	1
	Victoria	819	0.6	491	550
Catarman		59,381	1.1	66,903	74,931
					0
	Paranas	2,286	2.1	4,801	5,377
	Jiabong	2,658	2.1	5,582	6,252
	Catbalogan	7,578	6.4	48,499	54,319
	San Sebastian	26	2.1	55	61
	Motiong	993	2.1	2,085	2,336
Catbalogan		13,541	4.5	61,022	68,344
					0

Watershed	Municipality	Area (ha)	Population Density (person/ha)	1995 Population	2000 Population
	Matuguinao	5,098	0.1	510	571
	Maslog	2,135	0.2	427	478
	Laoang	16,935	2.2	37,257	41,728
	San Jose de Buan	9,112	0.2	1,822	2,041
	Palapag	302	1.4	423	474
	Pambujan	3,801	1.4	5,321	5,960
	Silvino Lobos	2,295	0.5	1,148	1,285
	Jipapad	9,785	0.3	2,936	3,288
	Catubig	44,487	0.9	40,038	44,843
	Mapanas	174	0.8	139	156
Catubig		94,124	1.0	90,021	100,823
					0
	Maslog	25,722	0.2	5,144	5,762
	Can Avid	8,174	0.8	6,539	7,324
	Oras	14,366	1.7	24,422	27,353
	San Jose de Buan	13,537	0.7	9,476	10,613
	Dolores	20,100	1.1	22,110	24,763
	Arteche	2,662	1.2	3,194	3,578
Dolores		84,561	0.8	70,886	79,392
					0
	Tarangnan	10,251	1.2	12,301	13,777
	Sta. Margarita	8,944	1.3	11,627	13,022
	Matuguinao	8,006	0.1	801	897
	Calbayog	3,859	1.4	5,403	6,051
	Catbalogan	8,841	6.4	56,582	63,372
	San Jose de Buan	13,392	1.8	24,106	26,998
	Gandara	51,786	0.4	20,714	23,200
	Pagsanghan	5,243	1.0	5,243	5,872
Gandara		110,322	1.2	136,777	153,190
					0
	Catarman	31	1.1	34	38
	San Isidro	798	0.9	718	804
	San Jose	2,766	4.4	12,170	13,631
	Bobon	4,091	1.2	4,909	5,498
	Victoria	2,827	0.6	1,696	1,900
Gulganti		10,513	1.9	19,528	21,871
					0

Watershed	Municipality	Area (ha)	Population Density (person/ha)	1995 Population	2000 Population
	Maydolong	22	0.3	7	7
	Borongan	7,625	0.8	6,100	6,832
Linal-an		7,647	0.8	6,107	6,839
					0
	Balangiga	2,778	0.6	1,667	1,867
	Quinapondan	1,369	1.7	2,327	2,607
	Gen. Mac. Arthur	3,673	0.9	3,306	3,702
	Lawaan	593	0.6	356	398
	Sta. Rita	21,973	1.3	28,565	31,993
	Giporlos	4,839	1.0	4,839	5,420
Llorente		35,225	1.2	41,060	45,987
					0
	Borongan	4,690	0.8	3,752	4,202
Lo-om		4,690	0.8	3,752	4,202
					0
	Marabut	13,375	1.0	13,375	14,980
	Lawaan	520	0.6	312	349
	Basey	1,112	0.7	778	872
Marabut		15,007	1.0	14,465	16,201
					0
	Allen	1,239	3.8	4,708	5,273
	San Isidro	8,865	0.9	7,979	8,936
	San Jose	108	4.4	475	532
	Lavezares	4,510	1.7	7,667	8,587
	Calbayog	478	1.4	669	750
	Victoria	11,173	0.6	6,704	7,508
Mauo		26,373	1.1	28,202	31,586
					0
	Catarman	252	1.1	277	310
	Mondragon	5,796	0.9	5,216	5,842
Mondragon		6,048	0.9	5,494	6,153
					0

Watershed	Municipality	Area (ha)	Population Density (person/ha)	1995 Population	2000 Population
	San Policarpio	2,077	1.5	3,116	3,489
	Maslog	233	0.2	47	52
	Gamay	109	1.7	185	208
	Oras	5,242	1.7	8,911	9,981
	Lapinig	1,571	1.7	2,671	2,991
	Jipapad	10,764	0.3	3,229	3,617
	Arteche	7,478	1.2	8,974	10,050
	Catubig	731	0.9	658	737
Oras		28,205	1.0	27,790	31,125
					0
	Calbiga	2,087	0.6	1,252	1,402
	Paranas	438	0.6	263	294
	Hinabangan	4,293	0.3	1,288	1,442
	San Sebastian	2,073	0.4	829	929
Pabanog		8,891	0.4	3,632	4,068
					0
	San Roque	6,011	1.0	6,011	6,732
	Catarman	1,884	1.1	2,072	2,321
	Sta. Margarita	47	1.3	61	68
	Matuguinao	2,926	0.1	293	328
	Laong	536	2.2	1,179	1,321
	Calbayog	11,607	1.4	16,250	18,200
	Mondragon	526	0.9	473	530
	Pambujan	11,112	1.4	15,557	17,424
	Silvino Lobos	28,874	0.5	14,437	16,169
	Gandara	557	0.9	501	561
	Catubig	916	0.9	824	923
Pambujan		64,996	0.9	57,659	64,578
					0
	San Isidro	2,855	0.9	2,570	2,878
	Calbayog	42,319	1.4	59,247	66,356
Pan-as Hayiban		45,174	1.4	61,816	69,234
					0
	Calbiga	223	0.6	134	150
	Pinabacdao	2,590	1.4	3,626	4,061
	Llorente	14,418	0.3	4,325	4,844
	Villareal	8	0.9	7	8
	Basey	4,772	0.7	3,340	3,741
Silaga		22,011	0.5	11,433	12,805
					0

Watershed	Municipality	Area (ha)	Population Density (person/ha)	1995 Population	2000 Population
	San Julian	4,619	1.0	4,619	5,173
	Hinabangan	616	0.3	185	207
	Taft	17	1.0	17	19
	Sulat	11,540	0.9	10,386	11,632
Sulat		16,792	0.9	15,207	17,032
					0
	Balangkayan	4,655	0.4	1,862	2,085
	Calbiga	5,373	0.6	3,224	3,611
	Marabut	2,074	1.0	2,074	2,323
	Maydolong	22,562	0.3	6,769	7,581
	Hinabangan	2	0.3	1	1
	Sta. Rita	11,845	1.0	11,845	13,266
	Borongan	15,530	0.8	12,424	13,915
	Basey	6,910	0.7	4,837	5,417
Suribao		68,951	0.6	43,035	48,199
					0
	Calbiga	2	0.6	1	1
	San Julian	1,684	1.0	1,684	1,886
	Paranas	1,498	0.9	1,348	1,510
	Hinabangan	18,375	0.3	5,513	6,174
	Borongan	7,041	0.8	5,633	6,309
	Taft	10,050	1.0	10,050	11,256
	Sulat	3,038	0.9	2,734	3,062
Taft		41,688	0.6	26,963	30,198
					0
	Gen. Mac. Arthur	609	0.9	548	614
	Sta. Rita	2,615	1.3	3,400	3,807
Tangkip		3,224	1.2	3,948	11,114

Table 20
Water Requirement (MCM) by Sector in the Island of Samar

Sector	1975	2000	2025
Domestic	16.70	144.38	406.48
Manufacturing	0.45	5.54	63.33
Mining	0.00	0.04	0.43
Construction	0.03	0.33	3.80
Electricity	0.00	0.01	0.07
Agriculture	332.92	6,168.38	7,402.06
Total	**350.10**	**6,318.67**	**7,876.17**

Assumptions:
1.) All sectors except agriculture will continue to increase at the rate of growth from 1975 to 2000
2.) Agriculture water demand will not increase by more than 20% as all potential irrigable lands become fully developed

Table 21
Irrigation Facilities in the Different Watersheds of Samar Island

WATERSHED	MUNICIPALITY (visual estimate)	PROJECT	BARANGAY	SERVICE AREA (ha) New	Existing	TYPE
Balangiga	Balangiga	Balangiga	(not specified)	800		CIP
Basey WS	Basey	Basey	(not specified)	3,000		IP
Basey WS	Basey	Basiao	Basiao	30		CIP
Basey WS	Basey	Loog	Loog		65	CIS
Basey WS	Basey	Pilit-Novillas	Pelit, Nouvelas		92	CIS
Basey WS	Basey	Novillas	Nouvelas			CIP
Borongan	San Julian	Libas	Libas		60	CIS
Calbiga	Pinabacdao	Magbawat	Magdawat			CIP
Calbiga	Pinabacdao	Parasanon	Parasanon			CIP
Calbiga	Pinabacdao	Lale	Lale	250		SRIP
Can-Avid WS	Can-Avid	Malugo	Malogo			CIS
Can-Avid WS	Can-Avid	Aroganga	Aroganga	585		SRIP
Capul Island	Capul	Capul	(not specified)		50	CIS
Catarman	Bobon	Acerida	Acerida	200		CIP
Catarman	Catarman	Salawad	(not found)		40	CIS
Catarman	Catarman	Cag-Abaca	Cag-Abaca	100		CIP
Catarman	Catarman	Palali	(not found)	270		CIP
Catarman	Catarman	Imelda	Imelda			CIS
Catarman	Catarman	Hibabaugan	(not found)	200		CIP
Catbalogan	Jiabong	Parina	Parina	30		CIP
Catbalogan	Jiabong	Inungayan	(not found)		30	CIS
Catbalogan	Motiong	Camaroboan	Camarobo-An			CIS
Catbalogan	Paranas	Calapi	Calapi			CIS
Catbalogan	Paranas	Tutubigan	Tutubigan		30	CIS
Catbalogan	Paranas	Hinika-An	Hinica-An		30	CIS
Catbalogan	Paranas	Paco	Paco		50	CIS
Catbalogan	Paranas	Patag-Tabucan	Patag-Tabucan		65	(unspecified)
Catubig WS	Catubig	Catubig Valley	(not found)	1,820		IP
Catubig WS	Catubig	Irawahan	Irawahan	500	300	CIS
Catubig WS	Catubig	Sagudsoron	Sagudsoron	80		SRIP
Catubig WS	Laoang	Hangtud	(not found)	500		IP
Catubig WS	Palapag	Lower Sangay	Sangay		20	CIS
Catubig WS	Palapag	Palapag	(not specified)	450		CIP
Catubig WS	Palapag	Osmena	Osmena		20	CIP
Catubig WS	Mapanas	Mapno	Mapno		30	CIS
Catubig WS	Mapanas	Mapanas	(not specified)		80	CIS
Catubig WS	Gamay	Gamay	Gamay	350		CIP
Catubig WS	Catubig	Hibubulao	(not found)			CIS
Daram Island	Daram	Sua	Sua	20		CIP
Dolores WS	San Jose de Buan	Aguingayan	Aguingayan			CIP
Dolores WS	San Jose de Buan	Madua	(not found)			CIP

WATERSHED	MUNICIPALITY (visual estimate)	PROJECT	BARANGAY	SERVICE AREA (ha) New	Existing	TYPE
Dolores WS	Maslog	Maslog	Maslog	151		IP
Dolores WS	Oras	Cadi-An	Cadian		17	CIP
Dolores WS	Oras	Tagpili	(not found)	120		CIP
Dolores WS	Dolores	Jicontol	Jicontol			CIS
Dolores WS	Dolores	Osmena	Osmena			CIP
Dolores WS	Dolores	Dolores	(not specified)			IP
Dolores WS	Can-Avid	Dapdap	Dapdap	850		SRIP
Dolores WS	Dolores	San Pascual	San Pascual			CIP
Dolores WS	Can-Avid	Sulong	Solong			SRIP
Gandara WS	Calbayog	Mawacat	Mawacat			CIP
Gandara WS	Calbayog	Tun-Ok	(not found)	20		CIP
Gandara WS	Calbayog	Mabini	Mabini			CIP
Gandara WS	Santa Margarita	Napuro	Napuro		45	CIS
Gandara WS	Santa Margarita	Panaru-An	Panaruan		55	CIS
Gandara WS	Santa Margarita	Inuragulao	Inoraguiao	35		CIP
Gandara WS	Santa Margarita	Arapison	Arapison	40		CIP
Gandara WS	Gandara	Nacubi	Nacube	150		SRIP
Gandara WS	Gandara	Tagnao	Tagnao	40		CIP
Gandara WS	Gandara	La Paz	La Paz		136	CIS
Gandara WS	Tarangnan	Pajo	Pajo	130		CIP
Gandara WS	San Jose de Buan	Mamanday	(not found)	50		CIP
Gandara WS	San Jose de Buan	Gusa	Gusa			CIP
Gandara WS	San Jose de Buan	Bonadio	(not found)	100		CIP
Gandara WS	Catbalogan	Iguid	Iguid	20		CIP
Gandara WS	Matuguinao	Matuguinao	(not specified)	60		CIP
Linal-an	Borongan	San Jose	San Jose			CIS
Linal-an	Borongan	Cabunga	Cabonga			CIS
Linal-an	Borongan	Cabung	Cabong			CIP
Llorente	General MacArthur	Calutan / Macabut	Calutan			CIP
Llorente	General MacArthur	San Isidro	San Isidro	100		CIS
Llorente	Quinapondan	Guinapondan	(not specified)			CIS
Llorente	Quinapondan	San Pedro	San Pedro		20	CIS
Llorente	Quinapondan	Tinago	(not found)			CIS
Marabut	Marabut	Mabuhay	Mabuhay	30		CIP
Marabut	Marabut	Tag-Alag	Tagalag		30	CIS
Marabut	Marabut	Kaluayan	(not found)		30	CIS
Mauo	Allen	Allen	(not specified)			CIS
Mauo	Lavezares	Lipata	Lipata		50	CIS
Mauo	Lavezares	Villa	Villa	20		CIP
Mauo	Allen	Kinagitman	Kinaguitman		15	CIS
Mauo	Allen	Sabang	Sabang			CIS
Mauo	Allen	Kinabranan	Kinabranan		23	CIS
Mauo	Rosario	Rosario	(not specified)		50	CIS

WATERSHED	MUNICIPALITY (visual estimate)	PROJECT	BARANGAY	SERVICE AREA (ha) New	Existing	TYPE
Mauo	Rosario	San Miguel	San Miguel			CIS
Mauo	Rosario	Sinimangan	(not found)	120		CIP
Mauo	Rosario	Pandango	(not found)			CIS
Mauo	Victoria	Colab-Og	Colab-Og			CIS
Mauo	San Isidro	Palanit	Palanit		15	CIS
Mauo	San Jose	Tubig Danao	Tubigdanao	50		CIP
Mauo	San Jose	San Jose	(not specified)		55	CIS
Pabanog	Paranas	Tula	Tula	100		CIP
Pabanog	Paranas	Tabay	Tabay	200		CIP
Pambujan	Mondragon	Bugko	Bugko	500		CIP
Pambujan	San Roque	Coroconog	Coroconog	65		CIP
Pambujan	San Roque	Cabulo-An	Cabulaloan	30		CIP
Pambujan	(San Roque)	Mondragon	(not specified)	150		CIP
Pambujan	Pambujan	Coroconog	Coroconog	200		CIS
Pambujan	Pambujan	Himabug-At	(not found)		30	CIS
Pan-as Hayiban	Calbayog	San Joaquin	San Joaquin		20	CIS
Pan-as Hayiban	Calbayog	Danao	Danao		80	CIS
Pan-as Hayiban	Calbayog	Tabukno	(not found)	38		CIP
Pan-as Hayiban	Calbayog	Roxas	Roxas	200		CIP
Pan-as Hayiban	Calbayog	Himautan	(not found)	30		CIP
Pan-as Hayiban	Calbayog	Baay	Ba-ay			CIP
San Antonio Is	San Antonio	San Antonio	(not specified)	20		
Silaga	Santa Rita	Independencia	(not found)		30	CIS
Silaga	Santa Rita	Placer	Placer		20	CIS
Silaga	Santa Rita	Old Manunca	Old Manunca		30	CIS
Silaga	Santa Rita	Santa Rita	Santa Rita	1,000		SRIP
Silaga	Santa Rita	Tuminamos	Tominamos	20		CIP
Suribao	Balangkayan	Bangon	Bangon		80	CIP
Suribao	Balangkayan	Caisawan-Tugas	Caisawan			CIP
Taft WS	Taft	Mantang	Mantang			CIP
Tongkip	Llorente	Llorente	(not specified)	80		CIP
Tongkip	Hernani	Hernani	(not specified)			CIS
Zumarraga Islan	Zumarraga	Moalboal	Mongolbongol	30		CIP
	Victoria	Cabangan	(not found)			CIS
Total				**13,934**	**1,793**	

Table 22
Estimated Domestic Water Requirements by Watershed and Municipality

Watershed	Municipality	Area (ha)	Population Density (person/ha)	1995 Population	2000 Population	Domestic Water Required (MCM)
	Balangiga	5,788	0.6	3,473	3,890	0.213
	Marabut	122	1.0	122	137	0.007
	Lawaan	6,963	0.6	4,178	4,679	0.256
	Sta. Rita	415	1.3	540	604	0.033
Balangiga		13,288	0.6	8,312	23,401	1.281
	San Roque	9,340	1.0	9,340	26,295	1.440
	Mondragon	867	0.9	780	2,197	0.120
	Pambujan	183	1.4	256	721	0.039
Bantayan		10,390	1.0	10,377	29,213	1.599
	Marabut	1,181	1.0	1,181	3,325	0.182
	Llorente	570	0.3	171	481	0.026
	Basey	32,965	0.7	23,076	64,964	3.557
Basey		34,716	0.7	24,428	68,771	3.765
	San Julian	1,056	1.0	1,056	2,973	0.163
	Borongan	13,002	0.8	10,402	29,284	1.603
Borongan		14,058	0.8	11,458	32,257	1.766
	San Roque	316	1.0	316	890	0.049
	Catarman	2,494	1.1	2,743	7,723	0.423
	Mondragon	14,048	0.9	12,643	35,594	1.949
	Silvino Lobos	421	0.5	211	593	0.032
Bugko		17,279	0.9	15,913	44,800	2.453
	Marabut	883	1.0	883	2,486	0.136
	Lawaan	3,394	0.6	2,036	5,733	0.314
Bulasao		4,277	0.7	2,919	8,219	0.450
	Calbiga	8,918	0.6	5,351	15,064	0.825
	Pinabacdao	8,693	1.4	12,170	34,263	1.876
	Villareal	2,149	0.9	1,934	5,445	0.298
Calbiga		19,760	1.0	19,455	54,772	2.999

Watershed	Municipality	Area (ha)	Population Density (person/ha)	1995 Population	2000 Population	Domestic Water Required (MCM)
	Paranas	38,241	0.6	22,945	64,596	3.537
	Jiabong	5,269	2.1	11,065	31,151	1.706
	Maslog	1,668	0.2	334	939	0.051
	Can Avid	18,043	0.8	14,434	40,637	2.225
	Catbalogan	1583	6.4	10,131	28,522	1.562
	San Jose De Buan	2420	0.2	484	1,363	0.075
	Dolores	81	1.1	89	251	0.014
	Gandara	2182	0.1	218	614	0.034
	Taft	4307	1	4,307	12,125	0.664
	Motiong	11813	0.6	7,088	19,954	1.092
Can-Avid		85,607	0.6	48,150	135,557	7.422
	Catarman	47,660	1.1	52,426	147,595	8.081
	San Isidro	339	0.9	305	859	0.047
	San Jose	34	4.4	150	421	0.023
	Calbayog	4,542	1.4	6,359	17,902	0.980
	Bobon	5,947	1.2	7,136	20,091	1.100
	Mondragon	39	0.9	35	99	0.005
	Silvino Lobos	1	0.5	1	1	0.000
	Victoria	819	0.6	491	1,383	0.076
Catarman		59,381	1.1	66,903	188,352	10.312
	Paranas	2,286	2.1	4,801	13,515	0.740
	Jiabong	2,658	2.1	5,582	15,714	0.860
	Catbalogan	7,578	6.4	48,499	136,540	7.476
	San Sebastian	26	2.1	55	154	0.008
	Motiong	993	2.1	2,085	5,871	0.321
Catbalogan		13,541	4.5	61,022	171,794	9.406
	Matuguinao	5,098	0.1	510	1,435	0.079
	Maslog	2,135	0.2	427	1,202	0.066
	Laoang	16,935	2.2	37,257	104,890	5.743
	San Jose de Buan	9,112	0.2	1,822	5,131	0.281
	Palapag	302	1.4	423	1,190	0.065
	Pambujan	3,801	1.4	5,321	14,981	0.820
	Silvino Lobos	2,295	0.5	1,148	3,231	0.177
	Jipapad	9,785	0.3	2,936	8,264	0.452
	Catubig	44,487	0.9	40,038	112,720	6.171
	Mapanas	174	0.8	139	392	0.021
Catubig		94,124	1.0	90,021	253,436	13.876

Watershed	Municipality	Area (ha)	Population Density (person/ha)	1995 Population	2000 Population	Domestic Water Required (MCM)
	Maslog	25,722	0.2	5,144	14,483	0.793
	Can Avid	8,174	0.8	6,539	18,410	1.008
	Oras	14,366	1.7	24,422	68,756	3.764
	San Jose de Buan	13,537	0.7	9,476	26,678	1.461
	Dolores	20,100	1.1	22,110	62,246	3.408
	Arteche	2,662	1.2	3,194	8,993	0.492
Dolores		84,561	0.8	70,886	199,566	10.926
	Tarangnan	10,251	1.2	12,301	34,632	1.896
	Sta. Margarita	8,944	1.3	11,627	32,734	1.792
	Matuguinao	8,006	0.1	801	2,254	0.123
	Calbayog	3,859	1.4	5,403	15,210	0.833
	Catbalogan	8,841	6.4	56,582	159,296	8.721
	San Jose de Buan	13,392	1.8	24,106	67,864	3.716
	Gandara	51,786	0.4	20,714	58,317	3.193
	Pagsanghan	5,243	1.0	5,243	14,761	0.808
Gandara		110,322	1.2	136,777	385,068	21.082
	Catarman	31	1.1	34	96	0.005
	San Isidro	798	0.9	718	2,022	0.111
	San Jose	2,766	4.4	12,170	34,263	1.876
	Bobon	4,091	1.2	4,909	13,821	0.757
	Victoria	2,827	0.6	1,696	4,775	0.261
Gulganti		10,513	1.9	19,528	54,977	3.010
	Maydolong	22	0.3	7	19	0.001
	Borongan	7,625	0.8	6,100	17,173	0.940
Linal-an		7,647	0.8	6,107	17,192	0.941
	Balangiga	2,778	0.6	1,667	4,693	0.257
	Quinapondan	1,369	1.7	2,327	6,552	0.359
	Gen. Mac. Arthur	3,673	0.9	3,306	9,307	0.510
	Lawaan	593	0.6	356	1,002	0.055
	Sta. Rita	21,973	1.3	28,565	80,419	4.403
	Giporlos	4,839	1.0	4,839	13,623	0.746
Llorente		35,225	1.2	41,060	115,595	6.329
	Borongan	4,690	0.8	3,752	10,563	0.578
Lo-om		4,690	0.8	3,752	10,563	0.578

Watershed	Municipality	Area (ha)	Population Density (person/ha)	1995 Population	2000 Population	Domestic Water Required (MCM)
	Marabut	13,375	1.0	13,375	37,655	2.062
	Lawaan	520	0.6	312	878	0.048
	Basey	1,112	0.7	778	2,191	0.120
Marabut		15,007	1.0	14,465	40,724	2.230
	Allen	1,239	3.8	4,708	13,255	0.726
	San Isidro	8,865	0.9	7,979	22,462	1.230
	San Jose	108	4.4	475	1,338	0.073
	Lavezares	4,510	1.7	7,667	21,585	1.182
	Calbayog	478	1.4	669	1,884	0.103
	Victoria	11,173	0.6	6,704	18,873	1.033
Mauo		26,373	1.1	28,202	79,397	4.347
	Catarman	252	1.1	277	780	0.043
	Mondragon	5,796	0.9	5,216	14,686	0.804
Mondragon		6,048	0.9	5,494	15,466	0.847
	San Policarpio	2,077	1.5	3,116	8,771	0.480
	Maslog	233	0.2	47	131	0.007
	Gamay	109	1.7	185	522	0.029
	Oras	5,242	1.7	8,911	25,088	1.374
	Lapinig	1,571	1.7	2,671	7,519	0.412
	Jipapad	10,764	0.3	3,229	9,091	0.498
	Arteche	7,478	1.2	8,974	25,263	1.383
	Catubig	731	0.9	658	1,852	0.101
Oras		28,205	1.0	27,790	78,238	4.284
	Calbiga	2,087	0.6	1,252	3,525	0.193
	Paranas	438	0.6	263	740	0.041
	Hinabangan	4,293	0.3	1,288	3,626	0.199
	San Sebastian	2,073	0.4	829	2,334	0.128
Pabanog		8,891	0.4	3,632	10,225	0.560

Watershed	Municipality	Area (ha)	Population Density (person/ha)	1995 Population	2000 Population	Domestic Water Required (MCM)
	San Roque	6,011	1.0	6,011	16,923	0.927
	Catarman	1,884	1.1	2,072	5,834	0.319
	Sta. Margarita	47	1.3	61	172	0.009
	Matuguinao	2,926	0.1	293	824	0.045
	Laong	536	2.2	1,179	3,320	0.182
	Calbayog	11,607	1.4	16,250	45,748	2.505
	Mondragon	526	0.9	473	1,333	0.073
	Pambujan	11,112	1.4	15,557	43,797	2.398
	Silvino Lobos	28,874	0.5	14,437	40,644	2.225
	Gandara	557	0.9	501	1,411	0.077
	Catubig	916	0.9	824	2,321	0.127
Pambujan		64,996	0.9	57,659	162,327	8.887
	San Isidro	2,855	0.9	2,570	7,234	0.396
	Calbayog	42,319	1.4	59,247	166,797	9.132
Pan-as Hayiban		45,174	1.4	61,816	174,031	9.528
	Calbiga	223	0.6	134	377	0.021
	Pinabacdao	2,590	1.4	3,626	10,208	0.559
	Llorente	14,418	0.3	4,325	12,177	0.667
	Villareal	8	0.9	7	20	0.001
	Basey	4,772	0.7	3,340	9,404	0.515
Silaga		22,011	0.5	11,433	32,187	1.762
	San Julian	4,619	1.0	4,619	13,004	0.712
	Hinabangan	616	0.3	185	520	0.028
	Taft	17	1.0	17	48	0.003
	Sulat	11,540	0.9	10,386	29,240	1.601
Sulat		16,792	0.9	15,207	42,812	2.344
	Balangkayan	4,655	0.4	1,862	5,242	0.287
	Calbiga	5,373	0.6	3,224	9,076	0.497
	Marabut	2,074	1.0	2,074	5,839	0.320
	Maydolong	22,562	0.3	6,769	19,056	1.043
	Hinabangan	2	0.3	1	2	0.000
	Sta. Rita	11,845	1.0	11,845	33,347	1.826
	Borongan	15,530	0.8	12,424	34,977	1.915
	Basey	6,910	0.7	4,837	13,618	0.746
Suribao		68,951	0.6	43,035	121,156	6.633

Watershed	Municipality	Area (ha)	Population Density (person/ha)	1995 Population	2000 Population	Domestic Water Required (MCM)
	Calbiga	2	0.6	1	3	0.000
	San Julian	1,684	1.0	1,684	4,741	0.260
	Paranas	1,498	0.9	1,348	3,796	0.208
	Hinabangan	18,375	0.3	5,513	15,519	0.850
	Borongan	7,041	0.8	5,633	15,858	0.868
	Taft	10,050	1.0	10,050	28,294	1.549
	Sulat	3,038	0.9	2,734	7,698	0.421
Taft		41,688	0.6	26,963	75,909	4.156
	Gen. Mac. Arthur	609	0.9	548	1,543	0.084
	Sta. Rita	2,615	1.3	3,400	9,571	0.524
Tangkip		3,224	1.2	3,948	11,114	0.6085

Assumptions: 1.The per capita water requirement is 150 liters per person per day.

Table 23
Basic Information on Selected Water Districts of Samar Island

Water District	Number of Concessionaires			Ave Consumption/Concessionaire cu m/mo			Price/cu m			Volume of Water Drawn (cu m/mo)
	Domestic	Commercial	Industrial	Domestic	Commercial	Industrial	Domestic	Commercial	Industrial	
Hinabangan Water System							10			
Catbalogan Water District	2,651	305		18			16			96,889
Basey Water District	547	25		12			14	28		77,677
Paranas Waater Works	448	11					2	4	576	32,501
Calbiga Water District	1,153	35		13						25,194
Calbayog City Water District	4,558	455	4	17	23	205	194	533	6,501	107,621
Catarman Water District	846			3			120			30,500
Sulat Water District	350	1		15			13			4,000
Borongan Water District	1,509	60		18			15	30	30	32,622
Llorente Water District	127						100			

Table 24
Average Runoff Coefficient for Samar Island

Month	Dry Year Estimates			Wet Year Estimates			Average
	Basey	Can-Avid	Sulat	Basey	Can-Avid	Sulat	
January	20.8	23.4	30.0	23.7	24.0	30.0	25.3
February	49.1	21.7	26.2	34.4	35.1	39.5	34.4
March	66.5	34.7	37.8	39.3	39.8	42.0	43.4
April	31.1	86.4	84.0	38.5	41.9	47.0	54.8
May	17.3	94.6	94.0	32.6	98.4	99.1	72.6
June	11.9	18.0	23.5	29.2	40.7	45.1	28.1
July	9.6	20.4	25.4	17.8	79.8	82.3	39.2
August	74.6	8.7	15.8	24.6	20.0	25.6	28.2
September	12.3	14.1	20.1	28.0	33.2	38.3	24.3
October	20.1	20.6	25.1	23.5	14.7	20.3	20.7
November	29.5	9.4	15.7	30.4	31.5	34.1	25.1
December	43.2	32.3	33.2	41.7	49.4	50.3	41.7
Average	32.2	32.0	35.9	30.3	42.4	46.1	36.5

Table 25
Runoff Averages for Basey, Can-Avid and Sulat Watersheds

Month	Dry Year Estimates						Wet Year Estimates					
	Basey		Can-Avid		Sulat		Basey		Can-Avid		Sulat	
	mm	MCM	mm	MCM	mm	MCM	mm	MCM	mm	MCM	mm	MCM
January	43.90	15.24	54.30	47.02	79.60	13.37	54.30	18.85	105.30	91.19	131.70	22.11
February	43.00	14.93	53.60	46.42	108.10	18.15	53.60	18.61	128.40	111.19	144.60	24.28
March	35.40	12.29	65.80	56.98	102.50	17.21	65.80	22.84	129.90	112.49	137.30	23.05
April	27.90	9.69	38.80	33.60	67.10	11.27	38.80	13.47	132.70	114.92	148.90	25.00
May	24.70	8.57	32.80	28.40	57.10	9.59	32.80	11.39	83.90	72.66	84.50	14.19
June	21.70	7.53	36.50	31.61	47.50	7.98	36.50	12.67	61.10	52.91	67.70	11.37
July	36.50	12.67	31.80	27.54	45.00	7.56	31.80	11.04	52.70	45.64	54.30	9.12
August	42.10	14.62	46.40	40.18	56.00	9.40	46.40	16.11	46.30	40.10	59.10	9.92
September	33.00	11.46	39.70	34.38	58.00	9.74	39.70	13.78	39.80	34.47	45.90	7.71
October	49.40	17.15	34.90	30.22	52.90	8.88	34.90	12.12	54.10	46.85	74.90	12.58
November	52.80	18.33	64.90	56.20	180.80	30.36	64.90	22.53	261.90	226.80	283.50	47.60
December	56.20	19.51	176.70	153.02	176.90	29.70	176.70	61.34	325.40	281.80	331.60	55.68
Total	**466.60**	**161.99**	**676.20**	**585.59**	**1,031.50**	**173.20**	**676.20**	**234.75**	**1,421.50**	**1,231.02**	**1,564.00**	**262.61**

Table 26
Runoff for Basey Watershed Under Different Land Use Scenarios (mm)

Month	Current Land Uses	10% Reduction in forest cover	20% Reduction in forest cover	10% Increase in forest cover	20% Increase in forest cover
January	79.6	77.8	80.8	89.8	103.3
February	108.1	112.4	112.9	147.3	153.9
March	102.5	105.2	106.6	149.7	150.2
April	67.1	68.7	69.5	115.2	108.9
May	57.1	59.2	60.6	120.8	106.0
June	47.5	49.1	51.2	117.7	94.5
July	45.0	48.3	50.4	127.3	96.3
August	56.0	61.5	63.2	164.1	123.8
September	58.0	63.4	64.0	156.2	127.7
October	52.9	57.1	57.8	137.6	114.8
November	180.8	195.6	200.1	316.9	291.5
December	176.9	185.7	192.3	272.3	257.8
TOTAL	**1,031.5**	**1,084.0**	**1,109.4**	**1,914.9**	**1,728.7**

Table 27
Runoff for Can-Avid Watershed Under Different Land Use Scenarios (mm)

Month	Current Land Uses	10% Reduction in forest cover	20% Reduction in forest cover	10% Increase in forest cover	20% Increase in forest cover
January	42.4	42.7	53.2	38.2	39.8
February	44.4	76.0	79.8	55.1	63.4
March	60.3	109.9	108.5	85.6	93.8
April	39.9	69.5	65.3	50.5	55.9
May	33.0	55.4	50.8	39.4	43.1
June	28.0	52.1	42.1	32.9	36.1
July	25.5	72.4	41.7	32.3	39.4
August	25.7	105.0	56.5	44.8	58.7
September	27.8	124.0	79.1	64.1	81.5
October	28.7	111.6	80.3	64.6	78.6
November	38.6	137.6	108.3	86.7	101.8
December	172.0	313.7	291.1	253.1	270.2
TOTAL	**566.3**	**1,269.9**	**1,056.7**	**847.3**	**962.3**

Table 28
Runoff for Sulat Watershed Under Different Land Use Scenarios (mm)

Month	Current Land Uses	10% Reduction in forest cover	20% Reduction in forest cover	10% Increase in forest cover	20% Increase in forest cover
January	54.3	53.4	53.8	74.3	77.3
February	53.6	55.5	56.8	100.4	103.4
March	65.8	71.0	72.8	123.8	127.5
April	38.8	41.3	42.2	75.5	79.2
May	32.8	34.5	35.1	60.0	63.4
June	36.5	37.9	38.4	59.7	63.8
July	31.8	32.7	33.2	63.1	70.7
August	46.4	44.5	44.9	93.8	104.0
September	39.7	40.7	41.3	108.2	117.3
October	34.9	36.5	37.3	102.9	109.8
November	64.9	66.9	68.2	144.2	150.0
December	176.7	190.3	194.9	319.1	323.9
TOTAL	**676.2**	**705.2**	**718.9**	**1,325.0**	**1,390.3**

Table 29
Land Use Cover (ha) of Basey, Can-Avid and Sulat Watersheds

Land Use	BASEY		CAN-AVID		SULAT	
Cultivated area mixed w/ brush and grass	15,509.57	44.41%	32,392.95	37.41%	4,337.42	25.81%
Closed canopy (mature trees > 50%)	396.06	1.13%	14,076.24	16.26%	4,882.01	29.05%
Open canopy (mature trees < 50%)	10,175.43	29.14%	35,775.79	41.32%	4,642.58	27.63%
Cropland mixed w/ coconut	4,178.27	11.96%	2,880.07	3.33%	892.71	5.31%
Coconut	4,600.82	13.17%	0.00	0.00%	448.33	2.67%
Others	63.87	0.18%	1,453.15	1.68%	1,600.00	9.52%
TOTAL	**34,924.01**	**100.00%**	**86,578.20**	**100.00%**	**16,803.06**	**100.00%**

Table 30a
Area Distribution (ha) of Potential Soil Erosion by Slope Class in Basey Watershed

Erosion (tons/ha)	Slope Class 0- 18	18 - 35	35 - 50	> 50	Total	Percent of Total Area
< 5.0	1,096	4,295	3,691	144	9,226	24.87
5.1 - 10.0	339	-	382	-	721	1.94
10.1 - 15.0	4,491	-	-	2,311	6,802	18.33
15.1 - 20.0	1,431	-	-	-	1,431	3.86
20.1 - 30.0	5,848	-	-	-	5,848	15.76
30.1 - 50.0	3,557	-	-	-	3,557	9.59
>50.0	-	2,795	5,523	1,196	9,514	25.64
Total	**16,762**	**7,090**	**9,596**	**3,651**	**37,099**	**100.00**

Table 30b
Area Distribution (ha) of Potential Soil Erosion by Slope Class in Can-Avid Watershed

Erosion (tons/ha)	Slope Class in % 0 - 18	18 - 35	30 - 50	Total	Percent of Total Area
< 5.0	5,424	19,368	23417	48,209	55.09
5.1 - 10.0	-	-	1279	1,279	1.46
10.1 - 15.0	76	-	0	76	0.09
15.1 - 20.0	291	-	0	291	0.33
20.1 - 30.0	5,668	102	0	5,770	6.59
30.1 - 50.0	12,471	433	28	12,932	14.78
>50.0	-	9,826	9125	18,951	21.66
Total	**23,930**	**29,729**	**33,849**	**87,508**	**100.00**

Table 30c
Area Distribution (ha) of Potential Soil Erosion by Slope Class in Sulat Watershed

Erosion (tons/ha)	Slope Class 0- 18	18 - 35	35 - 50	> 50	Total	Percent of Total Area
< 5.0	232	3,184	2,021	1,433	6,870	63.66
5.1 - 10.0	-	-	-	153	153	1.42
10.1 - 15.0	109	-	-	1,421	1,530	14.18
15.1 - 20.0	16	-	-	-	16	0.15
30.1 - 50.0	161	-	34	-	195	1.81
> 50.0	-	407	686	934	2,027	18.78
Total	**518**	**3,591**	**2,741**	**3,941**	**10,791**	**100.00**

Table 31a
Area Distribution (ha) of Potential Soil Erosion Class by Land Use in Basey Watershed

Erosion (tons/ha)	Cultivated Grass/Brush	Coconut	Cropland w/ Coconut	Open Canopy Forest	Closed Canopy Forest	Total	Percent of Total Area
< 5.0	-	-	-	8,747	479	9,226	24.86
5.1 - 10.0	-	-	339	382	-	721	1.94
10.1 - 15.0	-	4,491	-	2,311	-	6,802	18.33
15.1 - 20.0	-	142	1,289	13	-	1,444	3.89
20.1 - 30.0	3,071	-	2,777	-	-	5,848	15.76
30.1 - 50.0	3,557	-	-	-	-	3,557	9.58
> 50.0	9,512	-	2	-	-	9,514	25.64
Total	**16,140**	**4,633**	**4,407**	**11,453**	**479**	**37,112**	**100.00**

Table 31b
Area Distribution (ha) of Potential Soil Erosion Class by Land Use in Can-Avid Watershed

Erosion (tons/ha)	Cultivated Grass/Brush	Cropland w/ Coconut	Open Canopy Forest	Closed Canopy Forest	Total	Percent of Total Area
< 5.0	-	-	38,041	12,608	50,649	57.90
5.1 - 10.0	-	-	-	-	-	-
10.1 - 15.0	-	76	-	-	76	0.09
15.1 - 20.0	291	-	-	-	291	0.33
20.1 - 30.0	3,603	2,167	-	-	5,770	6.60
30.1 - 50.0	12,904	-	-	-	12,904	14.75
> 50.0	16,512	1,281	-	-	17,793	20.34
Total	**33,310**	**3,524**	**38,041**	**12,608**	**87,483**	**100.00**

Table 31c
Area Distribution (ha) of Potential Soil Erosion Class by Land Use in Sulat Watershed

Erosion (tons/ha)	Cultivated Grass/Brush	Coconut	Open Canopy Forest	Closed Canopy Forest	Total	Percent of Total Area
< 5.0	-	-	1,664	5,206	6,870	64.15
5.1 - 10.0	-	-	153	-	153	1.43
10.1 - 15.0	-	109	1,421	-	1,530	14.29
15.1 - 20.0	-	16	-	-	16	0.15
20.1 - 30.0	0	0	0	0	0	-
30.1 - 50.0	161	34	-	-	195	1.82
> 50.0	1,979	48	-	-	2,027	18.93
Total	**2,140**	**125**	**3,238**	**5,206**	**10,709**	**100.00**

Table 32
Potential Annual Soil Erosion Under Current Land Uses in Different Watersheds of Samar Island

Watershed	Land Use	Potential Soil Erosion Class									
		Class 1		Class 2		Class 3		Class 4		Total	
		Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha
	1	6,643	39,858	-	-	25	400	1,523	63,966	8,191	104,224
	2	1,295	7,770	-	-	-	-	-	-	1,295	7,770
	4	3,773	22,638	-	-	-	-	-	-	3,773	22,638
	7	7	42	-	-	-	-	-	-	7	42
Balangiga		11,718	70,308		-	25	400	1,523	63,966	13,266	134,674
			-		-		-		-	-	-
	1	3,759	22,554	-	-	-	-	1,795	75,390	5,554	97,944
	3	3	18	-	-	-	-	-	-	3	18
	4	2,074	12,444	-	-	-	-	-	-	2,074	12,444
	5	349	2,094	-	-	54	864	198	8,316	601	11,274
Bantayan		6,185	37,110	-	-	54	864	1,993	83,706	8,232	121,680
			-		-		-		-	-	-
	1	8,625	51,750	3,394	44,122	3,502	56,032	-	-	15,521	151,904
	2	4,453	26,718	-	-	-	-	-	-	4,453	26,718
	3	4,106	24,636	-	-	-	-	-	-	4,106	24,636
	4	10,184	61,104	-	-	-	-	-	-	10,184	61,104
	7	394	2,364	-	-	-	-	-	-	394	2,364
Basey		27,762	166,572	3,394	44,122	-	-	-	-	31,156	210,694

Watershed	Land Use	Potential Soil Erosion Class									
		Class 1		Class 2		Class 3		Class 4		Total	
		Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha
			-		-		-		-	-	-
	1	560	3,360	825	10,725	2,762	44,192	-	-	4,147	58,277
	3	1,177	7,062	-	-	-	-	-	-	1,177	7,062
	4	6,684	40,104	-	-	-	-	-	-	6,684	40,104
	7	1,776	10,656	-	-	-	-	-	-	1,776	10,656
Borongan		10,197	61,182	825	10,725	2,762	44,192	-	-	13,784	116,099
			-		-		-		-	-	-
	1	3,101	18,606	-	-	-	-	9,194	386,148	12,295	404,754
	3	1,399	8,394	75	975	-	-	26	1,092	1,500	10,461
	4	2,324	13,944	-	-	-	-	-	-	2,324	13,944
Bugko		6,824	40,944	75	975	-	-	9,220	387,240	16,119	429,159
			-		-		-		-	-	-
	1	1,705	10,230	-	-	-	-	-	-	1,705	10,230
	2	410	2,460	-	-	-	-	-	-	410	2,460
	4	1,061	6,366	-	-	-	-	-	-	1,061	6,366
Bulosao		3,176	19,056	-	-	-	-	-	-	3,176	19,056
			-		-		-		-	-	-
	1	8,808	52,848	2,241	29,133	170	2,720	1,015	42,630	12,234	127,331
	4	2,006	12,036	-	-	-	-	-	-	2,006	12,036
	8	47	282	-	-	-	-	-	-	47	282
Calbiga		10,861	65,166	2,241	29,133	170	2,720	1,015	42,630	14,287	139,649

Watershed	Land Use	Potential Soil Erosion Class									
		Class 1		Class 2		Class 3		Class 4		Total	
		Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha
			-		-		-		-	-	-
	1	20,488	122,928	8,648	112,424	3,855	61,680	128	5,376	33,119	302,408
	3	2,876	17,256	-	-	-	-	-	-	2,876	17,256
	4	33,696	202,176	-	-	-	-	-	-	33,696	202,176
	7	14,091	84,546	-	-	-	-	-	-	14,091	84,546
	9	2,367	14,202	-	-	-	-	-	-	2,367	14,202
Can Avid		73,518	441,108	8,648	112,424	3,855	61,680	128	5,376	86,149	620,588
			-		-		-		-	-	-
	1	16,453	98,718	11,458	148,954	5,858	93,728	15,152	636,384	48,921	977,784
	3	829	4,974	-	-	-	-	-	-	829	4,974
	4	5,353	32,118	-	-	-	-	-	-	5,353	32,118
	5	15	90	480	6,240	-	-	245	10,290	740	16,620
	7	1,585	9,510	-	-	-	-	-	-	1,585	9,510
Catarman		24,235	145,410	11,938	155,194	5,858	93,728	15,397	646,674	57,428	1,041,006
			-		-		-		-	-	-
	1	5,409	32,454	3,406	44,278	-	-	-	-	8,815	76,732
	8	-	-	-	-	-	-	-	-	-	-
	9	1,988	11,928	-	-	-	-	-	-	1,988	11,928
Catbalogan		7,397	44,382	3,406	44,278	-	-	-	-	10,803	88,660
			-		-		-		-	-	-
	1	24,327	145,962	3,789	49,257	-	-	9,625	404,250	37,741	599,469
	3	5,961	35,766	368	4,784	-	-	189	7,938	6,518	48,488
	4	16,678	100,068	-	-	-	-	-	-	16,678	100,068
	5	4,919	29,514	5	65	252	4,032	1,475	61,950	6,651	95,561
	7	21,664	129,984	-	-	-	-	-	-	21,664	129,984
Catubig		73,549	441,294	4,162	54,106	252	4,032	11,289	474,138	89,252	973,570

Watershed	Land Use	Potential Soil Erosion Class									
		Class 1		Class 2		Class 3		Class 4		Total	
		Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha
			-		-		-		-	-	-
	1	17,012	102,072	1,322	17,186	5,997	95,952	3,054	128,268	27,385	343,478
	3	9,342	56,052	218	2,834	284	4,544	-	-	9,844	63,430
	4	22,930	137,580	-	-	-	-	-	-	22,930	137,580
	7	22,442	134,652	-	-	-	-	-	-	22,442	134,652
Dolores		71,726	430,356	1,540	20,020	6,281	100,496	3,054	128,268	82,601	679,140
			-		-		-		-	-	-
	1	22,017	132,102	43,462	565,006	-	-	2,959	124,278	68,438	821,386
	3	2,636	15,816	-	-	-	-	-	-	2,636	15,816
	4	12,043	72,258	-	-	-	-	-	-	12,043	72,258
	5	1,736	10,416	-	-	-	-	800	33,600	2,536	44,016
	7	12,537	75,222	-	-	-	-	-	-	12,537	75,222
	8	3,195	19,170	-	-	-	-	-	-	3,195	19,170
	9	4,884	29,304	-	-	-	-	-	-	4,884	29,304
Gandara		59,048	354,288	43,462	565,006	-	-	3,759	157,878	106,269	1,077,172
			-		-		-		-	-	-
	1	4,045	24,270	664	8,632	2,529	40,464	-	-	7,238	73,366
	3	735	4,410	-	-	-	-	-	-	735	4,410
	4	970	5,820	-	-	-	-	-	-	970	5,820
Gulganti		5,750	34,500	664	8,632	2,529	40,464	-	-	8,943	83,596

Watershed	Land Use	Potential Soil Erosion Class									
		Class 1		Class 2		Class 3		Class 4		Total	
		Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha
			-		-		-		-	-	-
	1	1,270	7,620	-	-	2,864	45,824	177	7,434	4,311	60,878
	2	110	660	-	-	-	-	-	-	110	660
	3	316	1,896	-	-	-	-	-	-	316	1,896
	4	1,405	8,430	-	-	-	-	-	-	1,405	8,430
	7	971	5,826	-	-	-	-	-	-	971	5,826
Linal-an		4,072	24,432	-	-	2,864	45,824	177	7,434	7,113	77,690
			-		-		-		-	-	-
	1	8,327	49,962	-	-	3,600	57,600	8,766	368,172	20,693	475,734
	3	768	4,608	-	-	-	-	-	-	768	4,608
	4	6,401	38,406	-	-	-	-	-	-	6,401	38,406
	7	7,129	42,774	-	-	-	-	-	-	7,129	42,774
Llorente		22,625	135,750	-	-	3,600	57,600	8,766	368,172	34,991	561,522
			-		-		-		-	-	-
	1	2,440	14,640	999	12,987	403	6,448	-	-	3,842	34,075
	3	587	3,522	-	-	-	-	-	-	587	3,522
	4	114	684	-	-	-	-	-	-	114	684
	7	19	114	-	-	-	-	-	-	19	114
Lo-om		3,160	18,960	999	12,987	403	6,448	-	-	4,562	38,395
			-		-		-		-	-	-
	1	2,616	15,696	-	-	44	704	-	-	2,660	16,400
	2	-	-	-	-	-	-	-	-	-	-
	3	145	870	-	-	-	-	-	-	145	870
	4	2,580	15,480	-	-	-	-	-	-	2,580	15,480
Marabut		5,341	32,046	-	-	44	704	-	-	5,385	32,750

Watershed	Land Use	Potential Soil Erosion Class									
		Class 1		Class 2		Class 3		Class 4		Total	
		Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha
			-		-		-		-	-	-
	1	5,690	34,140	4,474	58,162	1,100	17,600	272	11,424	11,536	121,326
	2	2,160	12,960	-	-	-	-	-	-	2,160	12,960
	3	10	60	-	-	-	-	-	-	10	60
	4	12,327	73,962	-	-	-	-	-	-	12,327	73,962
Mauo		20,187	121,122	4,474	58,162	1,100	17,600	272	11,424	26,033	208,308
			-		-		-		-	-	-
	1	1,129	6,774	-	-	-	-	2,904	121,968	4,033	128,742
	3	691	4,146	4	52	-	-	-	-	695	4,198
	4	22	132	-	-	-	-	-	-	22	132
Mondragon		1,842	11,052	4	52	-	-	2,904	121,968	4,750	133,072
			-		-		-		-	-	-
	1	10,429	62,574	2,160	28,080	371	5,936	7,825	328,650	20,785	425,240
	3	1,692	10,152	-	-	-	-	-	-	1,692	10,152
	4	1,378	8,268	-	-	-	-	-	-	1,378	8,268
	7	907	5,442	-	-	-	-	-	-	907	5,442
Oras		14,406	86,436	2,160	28,080	371	5,936	7,825	328,650	24,762	449,102
			-		-		-		-	-	-
	1	1,616	9,696	453	5,889	-	-	1,016	42,672	3,085	58,257
	4	1,965	11,790	-	-	-	-	-	-	1,965	11,790
	8	192	1,152	-	-	-	-	-	-	192	1,152
Pabanog		3,773	22,638	453	5,889	-	-	1,016	42,672	5,242	71,199

Watershed	Land Use	Potential Soil Erosion Class									
		Class 1		Class 2		Class 3		Class 4		Total	
		Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha
			-		-		-		-	-	-
	1	10,314	61,884	8,979	116,727	-	-	10,902	457,884	30,195	636,495
	3	77	462	-	-	-	-	-	-	77	462
	4	25,813	154,878	-	-	-	-	-	-	25,813	154,878
	5	1,056	6,336	229	2,977	75	1,200	896	37,632	2,256	48,145
	7	52	312	-	-	-	-	-	-	52	312
Pambujan		37,312	223,872	9,208	119,704	75	1,200	11,798	495,516	58,393	840,292
			-		-		-		-	-	-
	1	13,809	82,854	19,645	255,385	914	14,624	1,348	56,616	35,716	409,479
	3	5,428	32,568	-	-	186	2,976	-	-	5,614	35,544
	4	3,445	20,670	-	-	-	-	-	-	3,445	20,670
	5	277	1,662	-	-	-	-	16	672	293	2,334
Pan-as		22,959	137,754	19,645	255,385	1,100	17,600	1,364	57,288	45,068	468,027
Hayiban			-		-		-		-	-	-
	1	11,255	67,530	6,302	81,926	1,029	16,464	12	504	18,598	166,424
	3	827	4,962	26	338	-	-	23	966	876	6,266
	4	1,223	7,338	-	-	-	-	-	-	1,223	7,338
	7	54	324	-	-	-	-	-	-	54	324
Silaga		13,359	80,154	6,328	82,264	1,029	16,464	35	1,470	20,751	180,352
			-		-		-		-	-	-
	1	1,265	7,590	17	221	3,066	49,056	-	-	4,348	56,867
	2	356	2,136	-	-	-	-	-	-	356	2,136
	3	889	5,334	-	-	-	-	-	-	889	5,334
	4	4,646	27,876	-	-	-	-	-	-	4,646	27,876
	7	4,879	29,274	-	-	-	-	-	-	4,879	29,274
Sulat		12,035	72,210	17	221	3,066	49,056	-	-	15,118	121,487

Watershed	Land Use	Potential Soil Erosion Class									
		Class 1		Class 2		Class 3		Class 4		Total	
		Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha	Area (ha)	Tons/Ha
			-		-		-		-	-	-
	1	11,629	69,774	-	-	5,816	93,056	-	-	17,445	162,830
	2	1,375	8,250	-	-	-	-	-	-	1,375	8,250
	4	27,481	164,886	-	-	-	-	-	-	27,481	164,886
	7	22,239	133,434	-	-	-	-	-	-	22,239	133,434
	10	420	2,520	-	-	-	-	-	-	420	2,520
Suribao		63,144	378,864	-	-	5,816	93,056	-	-	68,960	471,920
			-		-		-		-	-	-
	1	2,002	12,012	-	-	1,607	25,712	-	-	3,609	37,724
	3	3,438	20,628	-	-	-	-	-	-	3,438	20,628
	4	18,001	108,006	-	-	-	-	-	-	18,001	108,006
	7	16,032	96,192	-	-	-	-	-	-	16,032	96,192
Taft		39,473	236,838	-	-	1,607	25,712	-	-	41,080	262,550
			-		-		-		-	-	-
	1	1,365	8,190	-	-	42	672	-	-	1,407	8,862
	3	319	1,914	-	-	-	-	-	-	319	1,914
	4	1,355	8,130	-	-	-	-	-	-	1,355	8,130
Tangkip		3,039	163,188	-	-	42	672	-	-	3,081	18,906
Total		**646,965**	**4,026,694**	**123,653**	**1,607,369**	**42,888**	**686,058**	**80,022**	**3,360,514**	**893,498**	**9,535,651**

Note: Potential soil erosion classes are defined below:

class	erosion (tons/ha) from	to
1	0.1	12
2	12	14
3	14	18
4	18	66

Table 33
Potential Annual Soil Erosion Under Various Land Use Scenarios in Different Watersheds of Samar Island

Watershed	Land Use	Current Land Uses		Potential Soil Erosion Under Various Scenarios: -10% Forest Cover		-20% Forest Cover		+ 10% Forest Cover		+ 20% Forest Cover	
		Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)
	1	8,191.0	10,422.4	8,568.3	10,902.5	8,945.6	11,382.6	7,813.7	9,942.3	7,436.4	9,462.2
	2	1,295.0	777.0	1,295.0	777.0	1,295.0	777.0	1,295.0	777.0	1,295.0	777.0
	3	-	-	-	-	-	-	-	-	-	-
	4	3,773.0	2,263.8	3,395.7	2,037.4	3,018.4	1,811.0	4,150.3	2,490.2	4,527.6	2,716.6
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	7.0	4.2	7.0	4.2	7.0	4.2	7.0	4.2	7.0	4.2
Balangiga		13,266.0	13,467.4	13,266.0	13,721.1	13,266.0	13,974.8	13,266.0	13,213.7	13,266.0	12,960.0
	1	5,554.0	9,794.4	5,761.4	10,160.1	5,968.8	10,525.9	5,346.6	9,428.7	5,139.2	9,062.9
	2	-	-	-	-	-	-	-	-	-	-
	3	3.0	1.8	3.0	1.8	3.0	1.8	3.0	1.8	3.0	1.8
	4	2,074.0	1,244.4	1,866.6	1,120.0	1,659.2	995.5	2,281.4	1,368.8	2,488.8	1,493.3
	5	601.0	1,127.4	601.0	1,127.4	601.0	1,127.4	601.0	1,127.4	601.0	1,127.4
	6	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-	-
Bantayan		8,232.0	12,168.0	8,232.0	12,409.3	8,232.0	12,650.6	8,232.0	11,926.7	8,232.0	11,685.4

Watershed	Land Use	Potential Soil Erosion Under Various Scenarios									
		Current Land Uses		-10% Forest Cover		-20% Forest Cover		+ 10% Forest Cover		+ 20% Forest Cover	
		Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)
	1	15,521.0	15,190.4	16,539.4	16,187.1	17,557.8	17,183.8	14,502.6	14,193.7	13,484.2	13,197.0
	2	4,453.0	2,671.8	4,453.0	2,671.8	4,453.0	2,671.8	4,453.0	2,671.8	4,453.0	2,671.8
	3	4,106.0	2,463.6	4,106.0	2,463.6	4,106.0	2,463.6	4,106.0	2,463.6	4,106.0	2,463.6
	4	10,184.0	6,110.4	9,165.6	5,499.4	8,147.2	4,888.3	11,202.4	6,721.4	12,220.8	7,332.5
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	394.0	236.4	394.0	236.4	394.0	236.4	394.0	236.4	394.0	236.4
Basey		34,658.0	26,672.6	34,658.0	27,058.3	34,658.0	27,443.9	34,658.0	26,286.9	34,658.0	25,901.3
	1	4,147.0	5,827.7	4,815.4	6,767.0	5,483.8	7,706.3	3,478.6	4,888.4	2,810.2	3,949.1
	2	-	-	-	-	-	-	-	-	-	-
	3	1,177.0	706.2	1,177.0	706.2	1,177.0	706.2	1,177.0	706.2	1,177.0	706.2
	4	6,684.0	4,010.4	6,015.6	3,609.4	5,347.2	3,208.3	7,352.4	4,411.4	8,020.8	4,812.5
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	1,776.0	1,065.6	1,776.0	1,065.6	1,776.0	1,065.6	1,776.0	1,065.6	1,776.0	1,065.6
Borongan		13,784.0	11,609.9	13,784.0	12,148.1	13,784.0	12,686.4	13,784.0	11,071.7	13,784.0	10,533.4

Watershed	Land Use	Potential Soil Erosion Under Various Scenarios									
		Current Land Uses		-10% Forest Cover		-20% Forest Cover		+ 10% Forest Cover		+ 20% Forest Cover	
		Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)
	1	12,295.0	40,475.4	12,527.4	41,240.5	12,759.8	42,005.5	12,062.6	39,710.3	11,830.2	38,945.3
	2	-	-	-	-	-	-	-	-	-	-
	3	1,500.0	1,046.1	1,500.0	1,046.1	1,500.0	1,046.1	1,500.0	1,046.1	1,500.0	1,046.1
	4	2,324.0	1,394.4	2,091.6	1,255.0	1,859.2	1,115.5	2,556.4	1,533.8	2,788.8	1,673.3
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-	-
Bugko		16,119.0	42,915.9	16,119.0	43,541.5	16,119.0	44,167.2	16,119.0	42,290.3	16,119.0	41,664.6
	1	1,705.0	1,023.0	1,811.1	1,086.7	1,917.2	1,150.3	1,598.9	959.3	1,492.8	895.7
	2	410.0	246.0	410.0	246.0	410.0	246.0	410.0	246.0	410.0	246.0
	3	-	-	-	-	-	-	-	-	-	-
	4	1,061.0	636.6	954.9	572.9	848.8	509.3	1,167.1	700.3	1,273.2	763.9
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-	-
Bulosao		3,176.0	1,905.6	3,176.0	1,905.6	3,176.0	1,905.6	3,176.0	1,905.6	3,176.0	1,905.6

Watershed	Land Use	Potential Soil Erosion Under Various Scenarios									
		Current Land Uses		-10% Forest Cover		-20% Forest Cover		+ 10% Forest Cover		+ 20% Forest Cover	
		Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)
	1	12,234.0	12,733.1	12,434.6	12,941.9	12,635.2	13,150.7	12,033.4	12,524.3	11,832.8	12,315.5
	2	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-
	4	2,006.0	1,203.6	1,805.4	1,083.2	1,604.8	962.9	2,206.6	1,324.0	2,407.2	1,444.3
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-	-
	8	47.0	28.2	47.0	28.2	47.0	28.2	47.0	28.2	47.0	28.2
Calbiga		14,287.0	13,964.9	14,287.0	14,053.3	14,287.0	14,141.7	14,287.0	13,876.5	14,287.0	13,788.1
	1	33,119.0	30,240.8	36,488.6	33,317.6	39,858.2	36,394.3	29,749.4	27,164.0	26,379.8	24,087.3
	2	-	-	-	-	-	-	-	-	-	-
	3	2,876.0	1,725.6	2,876.0	1,725.6	2,876.0	1,725.6	2,876.0	1,725.6	2,876.0	1,725.6
	4	33,696.0	20,217.6	30,326.4	18,195.8	26,956.8	16,174.1	37,065.6	22,239.4	40,435.2	24,261.1
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	14,091.0	8,454.6	14,091.0	8,454.6	14,091.0	8,454.6	14,091.0	8,454.6	14,091.0	8,454.6
	8	-	-	-	-	-	-	-	-	-	-
	9	2,367.0	1,420.2	2,367.0	1,420.2	2,367.0	1,420.2	2,367.0	1,420.2	2,367.0	1,420.2
Can-Avid		86,149.0	62,058.8	86,149.0	63,113.8	86,149.0	64,168.8	86,149.0	61,003.8	86,149.0	59,948.8

Watershed	Land Use	Potential Soil Erosion Under Various Scenarios									
		Current Land Uses		-10% Forest Cover		-20% Forest Cover		+ 10% Forest Cover		+ 20% Forest Cover	
		Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)
	1	48,921.0	97,778.4	49,456.3	98,848.3	49,991.6	99,918.2	48,385.7	96,708.5	47,850.4	95,638.6
	2	-	-	-	-	-	-	-	-	-	-
	3	829.0	497.4	829.0	497.4	829.0	497.4	829.0	497.4	829.0	497.4
	4	5,353.0	3,211.8	4,817.7	2,890.6	4,282.4	2,569.4	5,888.3	3,533.0	6,423.6	3,854.2
	5	740.0	1,662.0	740.0	1,662.0	740.0	1,662.0	740.0	1,662.0	740.0	1,662.0
	6	-	-	-	-	-	-	-	-	-	-
	7	1,585.0	951.0	1,585.0	951.0	1,585.0	951.0	1,585.0	951.0	1,585.0	951.0
Catarman		57,428.0	104,100.6	57,428.0	104,849.3	57,428.0	105,598.0	57,428.0	103,351.9	57,428.0	102,603.2
	1	8,815.0	7,673.2	8,815.0	7,673.2	8,815.0	7,673.2	8,815.0	7,673.2	8,815.0	7,673.2
	2	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-	-
	9	1,988.0	1,192.8	1,988.0	1,192.8	1,988.0	1,192.8	1,988.0	1,192.8	1,988.0	1,192.8
Catbalogan		10,803.0	8,866.0	10,803.0	8,866.0	10,803.0	8,866.0	10,803.0	8,866.0	10,803.0	8,866.0

Watershed	Land Use	Potential Soil Erosion Under Various Scenarios									
		Current Land Uses		-10% Forest Cover		-20% Forest Cover		+ 10% Forest Cover		+ 20% Forest Cover	
		Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)
	1	37,741.0	59,946.9	39,408.8	62,596.0	41,076.6	65,245.1	36,073.2	57,297.8	34,405.4	54,648.7
	2	-	-	-	-	-	-	-	-	-	-
	3	6,518.0	4,848.8	6,518.0	4,848.8	6,518.0	4,848.8	6,518.0	4,848.8	6,518.0	4,848.8
	4	16,678.0	10,006.8	15,010.2	9,006.1	13,342.4	8,005.4	18,345.8	11,007.5	20,013.6	12,008.2
	5	6,651.0	9,556.1	6,651.0	9,556.1	6,651.0	9,556.1	6,651.0	9,556.1	6,651.0	9,556.1
	6	-	-	-	-	-	-	-	-	-	-
	7	21,664.0	12,998.4	21,664.0	12,998.4	21,664.0	12,998.4	21,664.0	12,998.4	21,664.0	12,998.4
Catubig		89,252.0	97,357.0	89,252.0	99,005.4	89,252.0	100,653.8	89,252.0	95,708.6	89,252.0	94,060.2
	1	27,385.0	34,347.8	29,678.0	37,223.8	31,971.0	40,099.8	25,092.0	31,471.8	22,799.0	28,595.8
	2	-	-	-	-	-	-	-	-	-	-
	3	9,844.0	6,343.0	9,844.0	6,343.0	9,844.0	6,343.0	9,844.0	6,343.0	9,844.0	6,343.0
	4	22,930.0	13,758.0	20,637.0	12,382.2	18,344.0	11,006.4	25,223.0	15,133.8	27,516.0	16,509.6
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	22,442.0	13,465.2	22,442.0	13,465.2	22,442.0	13,465.2	22,442.0	13,465.2	22,442.0	13,465.2
Dolores		82,601.0	67,914.0	82,601.0	69,414.2	82,601.0	70,914.4	82,601.0	66,413.8	82,601.0	64,913.6

Watershed	Land Use	Potential Soil Erosion Under Various Scenarios									
		Current Land Uses		-10% Forest Cover		-20% Forest Cover		+ 10% Forest Cover		+ 20% Forest Cover	
		Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)
	1	68,438.0	82,138.6	69,642.3	83,584.0	70,846.6	85,029.4	67,233.7	80,693.2	66,029.4	79,247.8
	2	-	-	-	-	-	-	-	-	-	-
	3	2,636.0	1,581.6	2,636.0	1,581.6	2,636.0	1,581.6	2,636.0	1,581.6	2,636.0	1,581.6
	4	12,043.0	7,225.8	10,838.7	6,503.2	9,634.4	5,780.6	13,247.3	7,948.4	14,451.6	8,671.0
	5	2,536.0	4,401.6	2,536.0	4,401.6	2,536.0	4,401.6	2,536.0	4,401.6	2,536.0	4,401.6
	6	-	-	-	-	-	-	-	-	-	-
	7	12,537.0	7,522.2	12,537.0	7,522.2	12,537.0	7,522.2	12,537.0	7,522.2	12,537.0	7,522.2
	8	3,195.0	1,917.0	3,195.0	1,917.0	3,195.0	1,917.0	3,195.0	1,917.0	3,195.0	1,917.0
	9	4,884.0	1,917.0	4,884.0	2,930.4	4,884.0	2,930.4	4,884.0	2,930.4	4,884.0	2,930.4
Gandara		106,269.0	1,917.0	106,269.0	108,440.0	106,269.0	109,162.8	106,269.0	106,994.4	106,269.0	106,271.6
	1	7,238.0	7,336.6	7,335.0	7,434.9	7,432.0	7,533.2	7,141.0	7,238.3	7,044.0	7,140.0
	2	-	-	-	-	-	-	-	-	-	-
	3	189.6	441.0	189.6	441.0	189.6	441.0	189.6	441.0	189.6	441.0
	4	970.0	582.0	873.0	523.8	776.0	465.6	1,067.0	640.2	1,164.0	698.4
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-	-
Gulganti		8,397.6	8,359.6	8,397.6	8,399.7	8,397.6	8,439.8	8,397.6	8,319.5	8,397.6	8,279.4

Watershed	Land Use	Potential Soil Erosion Under Various Scenarios									
		Current Land Uses		-10% Forest Cover		-20% Forest Cover		+ 10% Forest Cover		+ 20% Forest Cover	
		Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)
	1	4,311.0	6,087.8	4,451.5	6,286.2	4,592.0	6,484.6	4,170.5	5,889.4	4,030.0	5,691.0
	2	110.0	66.0	110.0	66.0	110.0	66.0	110.0	66.0	110.0	66.0
	3	316.0	189.6	316.0	189.6	316.0	189.6	316.0	189.6	316.0	189.6
	4	1,405.0	843.0	1,264.5	758.7	1,124.0	674.4	1,545.5	927.3	1,686.0	1,011.6
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	971.0	582.6	971.0	582.6	971.0	582.6	971.0	582.6	971.0	582.6
Linal-an		7,113.0	7,769.0	7,113.0	7,883.1	7,113.0	7,997.2	7,113.0	7,654.9	7,113.0	7,540.8
	1	20,693.0	47,573.4	21,333.1	49,045.0	21,973.2	50,516.6	20,052.9	46,101.8	19,412.8	44,630.2
	2	-	-	-	-	-	-	-	-	-	-
	3	768.0	460.8	768.0	460.8	768.0	460.8	768.0	460.8	768.0	460.8
	4	6,401.0	3,840.6	5,760.9	3,456.5	5,120.8	3,072.5	7,041.1	4,224.7	7,681.2	4,608.7
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	7,129.0	4,277.4	7,129.0	4,277.4	7,129.0	4,277.4	7,129.0	4,277.4	7,129.0	4,277.4
Llorente		34,991.0	56,152.2	34,991.0	57,239.7	34,991.0	58,327.3	34,991.0	55,064.7	34,991.0	53,977.1

Watershed	Land Use	Potential Soil Erosion Under Various Scenarios									
		Current Land Uses		-10% Forest Cover		-20% Forest Cover		+ 10% Forest Cover		+ 20% Forest Cover	
		Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)
	1	3,842.0	3,407.5	3,853.4	3,417.6	3,864.8	3,427.7	3,830.6	3,397.4	3,819.2	3,387.3
	2	-	-	-	-	-	-	-	-	-	-
	3	587.0	352.2	587.0	352.2	587.0	352.2	587.0	352.2	587.0	352.2
	4	114.0	68.4	102.6	61.6	91.2	54.7	125.4	75.2	136.8	82.1
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	19.0	11.4	19.0	11.4	19.0	11.4	19.0	11.4	19.0	11.4
Lo-om		4,562.0	3,839.5	4,562.0	3,842.8	4,562.0	3,846.0	4,562.0	3,836.2	4,562.0	3,833.0
	1	2,660.0	1,640.0	2,918.0	1,799.1	3,176.0	1,958.1	2,402.0	1,480.9	2,144.0	1,321.9
	2	-	-	-	-	-	-	-	-	-	-
	3	145.0	87.0	145.0	87.0	145.0	87.0	145.0	87.0	145.0	87.0
	4	2,580.0	1,548.0	2,322.0	1,393.2	2,064.0	1,238.4	2,838.0	1,702.8	3,096.0	1,857.6
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-	-
Marabut		5,385.0	3,275.0	5,385.0	3,279.3	5,385.0	3,283.5	5,385.0	3,270.7	5,385.0	3,266.5

Watershed	Land Use	Potential Soil Erosion Under Various Scenarios									
		Current Land Uses		-10% Forest Cover		-20% Forest Cover		+ 10% Forest Cover		+ 20% Forest Cover	
		Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)
	1	11,536.0	12,132.6	12,768.7	13,429.1	14,001.4	14,725.5	10,303.3	10,836.1	9,070.6	9,539.7
	2	2,160.0	1,296.0	2,160.0	1,296.0	2,160.0	1,296.0	2,160.0	1,296.0	2,160.0	1,296.0
	3	10.0	6.0	10.0	6.0	10.0	6.0	10.0	6.0	10.0	6.0
	4	12,327.0	7,396.2	11,094.3	6,656.6	9,861.6	5,917.0	13,559.7	8,135.8	14,792.4	8,875.4
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-	-
Mauo		26,033.0	20,830.8	26,033.0	21,387.6	26,033.0	21,944.5	26,033.0	20,274.0	26,033.0	19,717.1
	1	4,033.0	12,874.2	4,035.2	12,881.2	4,037.4	12,888.2	4,030.8	12,867.2	4,028.6	12,860.2
	2	-	-	-	-	-	-	-	-	-	-
	3	695.0	419.8	695.0	419.8	695.0	419.8	695.0	419.8	695.0	419.8
	4	22.0	13.2	19.8	11.9	17.6	10.6	24.2	14.5	26.4	15.8
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-	-
Mondragon		4,750.0	13,307.2	4,750.0	13,312.9	4,750.0	13,318.6	4,750.0	13,301.5	4,750.0	13,295.8

Watershed	Land Use	Potential Soil Erosion Under Various Scenarios									
		Current Land Uses		-10% Forest Cover		-20% Forest Cover		+ 10% Forest Cover		+ 20% Forest Cover	
		Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)
	1	20,785.0	42,524.0	20,922.8	42,805.9	21,060.6	43,087.8	20,647.2	42,242.1	20,509.4	41,960.2
	2	-	-	-	-	-	-	-	-	-	-
	3	1,692.0	10,152.0	1,692.0	10,152.0	1,692.0	10,152.0	1,692.0	10,152.0	1,692.0	10,152.0
	4	1,378.0	826.8	1,240.2	744.1	1,102.4	661.4	1,515.8	909.5	1,653.6	992.2
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	907.0	544.2	907.0	544.2	907.0	544.2	907.0	544.2	907.0	544.2
Oras		24,762.0	54,047.0	24,762.0	54,246.2	24,762.0	54,445.5	24,762.0	53,847.8	24,762.0	53,648.5
	1	3,085.0	5,825.7	3,281.5	6,196.8	3,478.0	6,567.8	2,888.5	5,454.6	2,692.0	5,083.6
	2	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-
	4	1,965.0	1,179.0	1,768.5	1,061.1	1,572.0	943.2	2,161.5	1,296.9	2,358.0	1,414.8
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-	-
	8	192.0	115.2	192.0	115.2	192.0	115.2	192.0	115.2	192.0	115.2
Pabanog		5,242.0	7,119.9	5,242.0	7,373.1	5,242.0	7,626.2	5,242.0	6,866.7	5,242.0	6,613.6

Watershed	Land Use	Potential Soil Erosion Under Various Scenarios									
		Current Land Uses		-10% Forest Cover		-20% Forest Cover		+ 10% Forest Cover		+ 20% Forest Cover	
		Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)
	1	30,195.0	63,649.5	32,776.3	69,090.7	35,357.6	74,532.0	27,613.7	58,208.3	25,032.4	52,767.0
	2	-	-	-	-	-	-	-	-	-	-
	3	77.0	46.2	77.0	46.2	77.0	46.2	77.0	46.2	77.0	46.2
	4	25,813.0	15,487.8	23,231.7	13,939.0	20,650.4	12,390.2	28,394.3	17,036.6	30,975.6	18,585.4
	5	2,256.0	4,814.5	2,256.0	4,814.5	2,256.0	4,814.5	2,256.0	4,814.5	2,256.0	4,814.5
	6	-	-	-	-	-	-	-	-	-	-
	7	52.0	31.2	52.0	31.2	52.0	31.2	52.0	31.2	52.0	31.2
Pambujan		58,393.0	84,029.2	58,393.0	87,921.7	58,393.0	91,814.1	58,393.0	80,136.7	58,393.0	76,244.3
	1	35,716.0	40,947.9	36,060.5	41,342.9	36,405.0	41,737.8	35,371.5	40,552.9	35,027.0	40,158.0
	2	-	-	-	-	-	-	-	-	-	-
	3	5,614.0	3,554.4	5,614.0	3,554.4	5,614.0	3,554.4	5,614.0	3,554.4	5,614.0	3,554.4
	4	3,445.0	2,067.0	3,100.5	1,860.3	2,756.0	1,653.6	3,789.5	2,273.7	4,134.0	2,480.4
	5	293.0	233.4	293.0	233.4	293.0	233.4	293.0	233.4	293.0	233.4
	6	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-	-
Pan-as Hayiban		45,068.0	46,802.7	45,068.0	46,991.0	45,068.0	47,179.2	45,068.0	46,614.4	45,068.0	46,426.2

Watershed	Land Use	Current Land Uses		Potential Soil Erosion Under Various Scenarios: -10% Forest Cover		-20% Forest Cover		+10% Forest Cover		+20% Forest Cover	
		Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)
	1	18,598.0	16,642.4	18,720.3	16,751.8	18,842.6	16,861.3	18,475.7	16,533.0	18,353.4	16,423.5
	2	-	-	-	-	-	-	-	-	-	-
	3	876.0	626.6	876.0	626.6	876.0	626.6	876.0	626.6	876.0	626.6
	4	1,223.0	733.8	1,100.7	660.4	978.4	587.0	1,345.3	807.2	1,467.6	880.6
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	54.0	32.4	54.0	32.4	54.0	32.4	54.0	32.4	54.0	32.4
Silaga		20,751.0	18,035.2	20,751.0	18,071.3	20,751.0	18,107.3	20,751.0	17,999.1	20,751.0	17,963.1
	1	4,348.0	5,686.7	4,812.6	6,294.3	5,277.2	6,902.0	3,883.4	5,079.1	3,418.8	4,471.4
	2	356.0	213.6	356.0	213.6	356.0	213.6	356.0	213.6	356.0	213.6
	3	889.0	533.4	889.0	533.4	889.0	533.4	889.0	533.4	889.0	533.4
	4	4,646.0	2,787.6	4,181.4	2,508.8	3,716.8	2,230.1	5,110.6	3,066.4	5,575.2	3,345.1
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	4,879.0	2,927.4	4,879.0	2,927.4	4,879.0	2,927.4	4,879.0	2,927.4	4,879.0	2,927.4
Sulat		15,118.0	12,148.7	15,118.0	12,477.6	15,118.0	12,806.5	15,118.0	11,819.8	15,118.0	11,490.9

Watershed	Land Use	Potential Soil Erosion Under Various Scenarios									
		Current Land Uses		-10% Forest Cover		-20% Forest Cover		+ 10% Forest Cover		+ 20% Forest Cover	
		Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)
	1	17,445.0	16,283.0	20,193.1	18,848.1	22,941.2	21,413.1	14,696.9	13,717.9	11,948.8	11,152.9
	2	1,375.0	825.0	1,375.0	825.0	1,375.0	825.0	1,375.0	825.0	1,375.0	825.0
	3	-	-	-	-	-	-	-	-	-	-
	4	27,481.0	16,488.6	24,732.9	14,839.7	21,984.8	13,190.9	30,229.1	18,137.5	32,977.2	19,786.3
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	22,239.0	13,343.4	22,239.0	13,343.4	22,239.0	13,343.4	22,239.0	13,343.4	22,239.0	13,343.4
	10	420.0	252.0	420.0	252.0	420.0	252.0	420.0	252.0	420.0	252.0
Suribao		68,960.0	47,192.0	68,960.0	48,108.2	68,960.0	49,024.4	68,960.0	46,275.8	68,960.0	45,359.6
	1	3,609.0	3,772.4	5,409.1	5,654.0	7,209.2	7,535.6	1,808.9	1,890.8	8.8	9.2
	2	-	-	-	-	-	-	-	-	-	-
	3	3,438.0	2,062.8	3,438.0	2,062.8	3,438.0	2,062.8	3,438.0	2,062.8	3,438.0	2,062.8
	4	18,001.0	10,800.6	16,200.9	9,720.5	14,400.8	8,640.5	19,801.1	11,880.7	21,601.2	12,960.7
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	16,032.0	9,619.2	16,032.0	9,619.2	16,032.0	9,619.2	16,032.0	9,619.2	16,032.0	9,619.2
Taft		41,080.0	26,255.0	41,080.0	27,056.5	41,080.0	27,858.1	41,080.0	25,453.5	41,080.0	24,651.9

Watershed	Land Use	Potential Soil Erosion Under Various Scenarios									
		Current Land Uses		-10% Forest Cover		-20% Forest Cover		+ 10% Forest Cover		+ 20% Forest Cover	
		Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)	Area (ha)	Total (tons)
	1	1,407.0	886.2	1,542.5	971.5	1,678.0	1,056.9	1,271.5	800.9	1,136.0	715.5
	2	-	-	-	-	-	-	-	-	-	-
	3	319.0	191.4	319.0	191.4	319.0	191.4	319.0	191.4	319.0	191.4
	4	1,355.0	813.0	1,219.5	731.7	1,084.0	650.4	1,490.5	894.3	1,626.0	975.6
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-	-
Tangkip		3,081.0	1,890.6	3,081.0	1,894.6	3,081.0	1,898.7	3,081.0	1,886.6	3,081.0	1,882.5

Assumptions:

1.) The reduction in forest cover occur only in open canopy forest and assumed converted to cultivated brush and grassland

2.) Likewise, the increase in forest cover decreases the cultivated grass and brushlands

3.) The land uses are:

1 cultivated brush and grass land
2 coconut plantation
3 cropland mixed with coconut
4 open canopy forest
5 arable lands, crops, cereals, sugar cane, tobacco
6 mangroves/fishponds
7 closed canopy forest
8 mangrove forest
9 mangroves/fishponds
10 mangroves/fishponds

Table 34a
Total Potential Annual Soil Erosion Under Various Land Use Scenarios in Different Watersheds of Samar Island

Watershed	Current Land Uses (tons)	-10% Forest Cover (tons)	-20% Forest Cover (tons)	+10% Forest Cover (tons)	+20% Forest Cover (tons)
Balangiga	13,467.4	13,721.1	13,974.8	13,213.7	12,960.0
Bantayan	12,168.0	12,409.3	12,650.6	11,926.7	11,685.4
Basey	26,672.6	27,058.3	27,443.9	26,286.9	25,901.3
Borongan	11,609.9	12,148.1	12,686.4	11,071.7	10,533.4
Bugko	42,915.9	43,541.5	44,167.2	42,290.3	41,664.6
Bulosao	1,905.6	1,905.6	1,905.6	1,905.6	1,905.6
Calbiga	13,964.9	14,053.3	14,141.7	13,876.5	13,788.1
Can Avid	62,058.8	63,113.8	64,168.8	61,003.8	59,948.8
Catarman	104,100.6	104,849.3	105,598.0	103,351.9	102,603.2
Catbalogan	8,866.0	8,866.0	8,866.0	8,866.0	8,866.0
Catubig	97,357.0	99,005.4	100,653.8	95,708.6	94,060.2
Dolores	67,914.0	69,414.2	70,914.4	66,413.8	64,913.6
Gandara	1,917.0	108,440.0	109,162.8	106,994.4	106,271.6
Gulganti	8,359.6	8,399.7	8,439.8	8,319.5	8,279.4
Linal-an	7,769.0	7,883.1	7,997.2	7,654.9	7,540.8
Llorente	56,152.2	57,239.7	58,327.3	55,064.7	53,977.1
Lo-om	3,839.5	3,842.8	3,846.0	3,836.2	3,833.0
Marabut	3,275.0	3,279.3	3,283.5	3,270.7	3,266.5
Mauo	20,830.8	21,387.6	21,944.5	20,274.0	19,717.1
Mondragon	13,307.2	13,312.9	13,318.6	13,301.5	13,295.8
Oras	54,047.0	54,246.2	54,445.5	53,847.8	53,648.5
Pabanog	7,119.9	7,373.1	7,626.2	6,866.7	6,613.6
Pambujan	84,029.2	87,921.7	91,814.1	80,136.7	76,244.3
Pan-as Hayiban	46,802.7	46,991.0	47,179.2	46,614.4	46,426.2
Silaga	18,035.2	18,071.3	18,107.3	17,999.1	17,963.1
Sulat	12,148.7	12,477.6	12,806.5	11,819.8	11,490.9
Suribao	47,192.0	48,108.2	49,024.4	46,275.8	45,359.6
Taft	26,255.0	27,056.5	27,858.1	25,453.5	24,651.9
Tangkip	1,890.6	1,894.6	1,898.7	1,886.6	1,882.5

Assumptions:
1.) The reduction in forest cover occur only in open canopy forest and assumed converted to cultivated brush and grassland
2.) Likewise, the increase in forest cover decreases the cultivated grass & brushlands

Table 34b
Estimated Sediment Yield for Each Watershed in Samar Island

Watershed	ESTIMATED SEDIMENT YIELD (g/l)				
	Current Land Use	10% Forest Reduction	20% Forest Reduction	10% Forest Increase	20% Forest Increase
Balangiga	0.104	0.105	0.113	0.078	0.075
Bantayan	0.101	0.101	0.109	0.075	0.072
Basey	0.080	0.080	0.086	0.060	0.058
Borongan	0.085	0.088	0.097	0.062	0.057
Bugko	0.215	0.216	0.231	0.161	0.156
Bulosao	0.046	0.045	0.048	0.035	0.034
Calbiga	0.076	0.075	0.080	0.057	0.056
Can Avid	0.076	0.076	0.082	0.057	0.055
Catarman	0.162	0.161	0.171	0.122	0.119
Catbalogan	0.071	0.070	0.074	0.054	0.053
Catubig	0.100	0.100	0.108	0.075	0.072
Dolores	0.085	0.085	0.092	0.063	0.060
Gandara	0.104	0.103	0.110	0.079	0.077
Gulganti	0.069	0.068	0.073	0.052	0.051
Linal-an	0.105	0.105	0.112	0.078	0.076
Llorente	0.164	0.165	0.177	0.122	0.117
Lo-om	0.084	0.083	0.088	0.064	0.063
Marabut	0.022	0.022	0.023	0.017	0.017
Mauo	0.070	0.071	0.077	0.052	0.050
Mondragon	0.191	0.188	0.199	0.145	0.142
Oras	0.191	0.189	0.201	0.145	0.141
Pabanog	0.087	0.088	0.097	0.064	0.060
Pambujan	0.137	0.141	0.156	0.099	0.092
Pan-as Hayiban	0.111	0.110	0.116	0.084	0.082
Silaga	0.088	0.087	0.092	0.067	0.065
Sulat	0.074	0.075	0.082	0.055	0.052
Suribao	0.070	0.070	0.076	0.052	0.050
Taft	0.065	0.066	0.072	0.048	0.045
Tangkip	0.060	0.060	0.063	0.046	0.045

Note: The sediment yield was estimated using 10% sediment delivery ratio, the USLE estimates and the the Brook 5 runoff estimates.

Table 35
Area Distribution of Critical Areas (in ha) by Watershed Within and Outside SINP

Watershed	Within SINP		Outside SINP		Total
	Critical	Non-Critical	Critical	Non-Critical	
Balangiga	268	5,518	1,670	5,838	13,294
Bantayan			2,187	8,310	10,497
Basey	2,001	12,341	6,777	13,614	34,733
Borongan	5,276	5,348	645	2,796	14,065
Bugko			9,731	7,556	17,287
Bulosao	89	1,889	107	2,194	4,279
Calbiga	119	2,482	3,812	13,448	19,861
Can-Avid	24,390	34,290	5,947	22,014	86,641
Catarman	4,409	2,674	31,625	20,701	59,409
Catbalogan			3,918	9,629	13,547
Catubig	26,328	16,742	13,269	37,907	94,246
Dolores	30,855	17,200	6,192	30,354	84,601
Gandara	26,921	13,041	36,490	35,509	111,961
Gulganti			3,521	6,996	10,517
Linal-an	2,977	1,564	1,189	1,921	7,651
Llorente	11,788	7,353	8,626	7,547	35,314
Lo-om	1,101	1,116	576	1,899	4,692
Marabut	228	3,808	813	10,165	15,014
Mauo			6,179	20,224	26,403
Mondragon			3,006	3,045	6,051
Oras	3,145	895	9,185	15,122	28,347
Pabanog	138	1,068	1,221	6,468	8,895
Pambujan	9,131	18,720	13,507	17,710	59,068
Pan-as Hayiban	92	-	23,123	21,980	45,195
Silaga	387	194	7,685	13,755	22,021
Sulat	7,483	4,898	968	3,450	16,799
Suribao	26,776	33,397	4,218	5,001	69,392
Taft	17,588	19,559	434	4,127	41,708
Tangkip			208	3,017	3,225
Total	**201,490**	**204,097**	**206,829**	**352,297**	**964,713**

FIGURE 2.
WATERSHED MAP OF SAMAR ISLAND

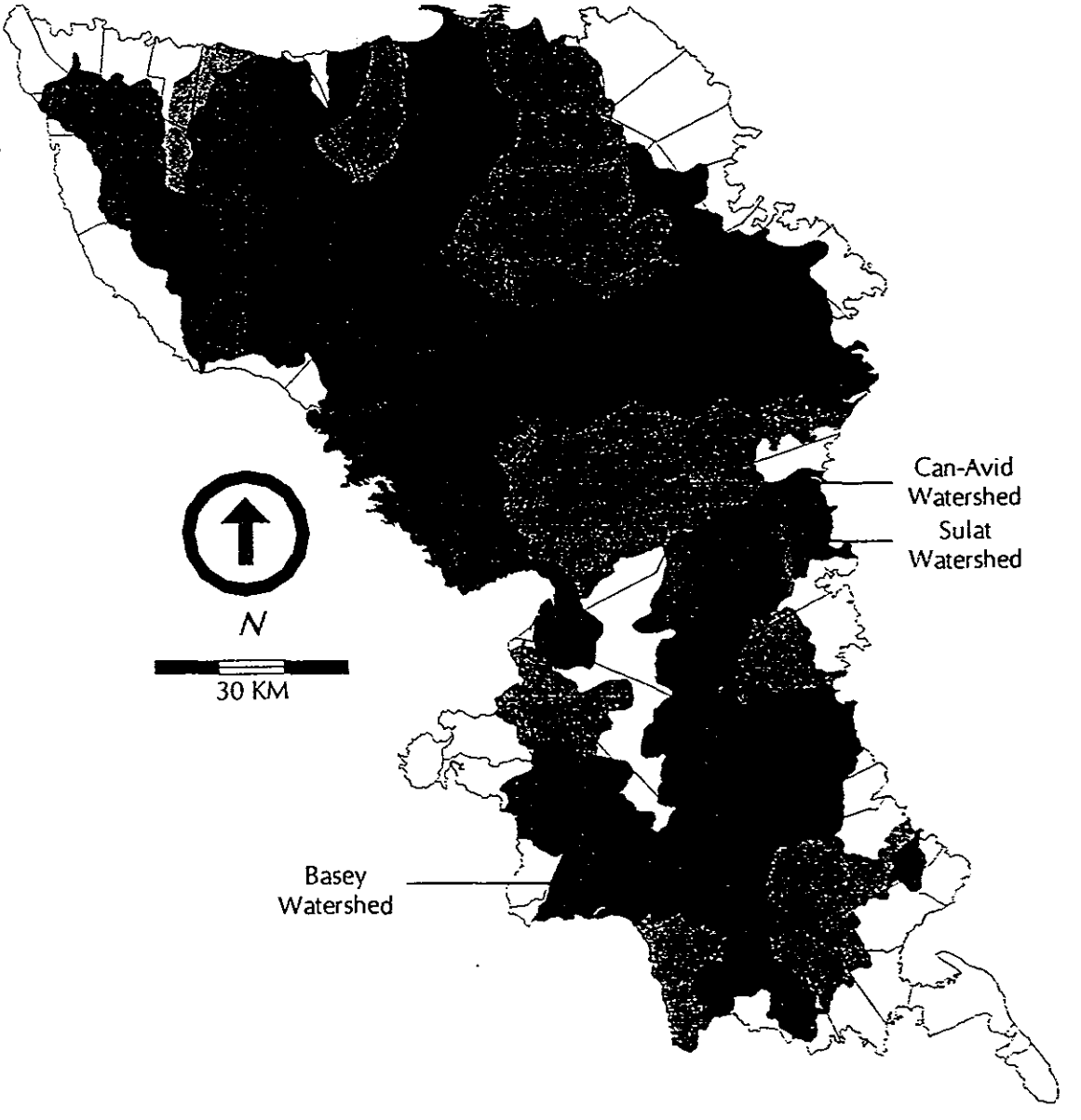
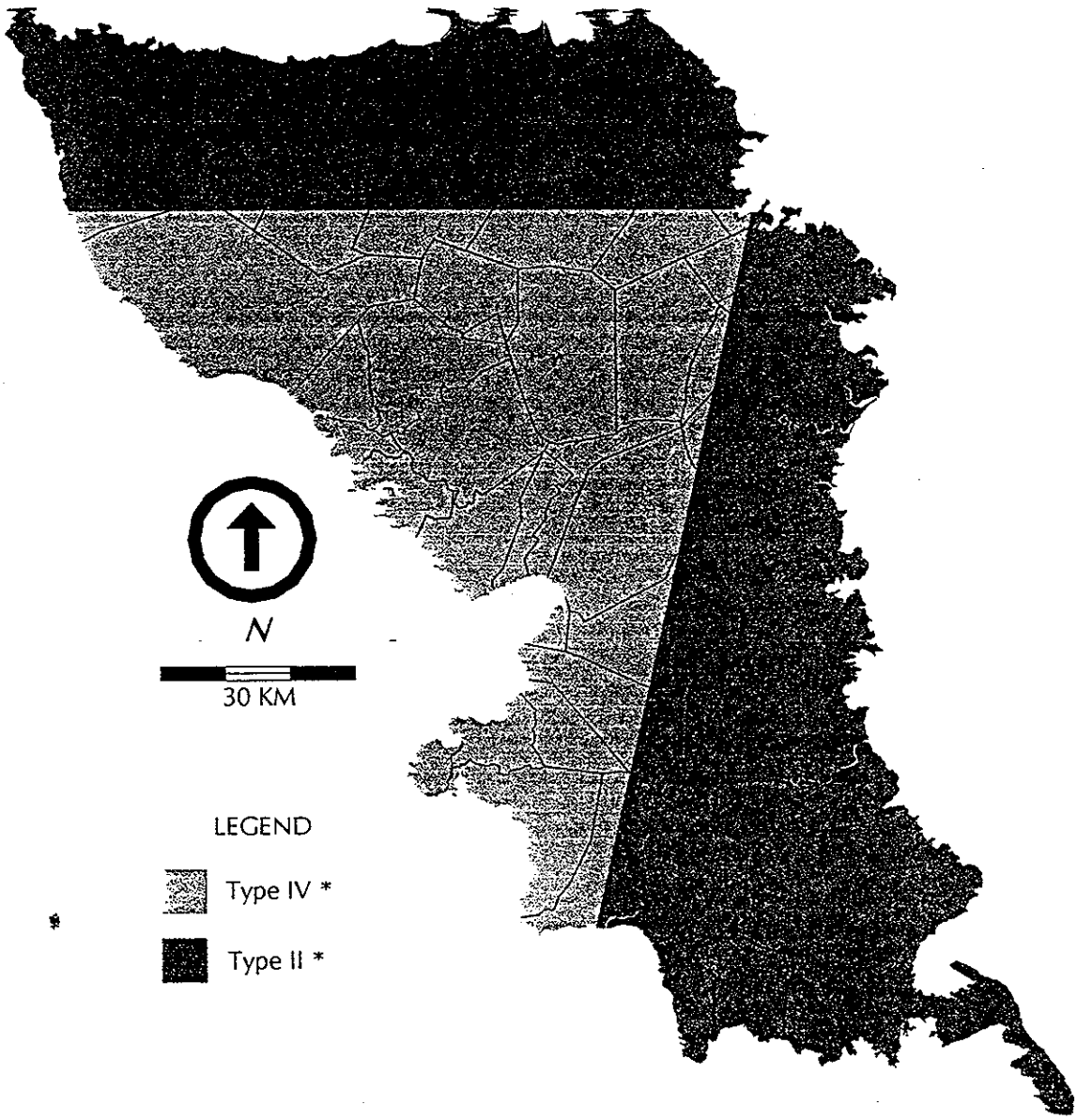


FIGURE 3.
CLIMATIC MAP OF SAMAR ISLAND



(* based on Corona Classification)

Figure 4a
Maximum, Minimum and Mean Monthly Temperature for Eastern Samar

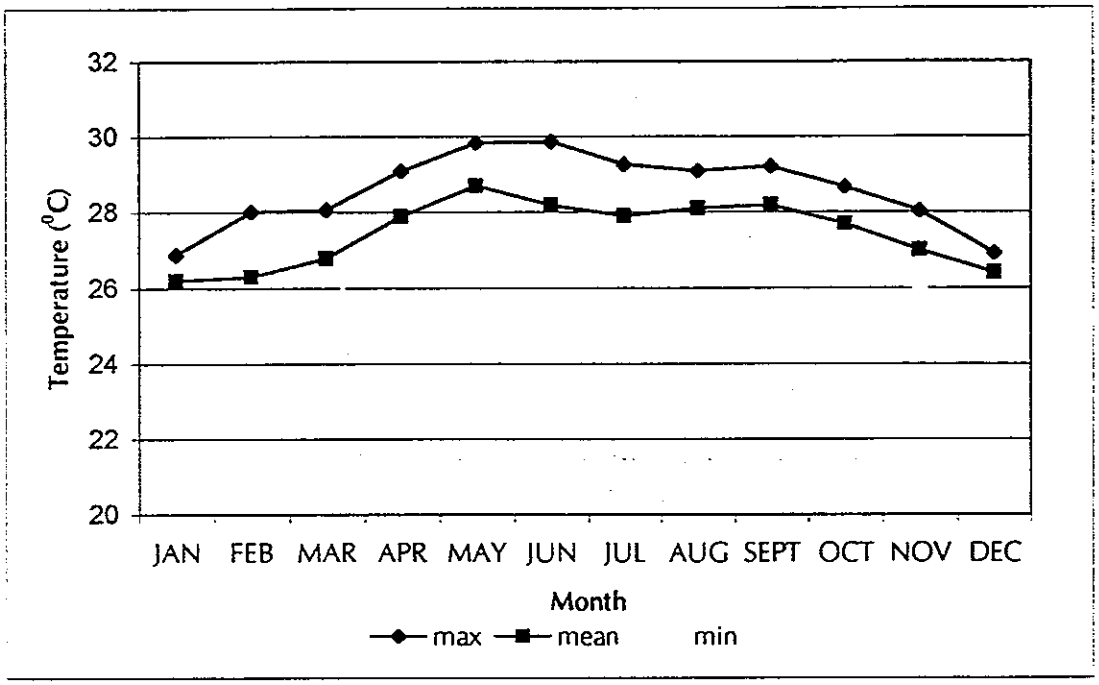


Figure 4b
Maximum, Minimum and Mean Monthly Temperature for Western Samar

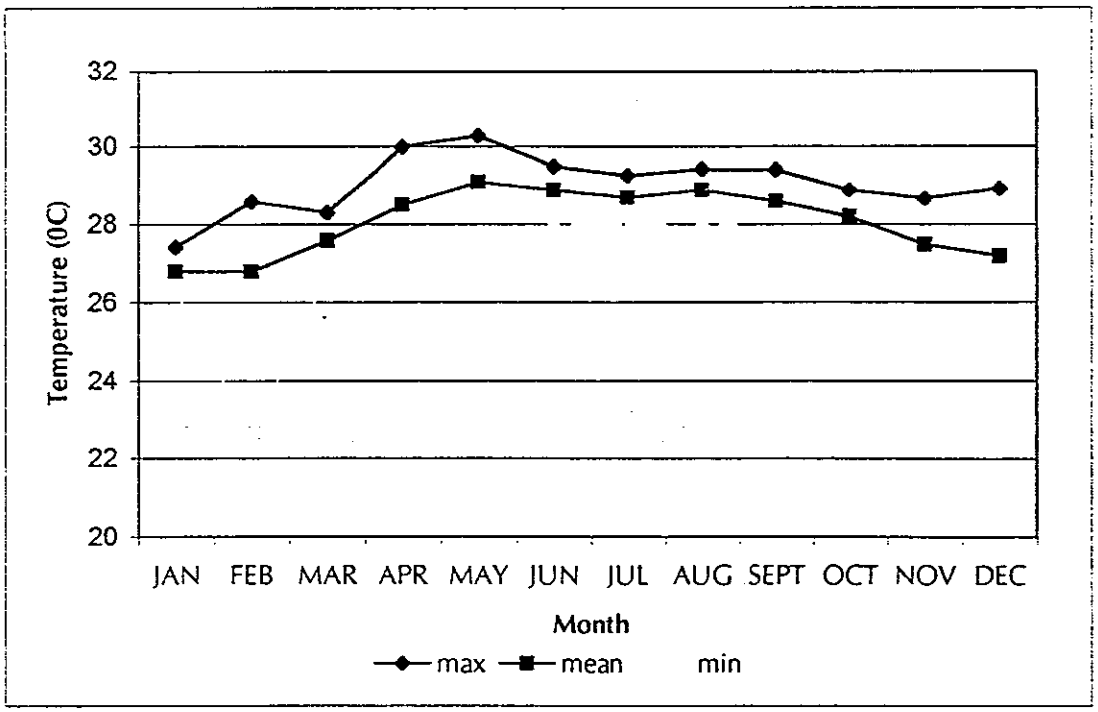


Figure 4c
Maximum, Minimum and Mean Monthly Temperature for Northern Samar

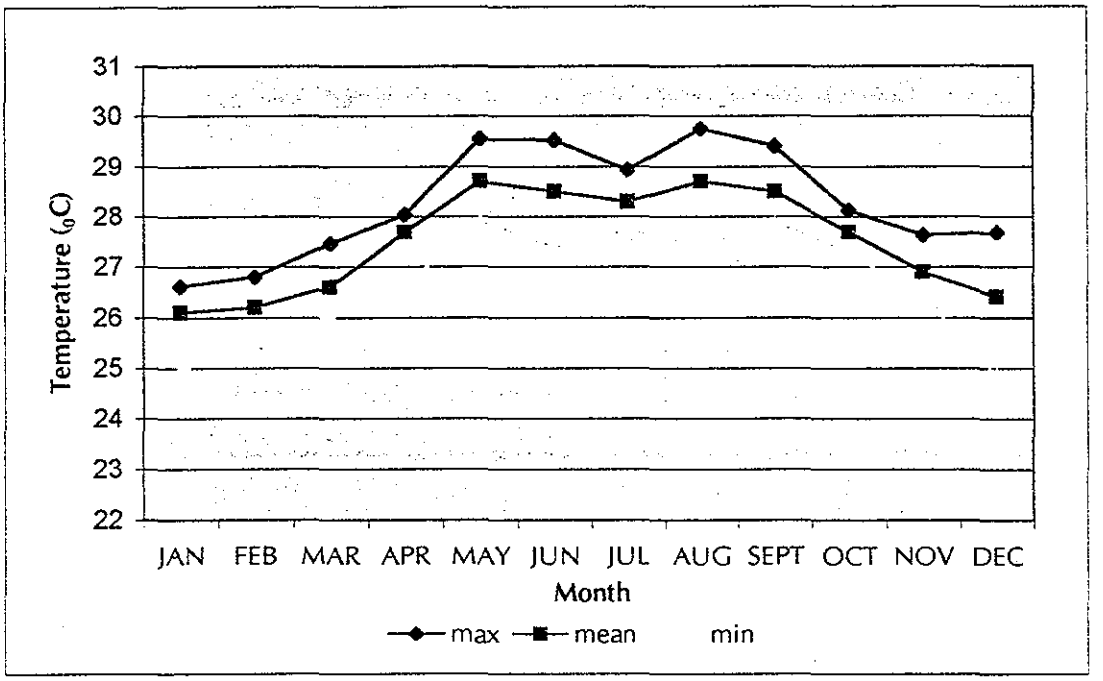


FIGURE 5.
ISOHYETAL MAP OF SAMAR ISLAND

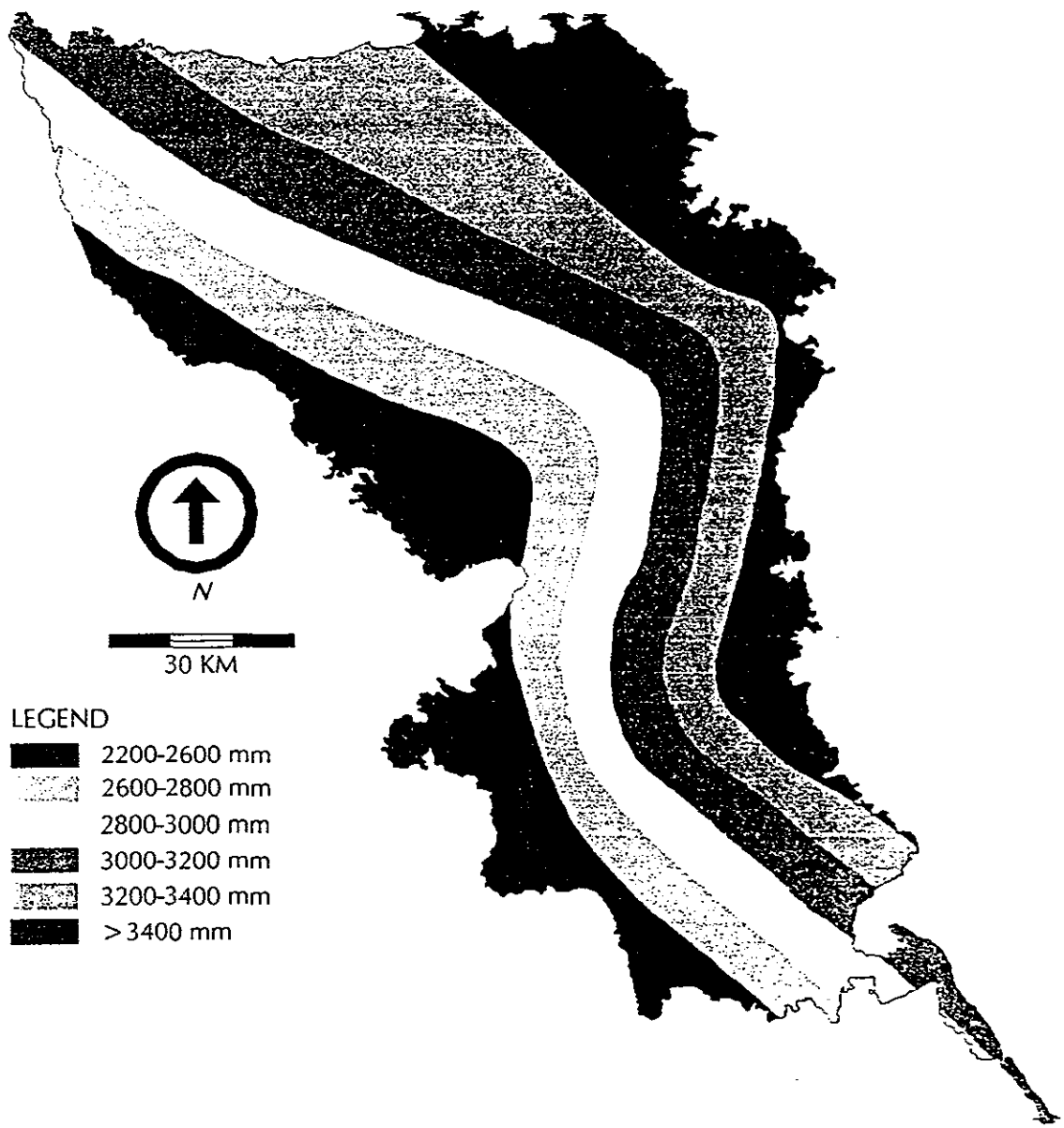


Figure 6
Maximum, Minimum and Mean Monthly Total Rainfall for Eastern Samar

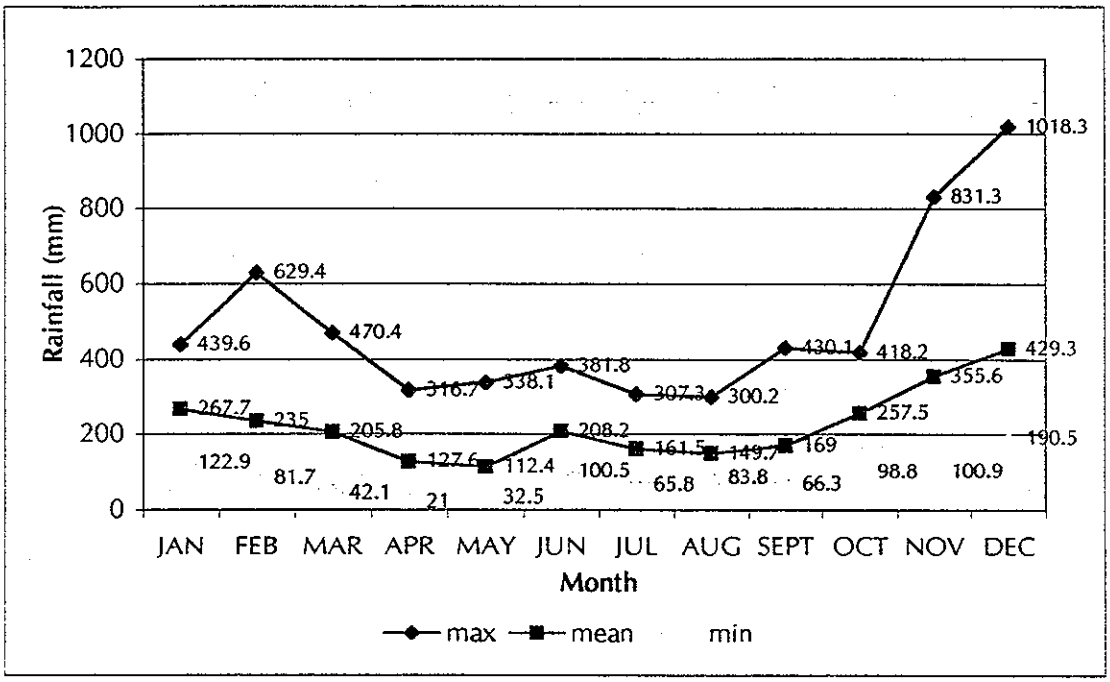


Figure 7
Maximum, Minimum and Mean Monthly Total Rainfall for Western Samar

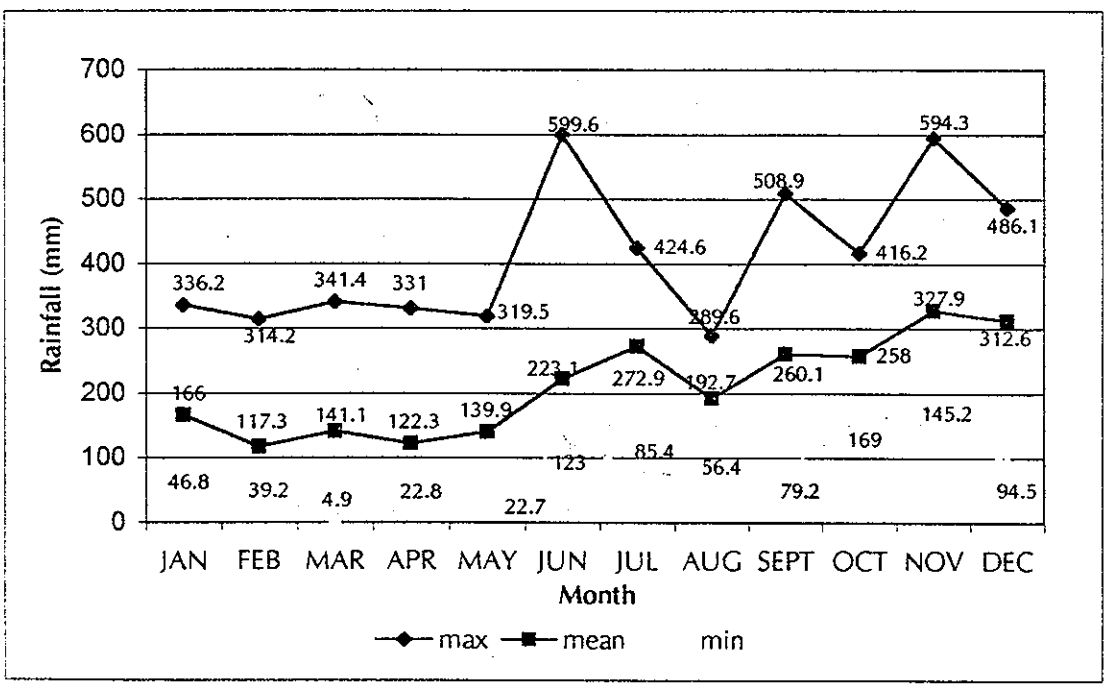
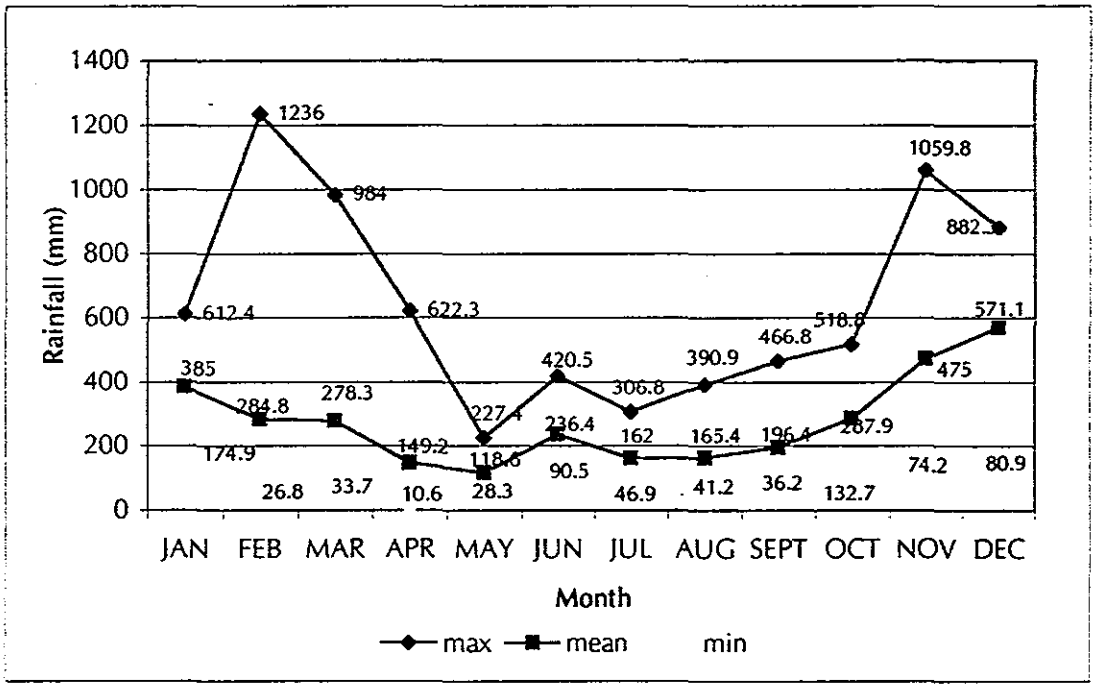


Figure 8
Maximum, Minimum and Mean Monthly Total Rainfall for Northern Samar



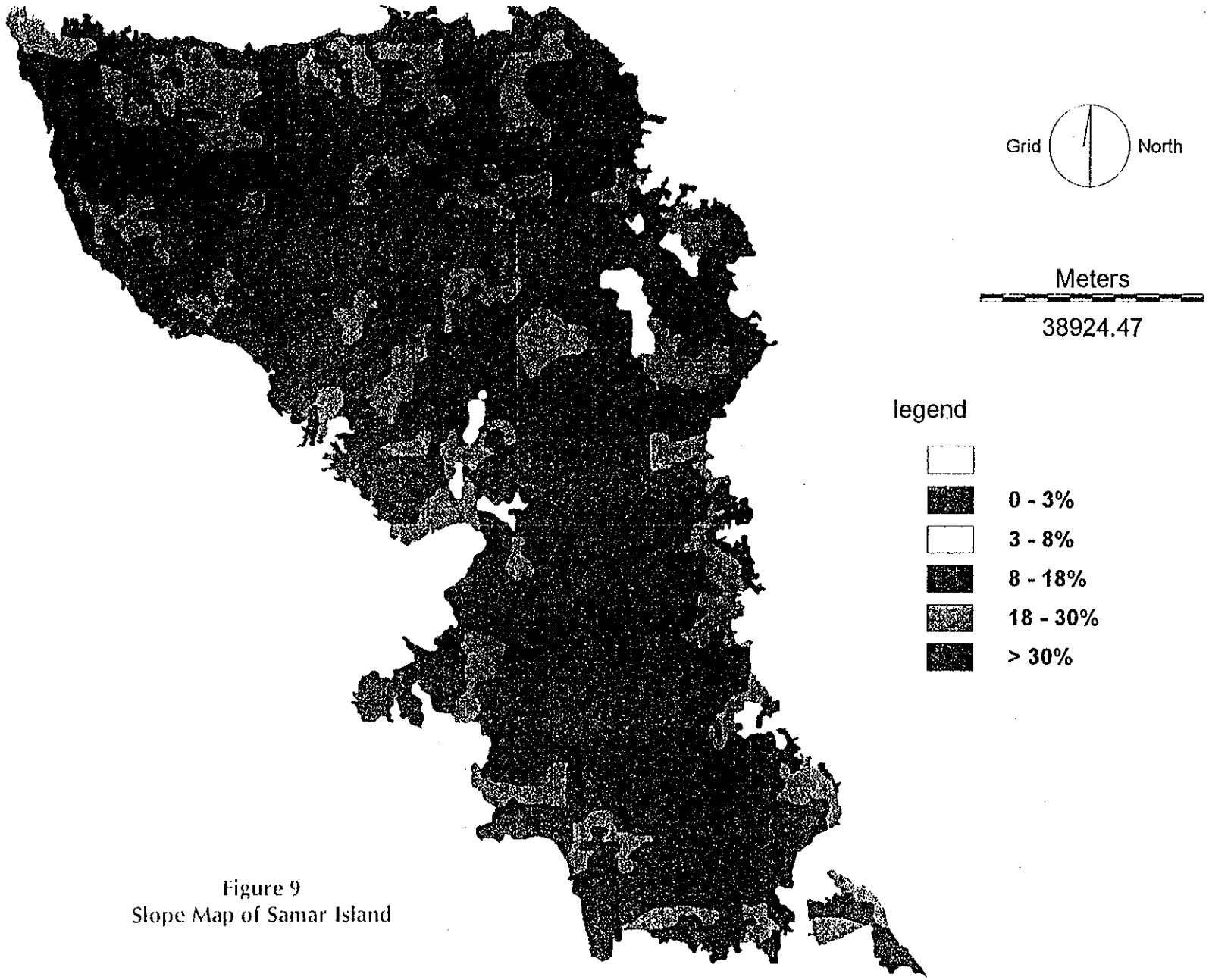


Figure 9
Slope Map of Samar Island

FIGURE 10.
SOIL MAP OF SAMAR ISLAND

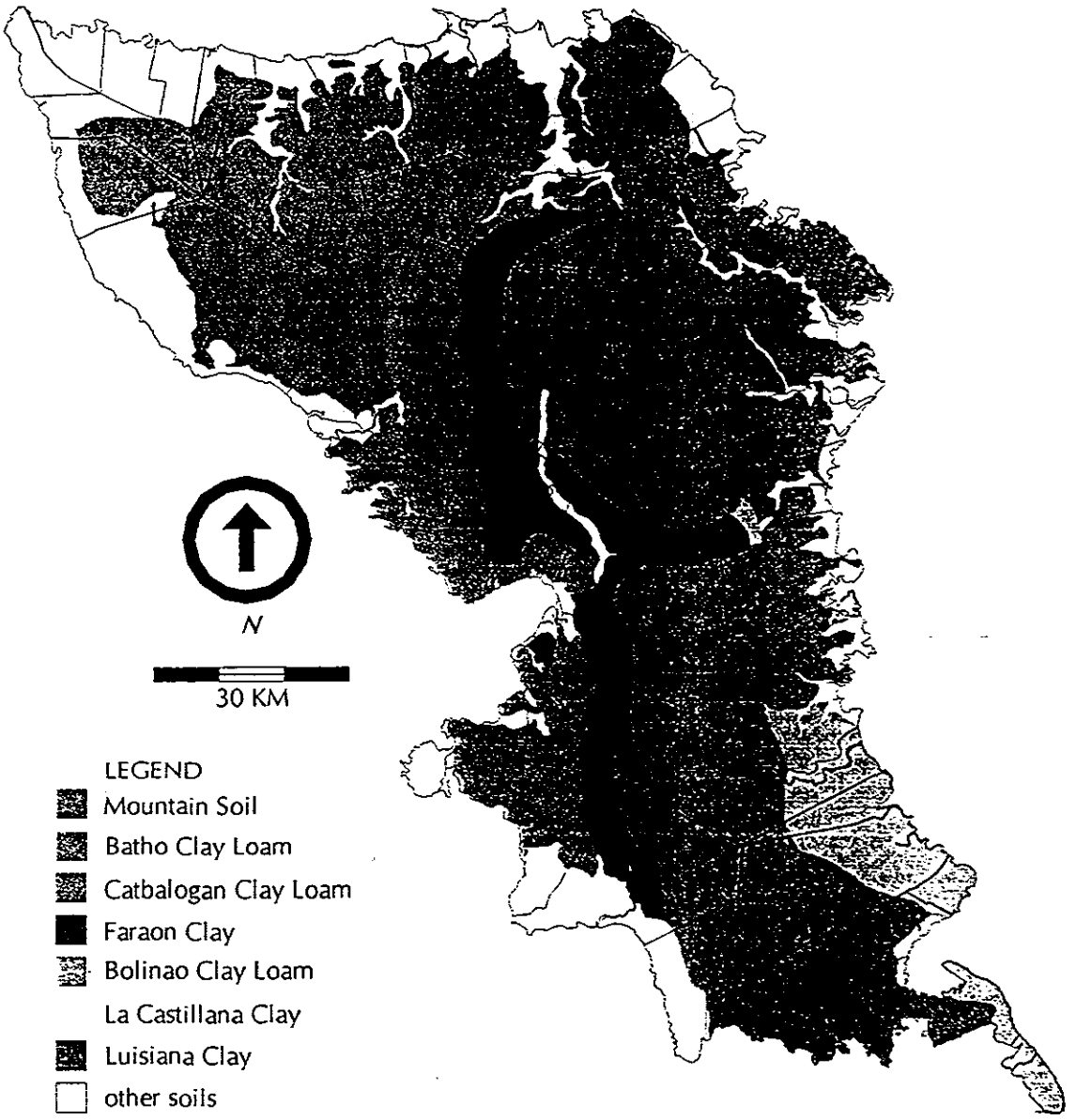


FIGURE 11.
SOIL SAMPLING SITES

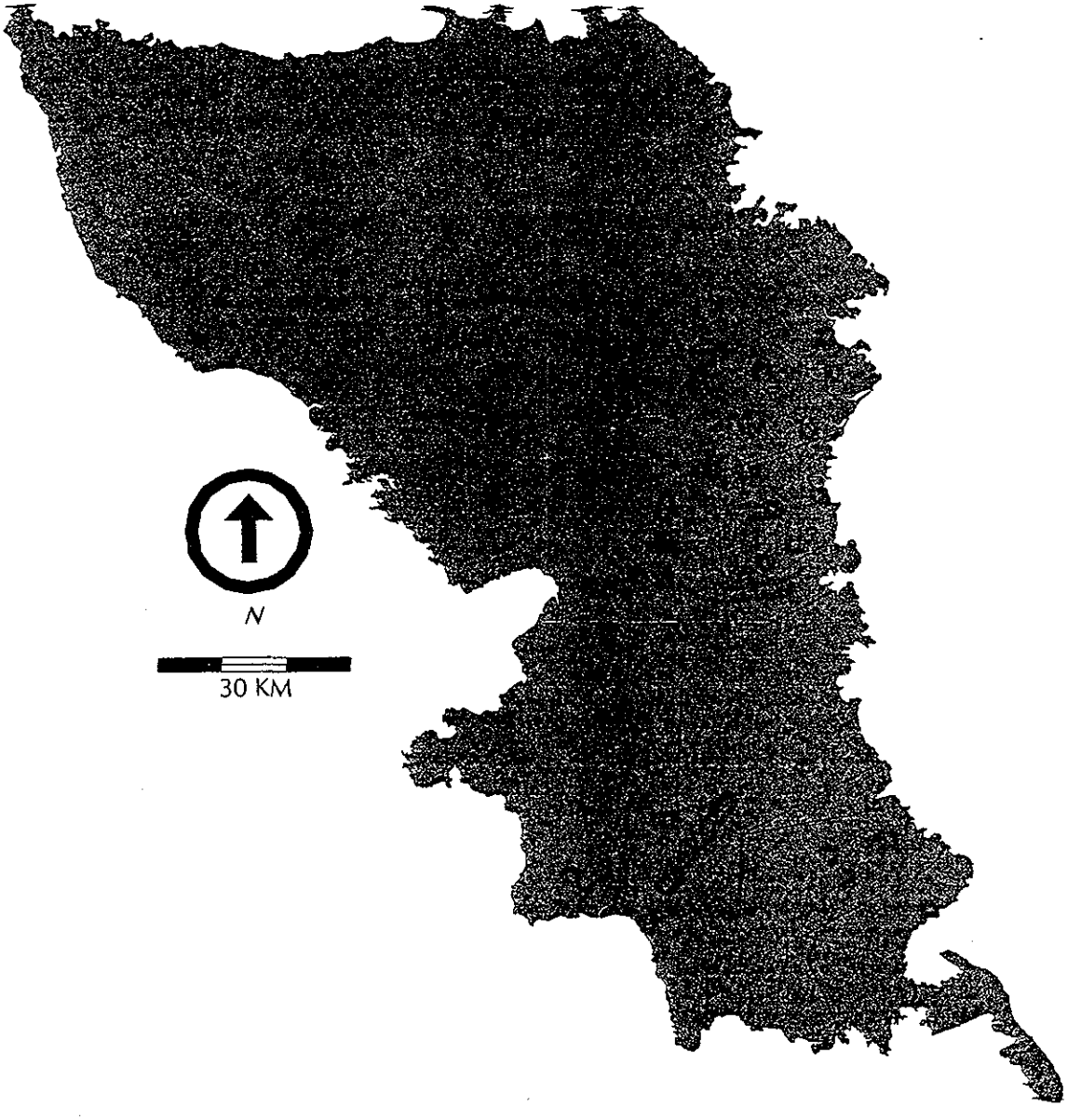


FIGURE 12.
LAND USE MAP OF SAMAR ISLAND

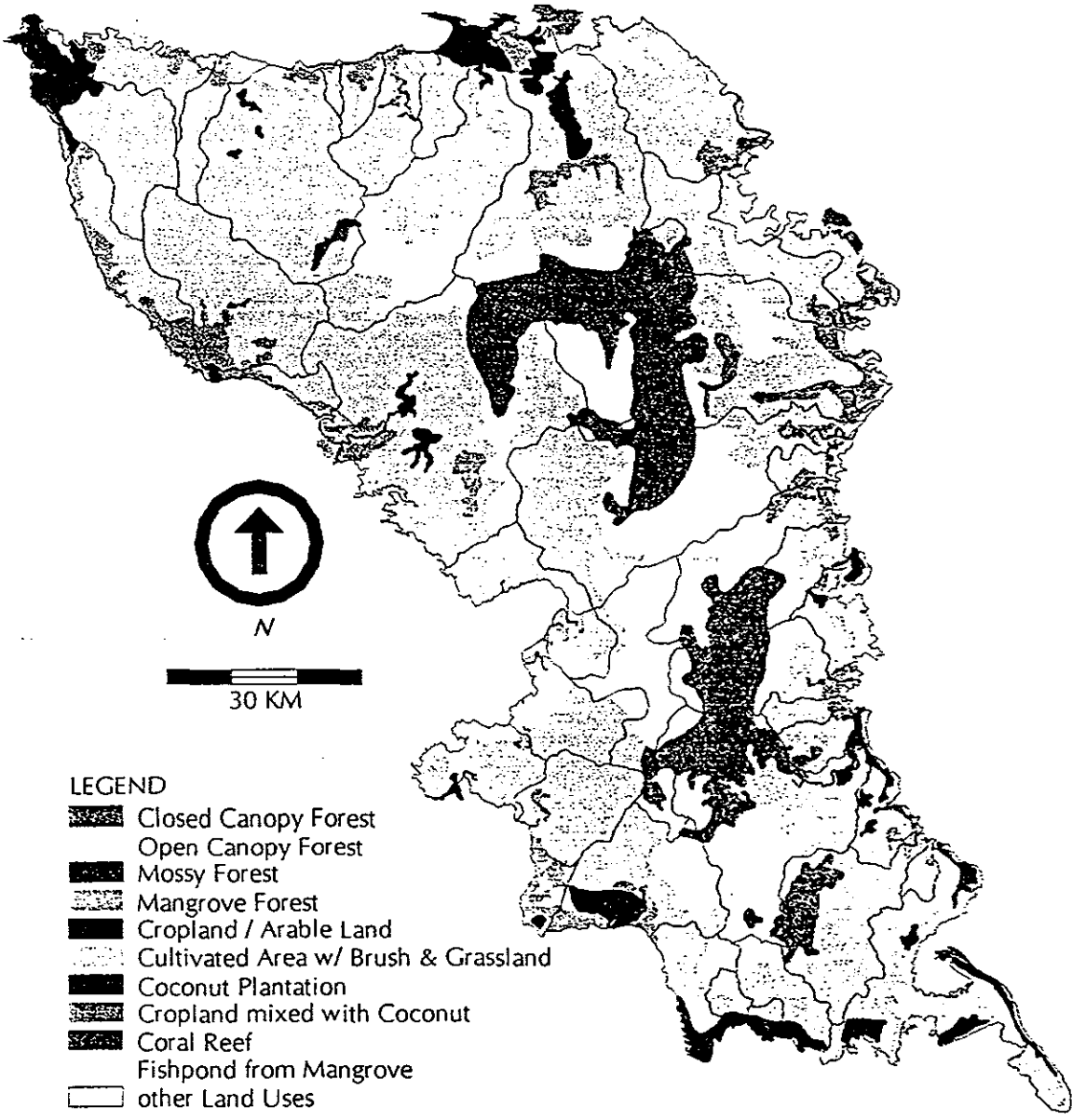


FIGURE 13.
SAMAR ISLAND FOREST RESERVE

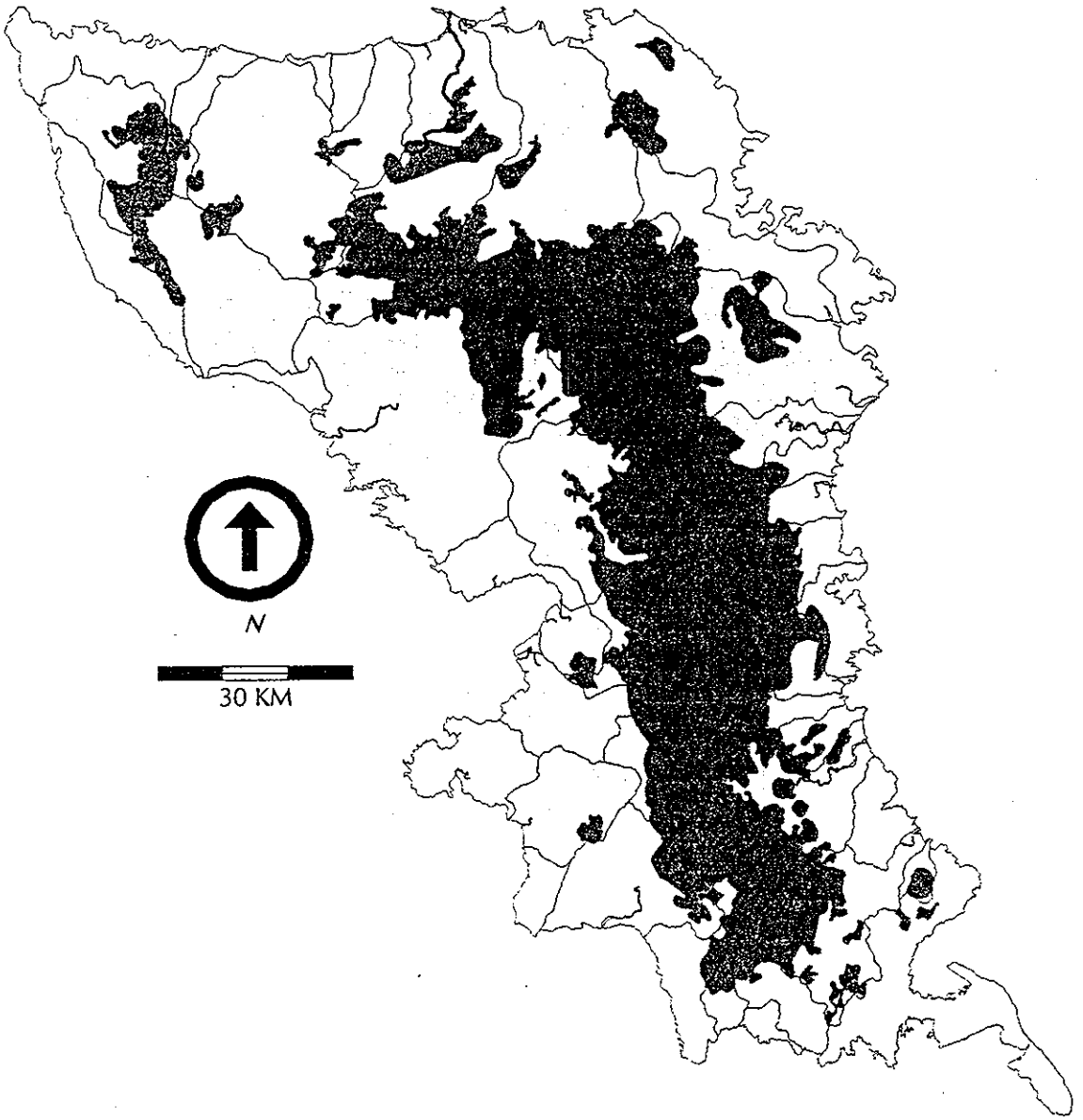


FIGURE 14.
PROPOSED SAMAR ISLAND NATIONAL PARK

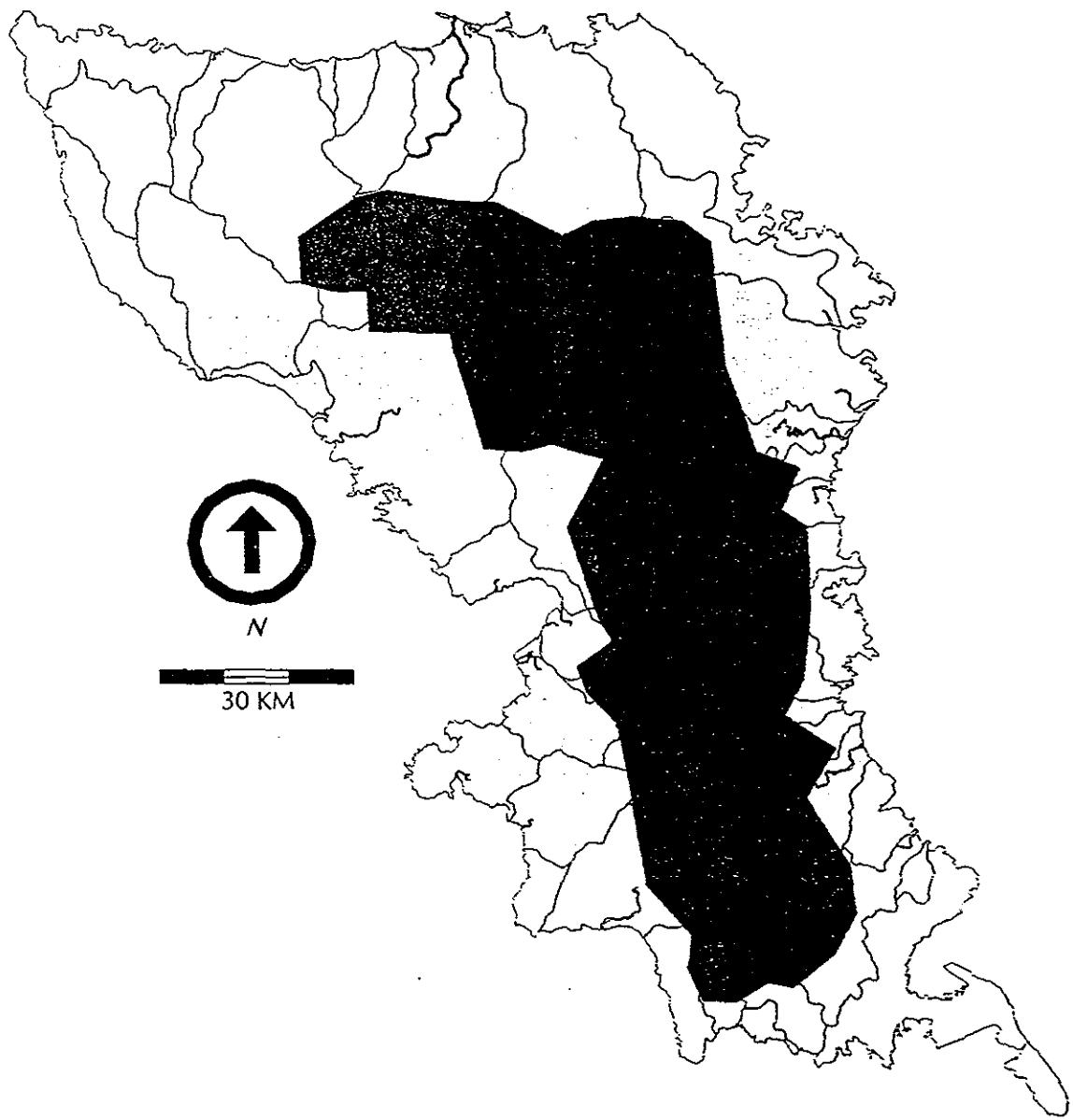


Figure 15
Runoff for Basey Watershed Under Different Land Use Scenarios (mm)

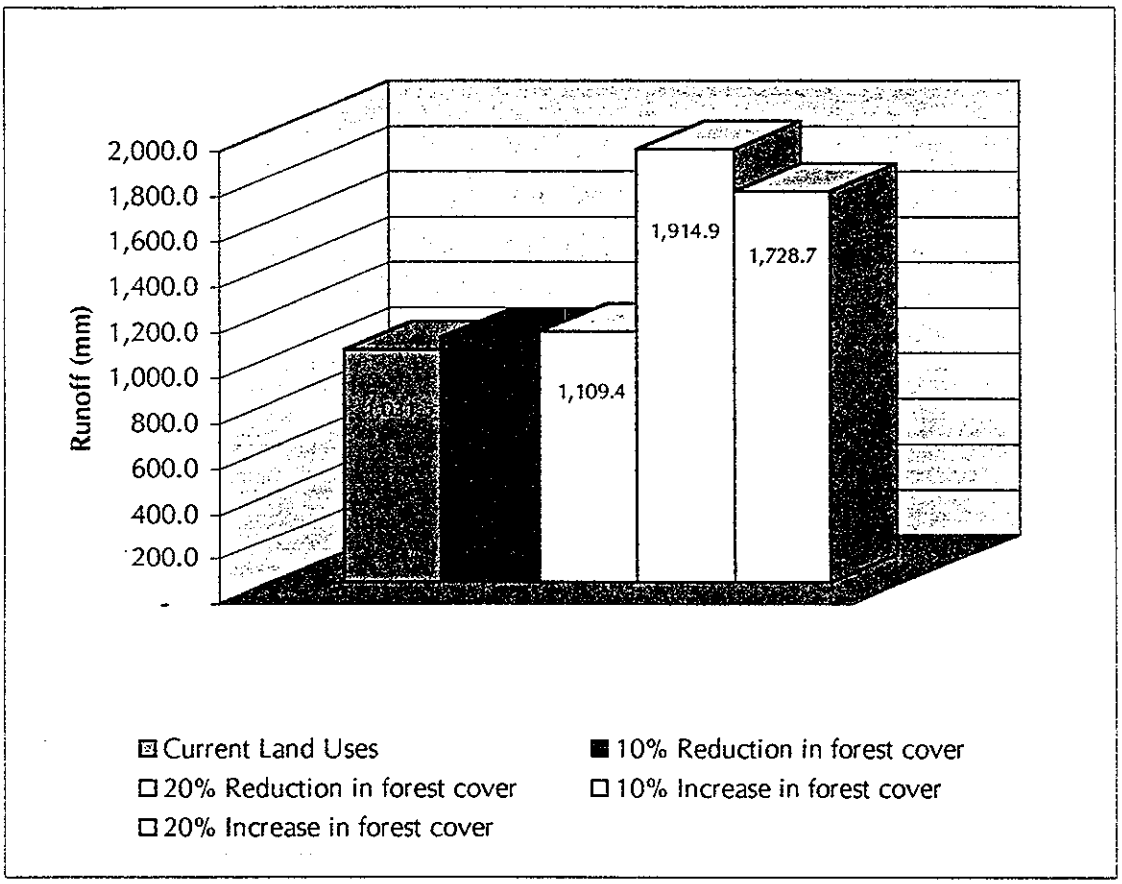


Figure 16
Runoff for Can-Avid Watershed Under Different Land Use Scenarios (mm)

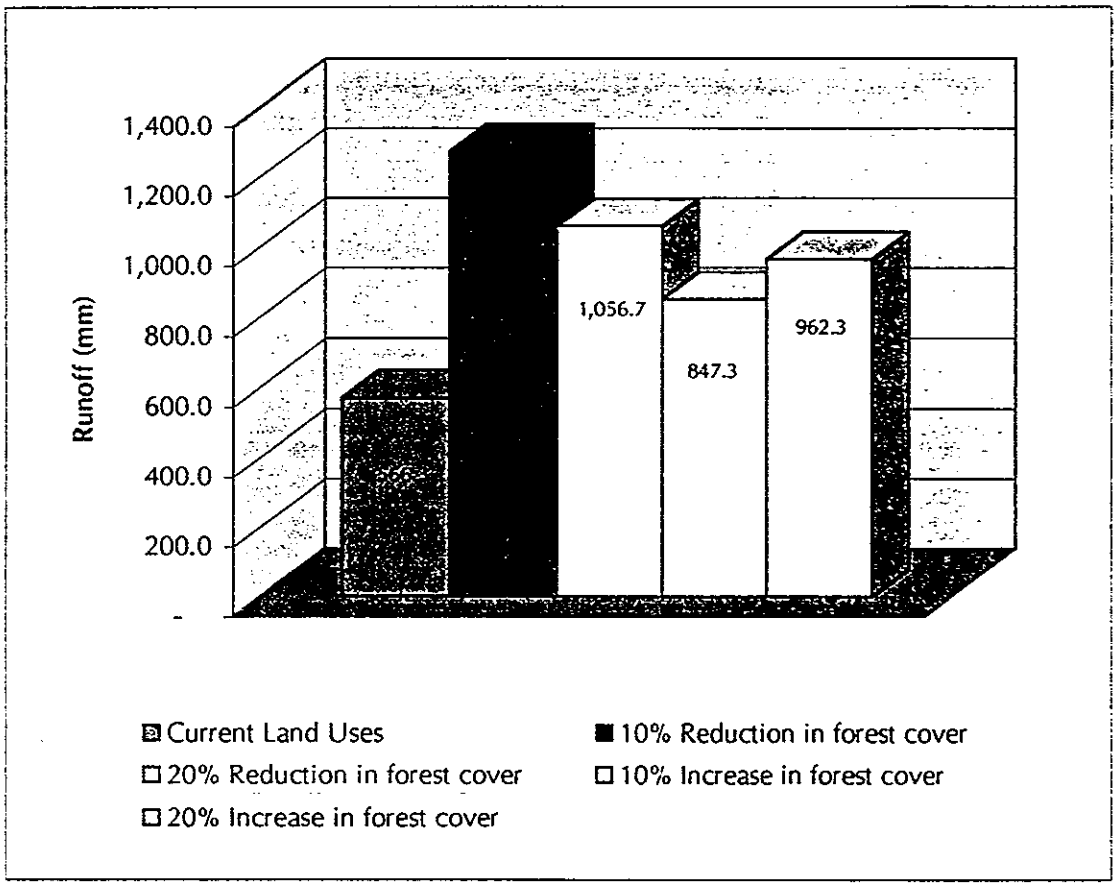
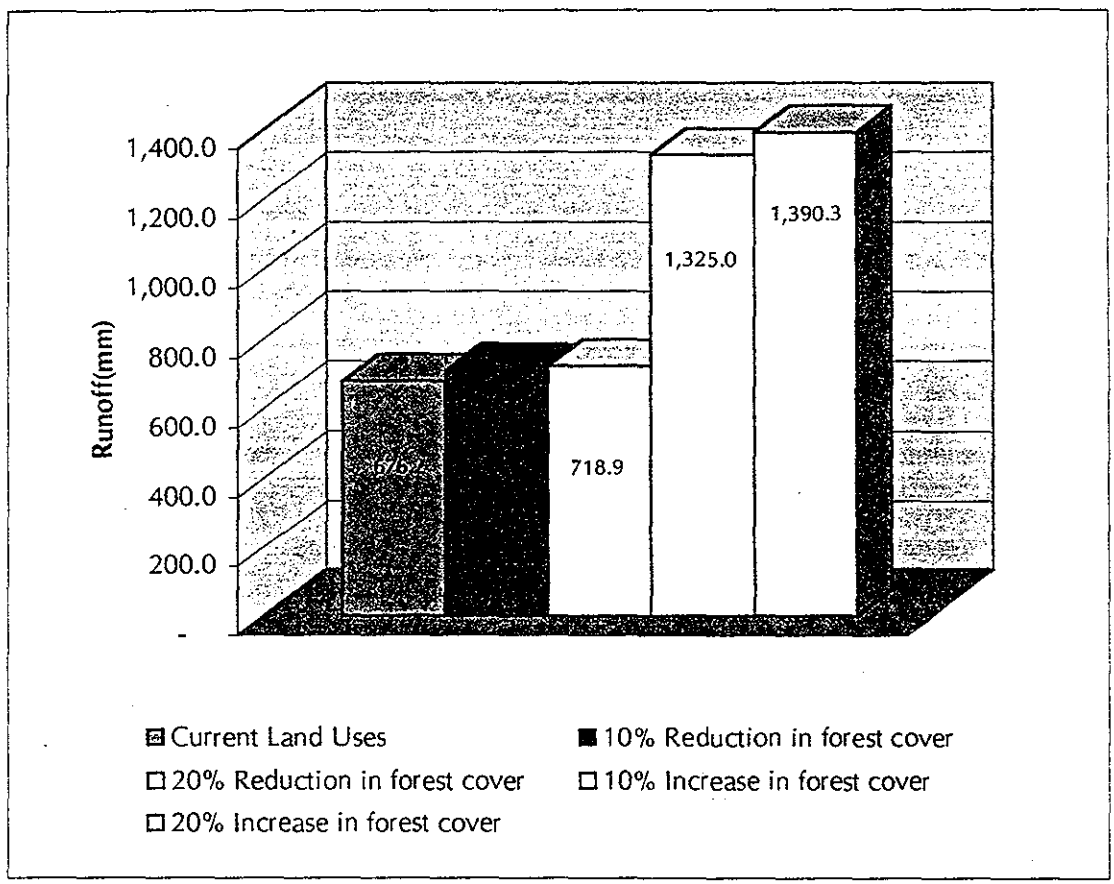


Figure 17
Runoff for Sulat Watershed Under Different Land Use Scenarios (mm)



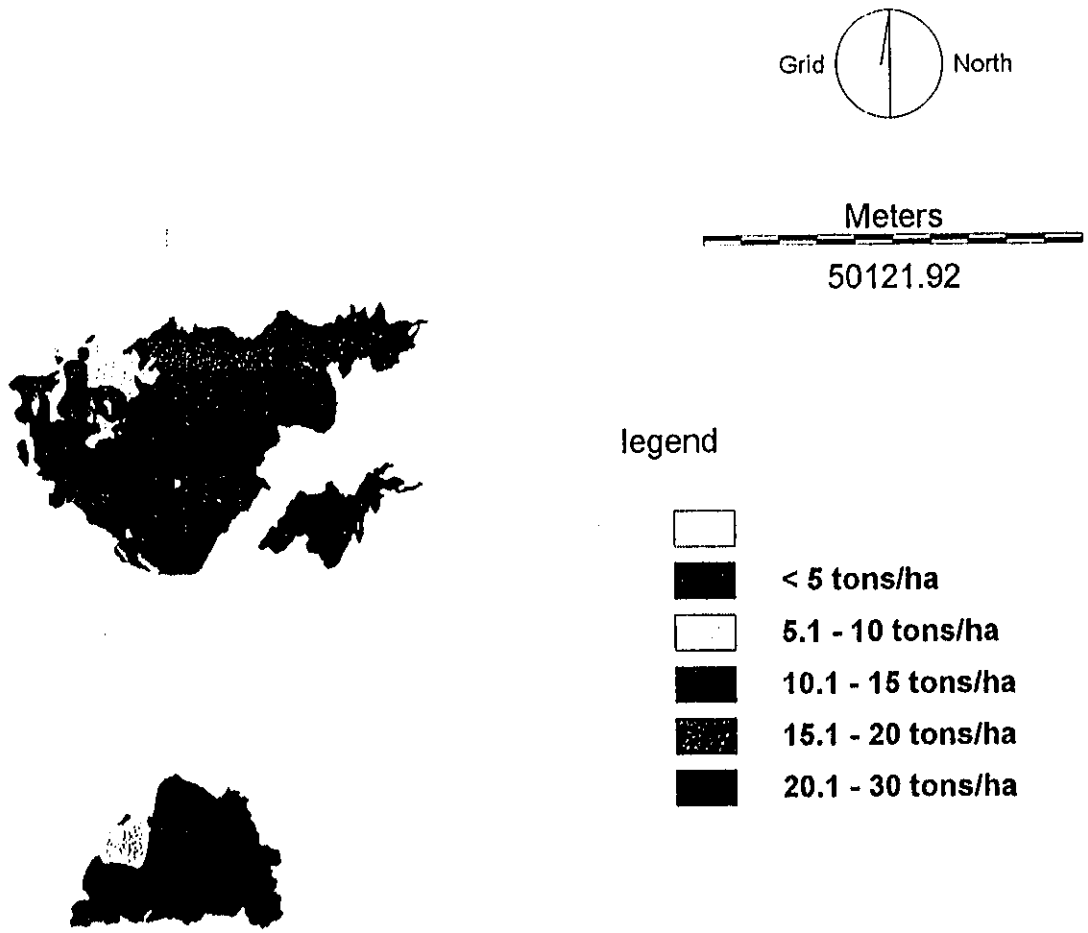


Figure 18
Soil Erosion Potential of Basey, Can-Avid and Sulat

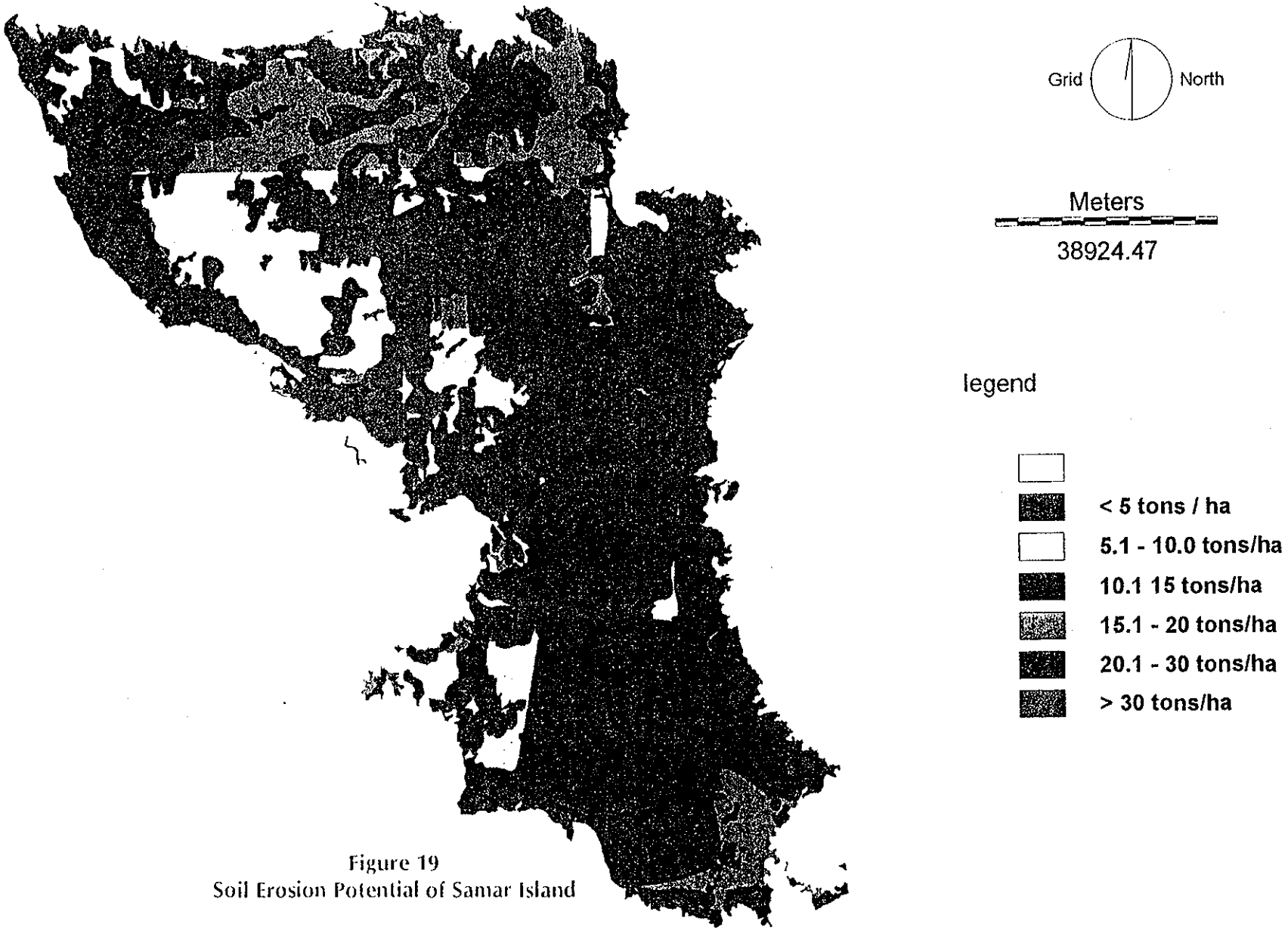


Figure 19
Soil Erosion Potential of Samar Island

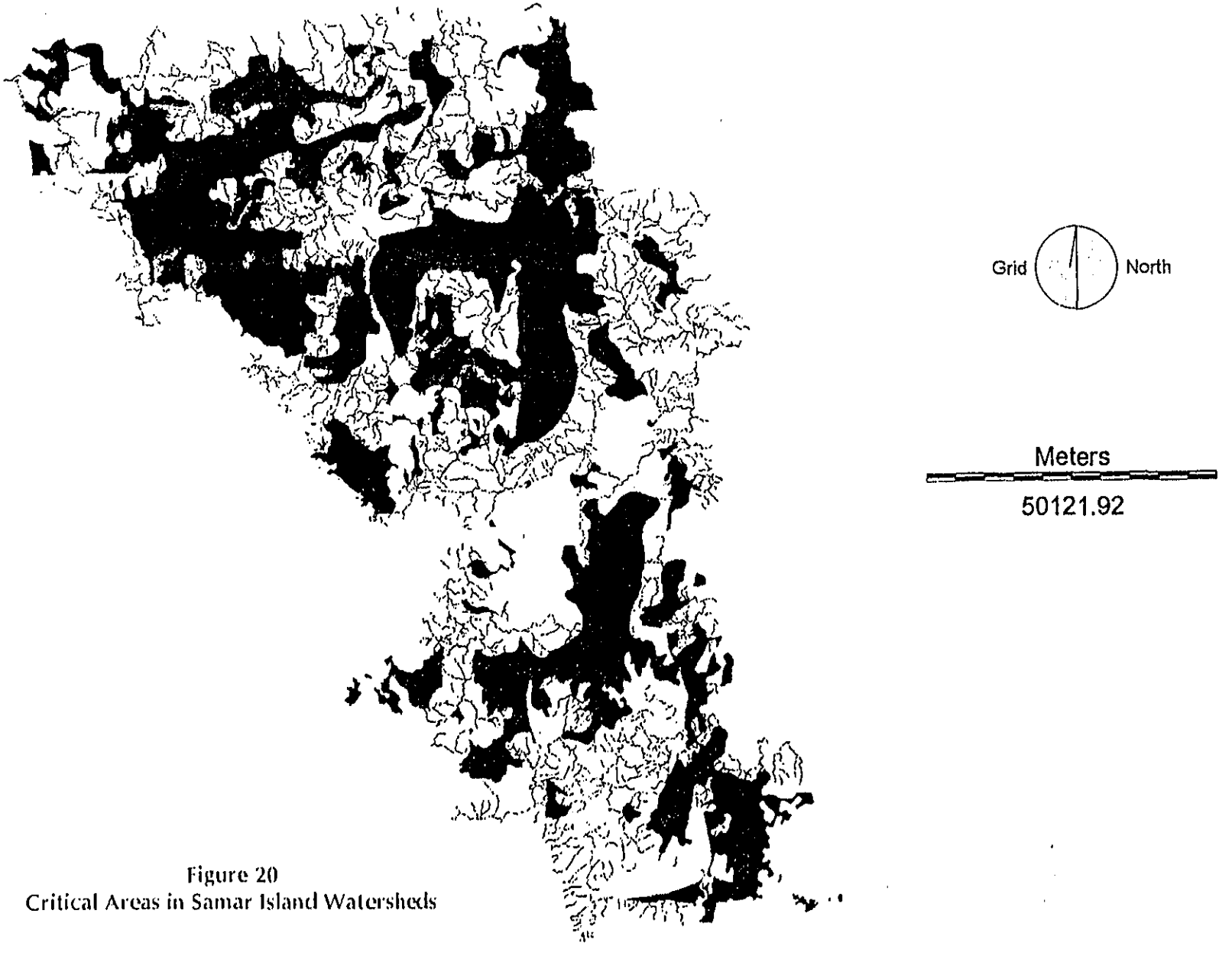


Figure 20
Critical Areas in Samar Island Watersheds

Appendix A
Sample Climatic Data for December 1999 from Three (3) PAGASA Stations

Guiuan Radar Station, Eastern Samar — *Latitude: 11° 02'* — *Longitude: 125° 44'*

Day of the Month	Station Pressure (MBS)	TEMPERATURE (°C) Dry Bulb	Wet Bulb	Maximum	Minimum	Mean	Mean Dew Point	Mean Rel. Hum.	Rainfall (M M)	WIND Average Velocity (MPS)	Prevailing Direction
1	2	3	4	5	6	7	8	9	10	11	12
1	1003.6	27.4	26.0	29.0	26.5	27.8	25.6	89	7.0	003	070
2	1004.1	27.4	25.8	29.4	25.2	27.3	25.3	88	17.1	004	070
3	1004.6	26.9	25.4	28.0	26.0	27.0	24.9	89	7.9	003	070
4	1003.4	27.1	26.0	29.0	25.4	27.2	25.7	92	3.6	003	070
5	1002.3	26.6	25.5	28.6	25.0	26.8	25.1	92	31.0	004	040
6	1000.7	25.7	24.9	26.5	25.0	25.8	24.6	94	38.0	004	070
7	1001.5	26.5	25.6	27.0	25.6	26.3	25.3	93	5.1	002	070
8	1001.3	27.1	26.3	30.5	26.0	28.2	26.1	94	18.8	002	070
9	1001.3	27.5	26.0	30.5	25.0	27.8	25.5	89	7.8	003	070
10	1001.1	27.2	25.8	29.0	25.4	27.2	25.4	89	11.0	001	040
11	1001.8	26.7	26.4	28.0	25.5	26.7	26.3	98	2.0	004	040
12	1001.7	26.7	25.6	28.4	25.3	26.8	25.2	92	51.9	003	070
13	1001.2	25.8	25.1	26.5	25.4	26.0	24.9	94	20.5	003	100
14	1002.2	26.9	25.9	30.5	26.0	28.2	25.6	92	1.8	001	090
15	1002.2	27.9	25.9	30.5	24.5	27.5	25.3	85	12.0	002	070
16	1003.1	26.3	24.9	28.4	24.5	26.4	24.4	89	10.8	001	090
17	1001.9	27.5	25.7	30.7	26.0	28.3	25.1	86	T	001	090
18	1001.3	27.4	26.2	30.2	25.0	27.6	25.8	91	10.8	002	040
19	1001.2	26.2	25.1	27.6	25.3	26.4	24.7	91	15.2	002	200
20	1001.4	28.2	26.4	32.0	26.2	29.2	25.8	87	12.0	001	200
21	1002.1	28.1	26.2	31.5	26.0	28.7	25.6	86	46.4	001	270
22	1002.7	26.6	25.1	30.0	25.0	27.5	24.6	88	46.2	004	040
23	1003.9	25.0	24.3	26.7	24.2	25.5	24.1	94	113.0	006	040
24	1003.4	25.5	24.4	27.4	24.2	25.8	24.0	91	52.8	003	040
25	1003.6	24.5	23.5	25.0	24.0	24.5	23.1	92	29.8	002	040
26	1004.3	26.0	25.1	27.0	24.0	25.5	24.8	93	21.0	001	360
27	1005.2	26.0	24.3	28.0	24.0	26.0	23.7	87	1.4	002	040
28	1004.7	26.7	25.6	29.0	25.5	27.3	25.2	92	9.0	003	040
29	1004.0	24.7	24.1	25.7	24.0	24.8	23.9	95	48.6	002	360
30	1003.4	26.9	25.6	29.0	25.7	27.4	25.2	90	0.4	003	040
31	1003.3	27.0	25.6	28.0	25.2	26.6	25.2	89	6.3	003	080
TOTAL	31082.5	826.0	788.3	887.6	780.6				659.2		
Mean or Extreme	1002.7	26.6	25.4	28.6	25.2	26.9				002	040

Guiuan Radar Station

	WIND			SUNSHINE			MISCELLANEOUS METEORS										
Day of the Month	Max. Wnd Speed (MPS)	Direction	Time (GMT)	Minutes	Percentage of Maximum Possible	Mean Cloudiness (1-8)	Smoke	Haze	Fog	Rain	Shower	Drizzle	Hail	Thunder	Storm	Distant	Lighthing
1	13	14	15	16	17	18	19		20	21			22	23		24	
1						4	x			x						x	
2						8	x			x				x		x	
3						8	x			x						x	
4						7	x			x						x	
5						7	x			x							
6	10	070	1454			8	x			x						x	
7						6	x			x							
8						8	x			x						x	
9						4	x			x							
10						8	x			x						x	
11						8	x			x						x	
12	10	090	1450			8	x			x							
13						8	x			x							
14						6	x			x							
15						6	x			x							
16						6	x			x							
17						5	x			x						x	
18						7	x			x							
19						7	x			x						x	
20						5	x			x						x	
21						5	x			x						x	
22	15	040	1555			8	x			x				x			
23	11	040	0405			8				x							
24						8	x			x							
25						8				x							
26						7	x			x							
27						7	x			x						x	
28						7	x			x							
29						8	x			x							
30						7	x			x							
31						5	x			x							
TOTAL						212		29			31				2		13
Mean or Extreme	15	040	1555			7											

151

Catarman Station, Northern Samar — *Lat. 12° 29" N* — *Long. 124° 38"E* — *Station Elev. 5 M.*

Day of the Month	Station Pressure (MBS)	TEMPERATURE (°C) Dry Bulb	Wet Bulb	Maximum	Minimum	Mean	Mean Dew Point	Mean Rel. Hum.	Rainfall (M M)	WIND Average Velocity	Prevailing Direction
1	2	3	4	5	6	7	8	9	10	11	12
1	1009.9	26.1	25.3	30.3	23.2	26.8	25.0	94	24.0	02	040
2	1011.1	27.7	26.2	31.0	24.3	27.6	25.7	89	12.2	04	040
3	1011.1	27.4	25.5	30.5	24.0	27.2	24.9	86	30.2	05	040
4	1010.3	26.6	25.4	29.8	24.5	27.2	25.0	91	44.4	04	040
5	1008.7	27.2	26.0	30.5	24.5	27.5	25.6	91	29.9	04	040
6	1007.1	26.7	25.8	28.3	24.3	26.3	25.5	93	32.9	04	040
7	1007.6	26.3	25.7	28.8	24.2	26.5	25.5	95	23.8	02	040
8	1008.1	26.1	25.1	29.2	23.6	26.4	24.8	92	2.8	01	040
9	1007.7	27.6	26.2	30.8	23.6	27.2	25.8	90	4.0	02	040
10	1007.8	27.6	26.1	30.5	24.4	27.4	25.6	89	39.5	04	040
11	1009.0	27.2	26.0	30.9	24.4	27.6	25.6	91	22.0	04	040
12	1008.8	25.8	24.7	29.5	24.1	26.8	24.3	91	61.0	02	140
13	1007.7	25.4	24.9	27.5	23.2	25.4	24.8	96	20.8	02	090
14	1008.1	26.4	25.2	29.6	23.5	26.6	24.8	91	0.2	01	090
15	1008.4	26.3	24.9	30.0	23.4	26.7	24.4	89	21.8	02	040
16	1008.8	27.8	26.4	31.0	22.5	26.8	26.0	90	9999	01	090
17	1007.9	26.6	25.3	29.6	24.0	26.8	24.9	90	3.3	01	020
18	1007.0	27.0	25.1	30.8	24.0	27.4	24.5	86	12.2	02	040
19	1006.9	26.8	25.1	31.5	23.2	27.4	24.5	87	0	01	090
20	1007.2	26.1	25.1	30.8	23.7	27.2	24.8	92	7.8	01	180
21	1008.0	25.5	25.1	30.2	23.8	27.0	25.0	97	140.7	04	040
22	1010.2	25.3	24.1	26.7	22.8	24.8	23.7	90	62.3	10	040
23	1012.0	23.7	23.1	25.5	22.0	23.8	22.9	95	144.0	08	020
24	1010.7	24.9	24.2	26.3	23.0	24.6	24.0	94	45.2	08	020
25	1010.0	24.7	23.9	29.0	22.0	25.5	23.6	94	39.4	02	020
26	1010.3	26.2	25.0	29.2	23.0	26.1	24.6	91	0	02	040
27	1011.3	26.9	25.2	30.2	22.8	26.5	24.6	87	5.0	02	040
28	1010.3	27.3	25.8	31.0	23.5	27.2	25.3	89	0	01	040
29	1009.5	26.2	24.9	30.0	23.4	26.7	24.5	90	1.0	02	040
30	1008.9	26.4	25.0	30.3	23.5	26.9	25.2	95	9.8	02	040
31	1008.6	27.3	25.8	30.8	24.0	27.4	25.3	89	4.9	02	040
TOTAL	31279.0	819.1	782.1	920.1	730.4				845.1		
Mean or Extreme	1009.0	26.4	25.2	29.7	23.6	26.6				03	040

Catarman Station

	WIND			SUNSHINE			MISCELLANEOUS METEORS																	
Day of the Month	Max. Wnd Speed (Knots)	Direction	Time	Minutes	Percentage of Maximum Possible	Mean Cloudiness (1-10)	Smoke	Haze	Fog	Rain	Shower	Drizzle	Hail	Thunder	Storm	Distant	Lighthing	Mean Sea Level Pressure
1	13	14	15	16	17	18	19		20		21		22		23		24	25
1	10	040	0830			7					x							1010.7
2	10	040	0640			7					x				x			1011.9
3	15	040	1806			8					x							1011.9
4						8					x							1011.1
5						7					x						x	1009.5
6						8					x							1007.9
7						7					x							1008.4
8						7					x				x		x	1008.9
9						5					x							1008.5
10						8					x				x			1008.6
11						8					x							1009.8
12						8					x				x			1009.6
13						7					x				x			1008.5
14						6					x							1008.9
15	10	040	0655			7					x							1009.2
16						6					x							1009.6
17						6					x				x			1008.7
18						7					x							1007.8
19						7											x	1007.7
20						6					x							1008.0
21	14	040	1746			8					x				x			1008.8
22	18	020	0210			8					x				x			1011.0
23	15	040	0305			8					x							1012.8
24	15	040	0255			8					x							1011.5
25						8					x							1010.8
26						6												1011.1
27						8					x							1012.1
28						6												1011.1
29						8					x							1010.3
30						7					x							1009.7
31						6					x							1009.4
TOTAL						221						28				8		3 31303.8
Mean or Extreme	18	020	0210			7												1009.8

153

Catbalogan Station, Western Samar — *Lat. 11° 47" N* — *Long. 124° 53" E* — *Station Elev. 5 M.*

Day of the Month	Station Pressure (MBS)	TEMPERATURE (°C) Dry Bulb	Wet Bulb	Maximum	Minimum	Mean	Mean Dew Point	Mean Rel. Hum.	Rainfall (M M)	WIND Average Velocity	Prevailing Direction
1	2	3	4	5	6	7	8	9	10	11	12
1	1008.5	26.9	25.0	32.0	25.0	28.5	24.4	86	2.1	1	090
2	1009.7	26.9	25.6	32.0	24.4	28.2	25.2	90	1.9	1	040
3	1010.4	26.2	24.8	31.0	23.4	27.2	24.3	89	8.2	1	040
4	1008.4	27.3	25.5	31.7	24.5	28.1	24.9	86	4.8	1	040
5	1008.4	26.0	25.2	31.2	23.8	27.5	24.9	94	10.5	1	090
6	1006.0	25.0	24.5	27.0	22.8	24.9	24.3	96	14.0	1	040
7	1006.4	25.6	24.9	27.0	24.2	25.6	24.7	94	29.8	1	040
8	1006.8	25.7	24.9	29.8	25.0	27.4	24.6	94	28.8	1	040
9	1006.5	27.5	25.4	32.0	24.0	28.0	24.7	84	0	1	140
10	1006.8	27.8	25.6	32.5	25.0	28.8	24.9	84	5.8	1	090
11	1007.0	27.4	25.3	32.0	25.0	28.5	24.6	84	2.2	1	090
12	1007.8	26.8	25.4	30.5	24.6	27.6	24.9	89	19.8	1	090
13	1007.4	25.5	24.6	27.3	24.6	26.0	24.3	93	22.6	0	0
14	1007.2	26.8	25.2	31.1	25.0	28.0	24.7	88	0.6	1	290
15	1007.2	27.1	24.9	32.5	24.0	28.2	24.2	84	2.7	1	120
16	1007.5	27.2	24.7	32.5	23.2	27.8	23.9	81	0	1	040
17	1007.3	26.2	24.6	31.0	23.8	27.4	24.0	88	13.4	1	110
18	1006.1	26.7	25.0	30.6	24.6	27.6	24.4	87	4.0	1	040
19	1006.2	26.3	24.7	30.0	23.8	26.9	24.2	88	1.2	1	020
20	1007.5	27.2	25.0	31.0	25.0	28.0	24.8	86	0	1	270
21	1007.2	27.2	25.1	31.5	24.0	27.8	24.4	84	9.2	1	220
22	1009.2	24.0	23.6	30.0	23.0	26.5	23.5	97	50.7	1	040
23	1011.2	23.5	22.8	27.0	22.0	24.5	22.5	94	58.0	1	040
24	1010.0	25.1	23.6	28.4	22.5	25.4	23.1	88	51.6	1	040
25	1010.4	24.2	23.7	28.0	22.2	25.1	23.5	96	6.8	1	360
26	1010.6	25.0	24.9	30.0	22.5	26.2	24.9	99	5.7	1	220
27	1011.2	26.4	24.6	30.0	23.5	26.8	24.0	86	1.5	1	090
28	1009.7	27.1	24.8	32.5	24.0	28.2	24.0	83	0.2	1	090
29	1009.3	24.0	23.6	26.5	22.0	24.2	23.5	97	60.5	1	030
30	1008.5	25.7	24.4	29.5	22.6	26.0	24.0	90	0	1	320
31	1008.4	25.9	24.4	31.0	23.4	27.2	23.9	88	7.4		
TOTAL	31254.8	810.2	766.3	939.1	737.4				424.0		
Mean or Extreme	1008.2	26.1	24.7	30.3	23.8	27.0					

Catbalogan Station

	WIND			SUNSHINE				MISCELLANEOUS METEORS								
Day of the Month	Max. Wnd Speed (Knots)	Direction	Time	Minutes	Percentage of Maximum Possible	Mean Cloudiness (1-10)	Smoke Haze	Fog	Rain Shower	Drizzle	Hail	Thunder Storm	Distant Lighthing			
1	13	14	15	16	17	18	19	20	21		22	23	24			
1						4			x							
2						6			x							
3						8			x							
4						5			x							
5						7			x							
6						6			x							
7						7			x							
8						7			x							
9						4										
10						5			x							
11						5			x							
12						7			x							
13						8			x							
14						5			x							
15						4			x							
16						5										
17						5			x							
18						6			x							
19						4			x							
20						4										
21						6			x							
22						8			x							
23						8			x							
24						6			x							
25						7			x							
26						6			x							
27						5			x							
28						5			x							
29						8			x							
30						5										
31						4			x							
TOTAL						180			27							
Mean or Extreme						6										

155.