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Planning for geographical allocation of rural development program resources in the uplands of the Province of Antique, Philippines

John David Lamb

To the Graduate Council:

I am submitting herewith a thesis written by John David Lamb entitled "Planning for geographical allocation of rural development program resources in the uplands of the Province of Antique, Philippines." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Agricultural Economics.

John R. Brooker, Major Professor

We have read this thesis and recommend its acceptance:

Robert Orr, David B. Eastwood

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

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Date December 1985

PLANNING FOR GEOGRAPHICAL ALLOCATION OF RURAL DEVELOPMENT PROGRAM RESOURCES IN THE UPLANDS OF THE PROVINCE OF ANTIQUE, PHILIPPINES

A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee, Knoxville

John David Lamb

December 1985

DEDICATION

To the uplanders of the Province of Antique.

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ABSTRACT

A problem involving geographical allocation of resources evolved over about ten years from 1975 to 1984 in the context of the Antique Upland Development Program (AUDP) in the Province of Antique, Philippines. The AUDP was a program initiated, planned, and implemented by the local government and targeted to the upland population of the province.

Parallel to the evolution of the problem, a set of maps were developed in response to a succession of planning operations in the province. Early planning operations did not provide much guidance for the use of map-based information in the planning process. One later planning operation, the Local Resources Management (LRM) project, provided much greater guidance in the use of map-based information and more clearly defined the place of geographical analysis in the planning process.

The LRM embodied a change from previous development models. The most notable change was a focus on specific poverty groups and the need to both address their basic human needs and involve the groups directly in the planning process.

The LRM project approached development in a manner similar to the AUDP and specifically recognized the role of local governments in development planning. One of the

tasks of local government, especially the province, was to identify priority poverty groups for inclusion in the development process, and to specify where, geographically, project resources should be concentrated.

This study documented the historical developments of the AUDP, the map-based information on the province, and the planning context to analyze the place of geographical analysis in the planning process at the local government level in the Philippines. From the map-based information developed in the province and the planning criteria embodied in the LRM, this study first analyzed the upland geographical patterns in the province, especially the patterns of population distribution, and then formulated a framework for making decisions on the geographical allocation of AUDP resources. Based on experiences in the planning operations of the province and the LRM planning approach, a general set of guidelines for conducting geographical analysis in local government planning operations was formulated.

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CHAPTER I

INTRODUCTION

1. The Problem

This study focuses on a problem which evolved over ten years from 1975 to 1984 as the author and others addressed the many problems of planning for the Antique Upland Development Program (AUDP) in the Province of Antique, Philippines.[1] Among the problems addressed was where to locate program activities and resources in the province. This at first did not receive much attention, but as the program expanded from its pilot area of operations, the need to evaluate alternatives on where activities and resources could best be located in relation to actual geographical patterns in the uplands took on greater importance.

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[1]Antique is pronounced as antiki with soft i vowels. Antique is the western most province of Panay Island in the central or Visayan portion of the Philippines. A location map is provided as Figure 1 on page 14 of Chapter II.

The Antique Upland Development Program focused its activities in the uplands of the province. Uplands refers to the hilly and mountainous areas of the province which have greater than 8 % slope, including some small areas of embedded land of less than 8 % slope. Uplanders in this study refers to members of households who live in the upland areas and/or gain all or a part of their livelihood from direct agricultural activities in the uplands.

Parallel to the evolution of the AUDP and the problem of geographical resource allocation, a set of maps of the province were being developed as an information base in planning operations. The manner in which the maps were developed and initially used in provincial planning was influenced by a succession of projects in which the province participated.

The planning context did not initially provide much guidance in how the maps could be used in planning for the AUDP. However, in later stages of this study, the planning context provided much greater stimulus for map use and provided a much clearer justification for planning the geographical allocation of AUDP resources.

This study addresses two problem areas related to both the Antique Upland Development Program and the general planning context of the province. The first problem relates to the planning context of both the AUDP and the province as a whole. The specific problem is how geographical analysis can fit into the planning process to assist in decisions concerning allocation of program resources. The second problem this study addresses is allocating development program resources to specific geographical areas. The specific problem is allocating the resources of the Antique Upland Development Program to specific areas in the Province of Antique.

The two problems of this study were based on a perceived planning problem in an actual planning situation. The inclusion of the planning context as a problem area in this study was based on a perception that planning methods and techniques, such as geographical analysis for resource allocation, cannot be divorced from actual planning contexts. The planning context influences the form of planning, or the manner in which planning is undertaken, and defines the content of planning, or the specific decision making problems addressed. For a planning method to be useful and relevant, it must be adaptable to a planning context which results in real decisions for resource allocation.

2. Goals and Objectives of the Study

The overall goals of this study were:

1) to define the place of geographical analysis in the type of rural development characteristic of the Antique Upland Development Program which focuses on the basic human needs of a defined poverty group, and

2) to provide a framework for decisions on geographical resource allocation specific to the uplands of the Province of Antique.

The objectives of this study were:

1) to describe the historical evolution of the problem of geographical resource allocation in the Antique Upland Development Program,

2) to describe the historical development of map based information about the Province of Antique within the planning context of the province,

3) to define the place of geographical analysis in addressing the problem of geographical allocation of program resources within the provincial planning context,

4) to analyze upland geographical patterns in the Province of Antique using map-based information resources developed within the provincial planning context,

5) to define appropriate criteria for the geographical allocation of resources,

6) to provide a framework for evaluating past program decisions and making future decisions on the allocation of program resources in the uplands of the province, and

7) to formulate a general set of guidelines for the development of map-based information in local government planning for development resource allocation in situations similar to those in the Province of Antique.

3. Procedure

In pursuing the goals and objectives, three principles were followed:

1) select techniques and methods of analysis appropriate to the local government situation in the Province of Antique,

2) focus on applications appropriate to the local government planning context in the Province of Antique, and

3) keep technical language to a minimum for understanding by generalist planners and local government decision makers in the Province of Antique.

These principles were followed in order to keep the study at a level which would consider real constraints found at the provincial level, be applicable to a defined decision making environment, and be understandable by those who would usually need to use the methods and analysis to plan and make decisions.

Information and analysis are presented in two ways. First, the planning context is analyzed as the historical development of 1) the Antique Upland Development Program and the problem of geographical resource allocation, and 2) the planning operations of the province which influenced the development of map-based information and defined the place of geographical analysis for resource allocation at the local government level. An historical approach, as opposed to a structured conceptual approach, was chosen in order to document the process which gave definition to both the form and content of planning in the province, and thus the study problems.

The main historical period covered was from 1975 to 1984, or the period in which the author actively participated in both AUDP and provincial planning operations.[2] Some historical developments prior to 1975 are included as explanation of events, and some historical developments after 1984 are included as reflections on past experience.

The second way in which information is presented is in the form of an analysis of upland geographical patterns in the province using map-based information developed within the provincial planning context. Using criteria for geographical resource allocation developed within the planning context, the upland geographical patterns are further analyzed to form a framework for planning the geographical allocation of program resources.

4. Limitations of the Study

Much of the content of this study was based on the work and personal observations of the author as he was associated with the Provincial Development Staff of the Province of Antique from 1975 to 1979 and the Antique Upland Development Program from 1981 to 1984. This study

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[2]The author was a Peace Corps Volunteer assigned to the Provincial Development Staff (planning staff) of the Province of Antique from April 1975 to August 1979. He returned to the Philippines in June 1981 to work with the Panay Island Consortium for Research and Development (PICRAD). While with the PICRAD, the author also worked closely with the AUDP in a formal capacity as advisor on planning, research and administration until his departure from the Philippines in July 1984.

was not formally proposed or undertaken until after the author left the province in July 1984.

During his work in the province, the author was concerned with provincial planning and AUDP program planning. The author did not approach his duties with this study in mind. Much of the content of this study was necessarily a recollection of past events and a collation of past analyses as they were deemed relevant to the study problems.

The late formal definition of the study problems and the necessity for using past experience which was outside the formal study framework posed limitations to the content of this study. The conduct of field observations and analyses were not systematically guided by a formal research framework.

This study was also limited by a lack of detailed documentation concerning the local planning situation in the province. This was due in part to the lack of documentation of any kind, but was also due to the lack of access to existing documentation at the time of writing. Since the study was formally proposed and undertaken after the author left the Philippines, much relevant documentation available in the Philippines was not available to the author in the United States. The author thus had to rely on recollections of his own observations and information either reported to him by other participants in the planning process or read by him and remembered without the benefit of formal reference.

Where not specifically noted, the information contained in this study should be attributed to the author. Although the author tried to report facts truthfully to the best of his knowledge, there may be some instances where others who participated more closely in events may have different recollections.

There may also be cases where the author used information contained in references which could not be recalled and which were not available at the time of writing. An attempt was made to provide at least general reference information in such cases. Any specific material overlooked or not explicitly referenced was inadvertent and due to the lack of direct access to some references at the time of writing.

5. Chapter Divisions

The remainder of this study is divided into six chapters. Chapter II describes the background or context of the problem of geographical resource allocation within the Antique Upland Development Program. This chapter provides a brief description of the AUDP and an historical account of how the study problem developed within the AUDP planning and decision making environment.

Chapter III describes the parallel development of the map-based information used in this study and focuses on the general provincial planning context in which the maps were developed. Chapter IV continues with a description of map development but focuses more on the use of maps in later planning contexts. This chapter also provides a discussion of the place of geographical analysis in planning for local government programs directed toward a group such as upland farmers.

Chapter V describes the methods used for map-based data gathering and analysis and the sources of secondary data. Since the primary data were gathered by the author before this study was formally proposed, a critique of the data gathering methods and data accuracy is also provided. Chapter VI presents the results of analysis to describe the upland geographical patterns in the province.

Chapter VII presents a summary of both the planning context and the analysis of upland geographical patterns as a basis for drawing implications for geographical allocation of resources and the use of geographical analysis in provincial planning operations. A framework for decisions on geographical resource allocation in the uplands of the Province of Antique is developed to evaluate past decisions and suggest avenues for future decisions. Also, guidelines for developing and using map-based information in provincial planning are presented.

CHAPTER II

THE AUDP CONTEXT: PROBLEM OF GEOGRAPICAL ALLOCATION OF PROGRAM RESOURCES

Most of the map-based information used in this study began to be developed shortly after the Antique Upland Development Program (AUDP) began operations in 1975 and evolved parallel to the development of the problem of geographical resource allocation in the decision making environment of the AUDP. The problem of geographical resource allocation in the AUDP did not become apparent until the program undertook geographical expansion after approximately six years of operation in a small pilot area. Thus the identification of the problem and the map-based analysis in this study were not necessarily pursued together in an identifiable and systematic manner.

To appreciate the results of this study, both the context of the problem and the context in which most of the map-based information was developed and initially used need to be examined. This will provide not only an historical context, but also a situation context for understanding the problems of geographical allocation of resources in an actual local government planning and decision making environment in the Philippines.

This chapter is divided into seven sections. The first section explores the general decision making environment of the province. Section 2 provides an account of early AUDP activities and the characteristics of the uplands in the pilot area of operations. Section 3 provides a brief description of program content. Section 4 describes the organization, management and planning style, and funding of the AUDP. Sections 5 and 6 describe the two rounds of geographical expansion of program activities and the problems encountered, including the development of the study problem. Section 7 highlights some important points in the preceding sections in relation to the geographical allocation of program resources.

A description of the author's efforts to develop some geographical analyses of the province for general planning use and the preliminary use of the analyses in planning for the AUDP is presented in the succeeding two chapters.

1. General Decision Making Environment

The AUDP began in a political and bureaucratic environment which was not conducive to innovation at the local government level. The Philippines was divided into five main political divisions: 1) nation, 2) province, 3) city, 4) municipality, and 5) barangay. The nation, as represented by the national government, held the major portion of political and administrative control. The province had some limited autonomous administrative control and also exercised oversight in relation to municipalities within its jurisdiction. The municipality also had limited autonomous administrative control and exercised oversight in relation to barangays in its jurisdiction. Cities had an independent charter and direct oversight in relation to barangays within the city jurisdiction. The barangay (formerly barrio) was the lowest political division and was usually a village in rural areas or a block or combination of blocks in an urban setting. The barangay had very little autonomous administrative control.[1]

To gain some insight into the geographic and demographic scale of the political divisions, a comparison with political divisions in the United States may be helpful. The land area of the Philippines is approximately 300,000 square kilometers (115,800 square miles)[2] which is roughly comparable to the states of Tennessee, Kentucky and Virginia combined with an area of about 312,100 square kilometers (120,500 square miles).[3] The population of the

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[1]See also Frederica M. Bunge, ed., Philippines: A Country Study, Area Handbook Series (Washington, D.C.: Government Printing Office, 1984), pp. 188-192.

[2]Ibid., p. xiv.

[3]U. S., Bureau of the Census, County and City Data Book 1983 (Washington, D.C.: Government Printing Office, 1983), p. 2.

Philippines in 1980 was approximately 48 million[4] as compared to the combined population of about 14 million for the states of Tennessee, Kentucky and Virginia.[5]

The Province of Antique has a land area of 2790 square kilometers (1077 square miles)[6] and is roughly comparable to the contiguous local government divisions of Sevier County and Blount County in Tennessee with a combined area of 2973 square kilometers (1148 square miles).[7] The population of the province was 344,605 in 1980[8] as compared to a combined population of 119,118 for Sevier and Blount counties.[9] Figure 1 shows the location of the Province of Antique in relation to the Philippines as a whole, and in relation to the three other provinces on the Island of Panay.

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[4] U. S., Bureau of the Census, Statistical Abstract of the United States 1985 (Washington D.C.: Government Printing Office, 1984), p. 840.

[5] Ibid., p. 2.

[6] Author's measurement of area as used in this study.

[7] U. S., Bureau of the Census, County and City Data Book 1983, p. 494 and p. 508.

[8] Philippines, National Census and Statistics Office, 1980 Census of Population by Municipality and Barangay, Special Report No. 2 (Manila: National Economic and Development Authority, 1982), p. 1.

[9] U. S., Bureau of the Census, County and City Data Book 1983, p. 494 and p. 508.

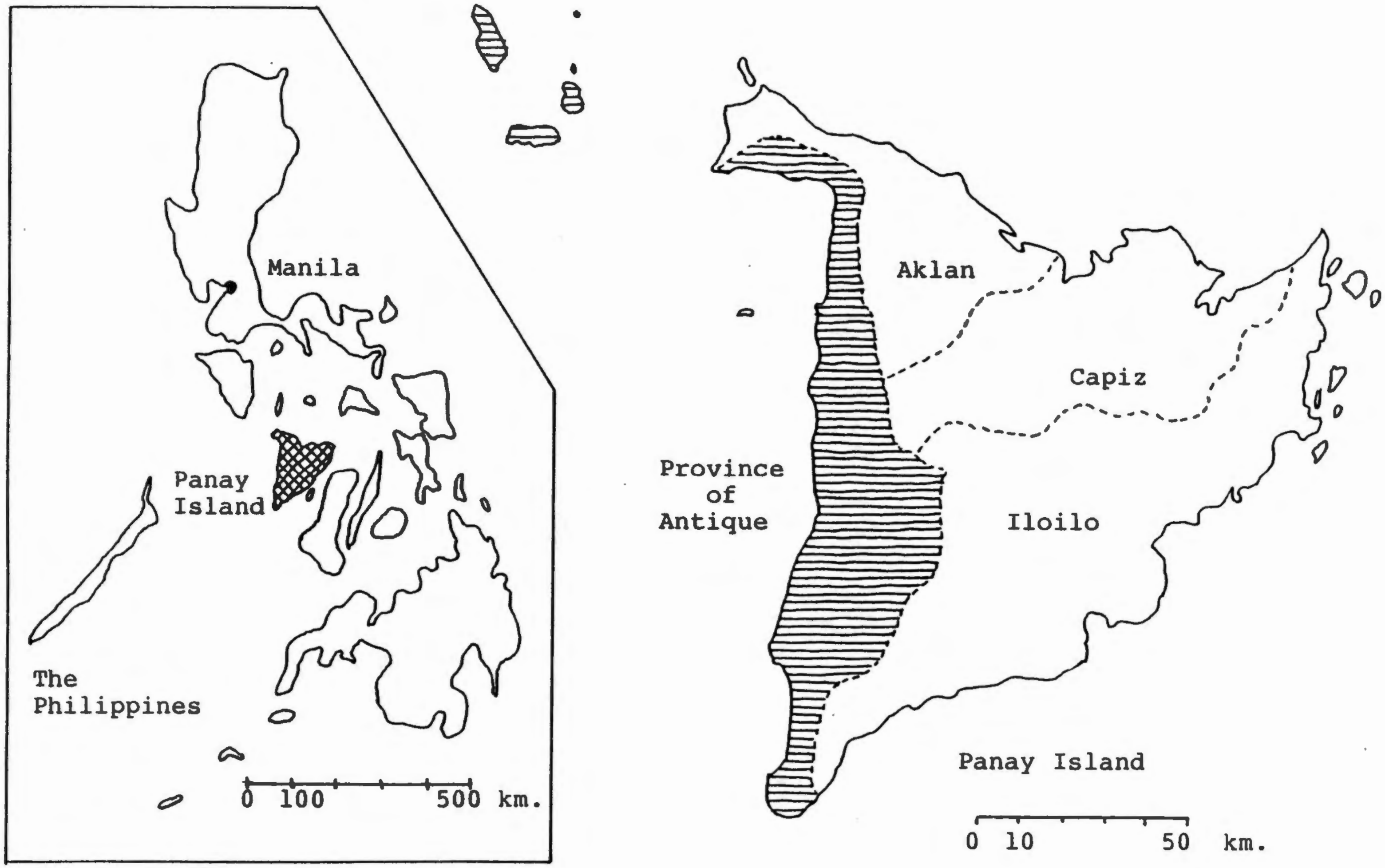

Figure 1. Location map of the Island of Panay and the Province of Antique.

At the time of this study, the Province of Antique was divided into 18 municipalities ranging in area from 20 to 374 square kilometers (8 to 144 square miles), and was further divided into 588 barangays or villages usually of less than 500 in population.[10] Figure 2 shows the political division of the province into municipalities.

Each political division had an elected executive head and an elected representative body or council. At the provincial level, the executive head was the governor who also acted as the chairman of the representative body.[11] Each province was also empowered to form a planning staff and an appointed planning council. The planning staff in the Province of Antique was directly under the governor's office until 1984 at which time it was changed into a separate office of the provincial government. Most of the national line agencies had district or provincial offices in the province as administrative divisions for general operations or program implementation. The heads of these offices were members of the planning council.

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[10] Philippines, 1980 Census of Population by Municipality and Barangay: Antique. Number of barangays based on listing by the National Census and Statistics Office. Area measurements by author.

[11] See also Bunge, Philippines: A Country Study, p. 189.

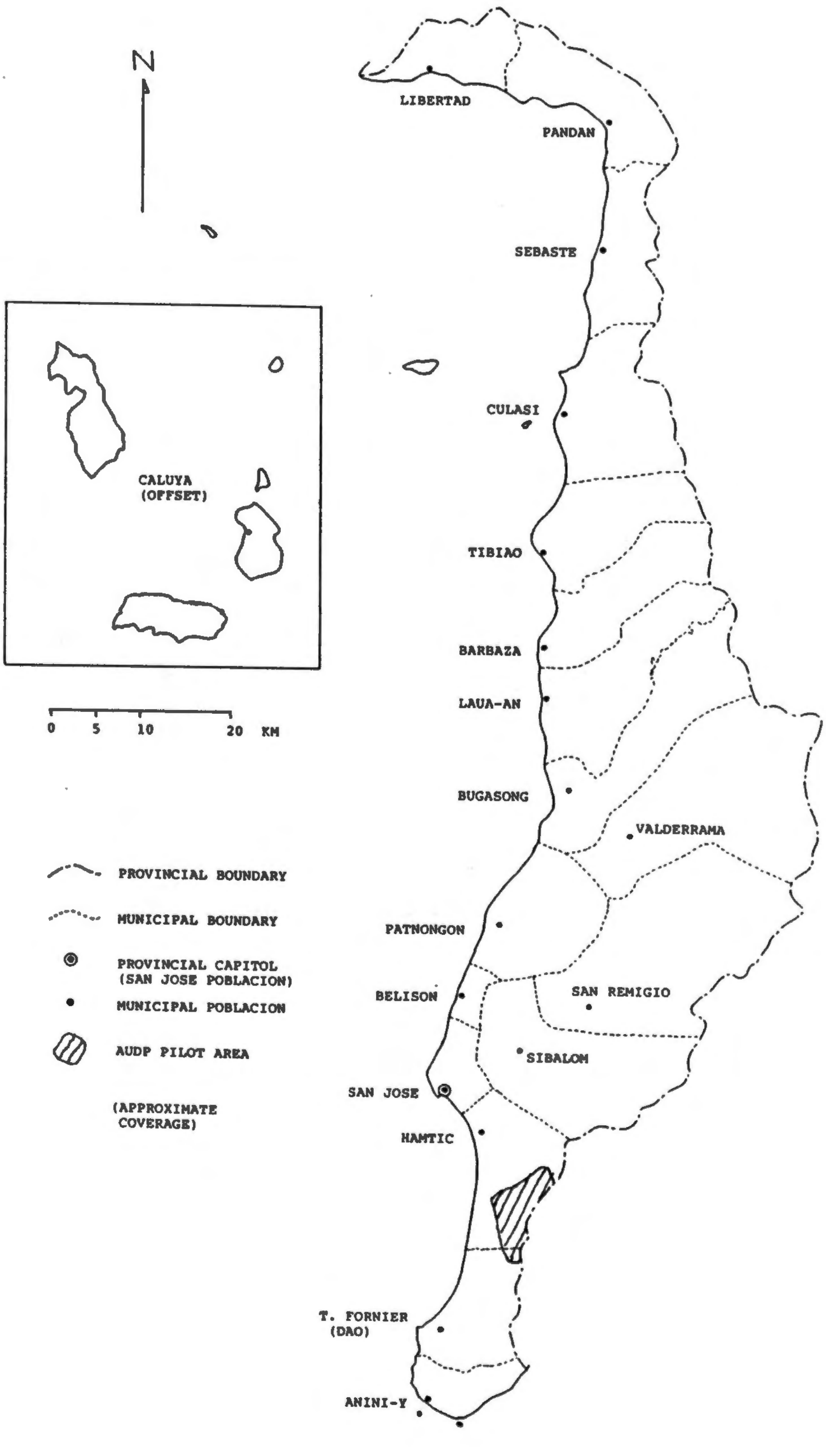

Figure 2. Map of municipal boundaries and location of AUDP pilot area.

In addition to the political divisions, there were regional divisions for planning and administrative purposes. These regions were usually made up of a number of contiguous provinces with the regional center located in a major city. The Province of Antique was one of five provinces of Region VI (Western Visayas) with the regional center located in Iloilo City in an adjacent province.

The political and administrative organization of the Philippines was centralized with the national government being the usual initiator of innovations and programs. The regional planning and administrative structure at times acted as an avenue for ideas coming from the provinces, municipalities or cities, but usually acted as an avenue in the other direction for rules, regulations and programs coming from the central government.

Most programs were controlled from the central government through the regional agencies and finally to district offices and agency field workers in the provinces, cities or municipalities. Very often the different departments (or present day ministries) and even the bureaus or divisions within the departments would implement programs with little or no coordination of efforts at the local level.

Although it was possible for any province or subnational political division to independently initiate a development program within its geographical jurisdiction, this was an exception and not the rule. The main factors limiting the initiation of independent development programs were limited finances, lack of trained personnel, and the difficulty in coordinating efforts with administratively independent national line agencies operating in the province.[12]

It was within this generally "top-down" and "picket fence" administrative context[13] that the Province of Antique independently initiated the Antique Upland Development Program (AUDP) in 1975.

2. AUDP Beginnings and Upland Characteristics

The stimulus for initiating the AUDP was the accidental happening in time and geographical space of a rain storm, consequent landslides in the mountains of the province, and the travel of the governor of the province over the mountain roads which were blocked by landslides. In

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[12]For a more detailed overview of local government in the Philippines at the time that the AUDP was started, see Proserpina Domingo-Tapales, "The Local Government System in the Philippines," paper prepared for the Seminar on Financing Local Government, Kuala Lumpur, Malaysia, May 10-27, 1976.

[13]Terms used in several government sponsored seminars and trainings attended by the author in the Philippines between 1975 and 1979. "Top-down" refers to the centralized nature of planning and development administration coming from the national level. "Picket fence" refers to the generally uncoordinated and segmented bureaucratic administration of programs at the local level.

short, the governor of the province in 1975 was stranded overnight in the mountains of the province.

During his overnight stay with an upland household, the governor was able to learn first hand about some of the hardships which faced the inhabitants of the uplands of the province. When he returned to the provincial capitol in the lowlands, he set in motion the beginning of the AUDP by calling together the heads of provincial offices of the national line agencies concerned with agriculture and forestry, along with the head of the provincial planning staff. These people, along with the governor, discussed the problem of the uplands and agreed to study the problem further and formulate a program of action.

About the same time that the problem of upland development in the province was being defined and initial planning was being undertaken, the area for pilot program activities was selected. The pilot area centered around the site in the mountains of the Municipality of Hamtic where the governor had been stranded and encompassed nine barangays or villages (see Figure 2 above). This selection of an area for program activities seemed to follow from the governor having been stranded in the area.[14]

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[14]The author has heard of no evidence that alternative areas for program activities were considered.

The planners of the program made several visits to the area and held formal and informal discussions to elicit farmers' opinions and perceptions of the upland problem and what the program should address. They also conducted a simple household level reconnaissance survey to gain some quantitative information.[15]

From the discussions with the upland farmers and the results of the survey, the general problems and characteristics of the upland population were identified. The most obvious problem was one of poverty, or quality of life, and this was most directly related to the difficulty of gaining a subsistence or livelihood from the upland resource base.

The median household size in the uplands was five or six individuals. Most of the upland households in the pilot area farmed less than 4 hectares (10 acres) of land, of which a little more than 1 hectare (2.5 acres) was usually cultivated for field crops at any one time. Most owned the land they tilled (about 60 percent) but a

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[15]The original household survey was not available to the author at the time of writing. The following discussion of household and farm characteristics was mainly from memory, but the author also used the following study as a cross check for accurate information: Genevieve Bouchet, et al., The Farming System in the Uplands of the South of Antique Province, Panay Island, The Philippines (Wageningen, The Netherlands: International Course for devlopment oriented Research in Agriculture, September 1982).

substantial proportion were tenants and a small proportion were landless.

Almost all of the upland farmers were sedentary. They farmed identifiable and often terraced or partially improved parcels of land year after year. The pressure of population on the land had brought a close to most <u>kaingin</u> (traditional slash-and-burn) agricultural activities, but some farmers with enough land could still allow a short fallow period between periods of cultivation.[16]

The main crop in the area was rice (<u>palay</u>). Rice was the main household food staple and was not marketed to any great degree. Corn and root crops also formed part of the food staple of the household but to a much lesser degree.

The production of the mainly traditional varieties of rice was very low, averaging below 15 cavans[17] per

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[16]The term <u>kaingin</u> and its relation to the situation found in the pilot area of the AUDP was somewhat confused. <u>Kaingin</u> was a generic term for the use of fire to clear a parcel of land of overgrowth prior to cultivation for crops. The term also refered to the more pioneering activity of clearing forest with the use of fire prior to cultivation for crops. Although there were occasions when the clearing of thick brush from fallowed land was observed, this was practiced by only a few farmers in the pilot area. There was no clearing of forest for cultivation of crops since there were no useful forest areas left in the pilot area. Farmers in the area had developed beyond the stage of pioneering development of the land for agriculture and had settled into a pattern of sedentary agricultural activities.

[17]The cavan was a nonstandard unit of measure which

hectare (about 660 kilograms or 1455 pounds per hectare, or about 588 pounds per acre). This average was variable between years depending on the variation in timing and amount of rainfall. A late rain or an untimely typhoon (cyclonic tropical storm originating in the Pacific Ocean region) could severly limit the production of the farm.

Some cash field crops such as mung bean and peanut were grown on a small scale. Corn was at times grown as a cash crop but also acted as a subsistence buffer. The yield of these crops was also low. Although considered as cash crops and thus marketed, a significant portion of these crops was consumed in the household (generally between 20 to 40 percent).

Perennials and livestock were much more important as cash earning enterprises of the farm. Perennials or tree crops provided some subsistence to the upland household but were used more as a source of cash income relative to field crops. The main perennial based enterprises on the farm were coconut, mango, banana, bamboo and firewood (various tree species).

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varied in weight depending on the volume of the sack which the farmer used to pack the rough harvested rice (palay). The conversion factor used in this study was 44 kilograms per cavan. This number was used also by the provincial planning office during the time that the author was working in the province. A standardized conversion factor of 50 kilograms per cavan was more common in modernized lowland agriculture.

Livestock was the most important cash earning enterprise on the farm. Cattle and pigs formed the largest contribution to farm cash income. Goats and chickens were raised part for market and part for home consumption. Most livestock was of small frame native breed. Pastures were not cultivated in any systematic manner and the indigenous grasses provided low grade food for the animals.

Carabao (water buffalo) was used mainly for draft power on the farm and thus contributed indirectly to both household subsistence and farm cash income. Most farmers owned at least one carabao and others were able to rent services under varying arrangements.

Most households also had a small homesite vegetable garden, mainly for household consumption. Many of the animal enterprises were also located near the homesite, especially the small animal enterprises such as goats, pigs and chickens.

Off-farm or non-farm income provided a significant portion of cash income to many households. Most of the labor spent in off-farm activity was in the form of agricultural labor. Some of this agricultural labor was provided within the area or within the lowlands of the province, but a considerable amount was provided as migrant labor outside the province, especially as seasonal migrant labor (sacada) to sugar cane growing areas in two other provinces in the region. Non-agricultural related sources of income varied from skilled occupations such as carpenter or driver for public transport, to low skilled and low paid occupations such as housemaid or helper in the more affluent lowland households (both within and outside the province).

Observations by the program planners of broader factors of the upland situation were made concerning the physical and social environment. Erosion was apparent in much of the area. The landslides which were part of the initial stimulus for the program were only a dramatic manifestation of the problem. Based more on the perceptions of the planners than the perceptions of the uplanders, the relationship of the upland farmer to the physical environment was included in the overall definition of the upland problem. The conjecture was that the upland farmer was eroding his own productive base and thus endangering his and the larger community's chance for long-term survival and productivity.

The social environment was less apparent to the planners. Based more on an ideal that community organization was a necessary component of development, and less on direct observation by the planners or the perceptions of the uplanders, the problem of a lack of community organization was also identified as a problem in the uplands.

From these observations and conjectures, a strategy was formulated to address the problems of the uplands in the pilot area. The focus of the strategy was on the small upland farmer and his needs for sustenance, livelihood, and active involvement in directing his own future, and the need of the larger community for a balanced relationship with the environment for long term survival.[18]

3. Program Content

At the core of the program was the model of the Self-Sufficient Small-Time Farmer.[19] This model evolved from both the thoughts of the planners and the thoughts of the upland farmers.

The planners noted that the upland farm had diverse enterprises, but that some of the enterprises were not very productive, and in certain circumstances not

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[18] For a more complete statement of program goals, objectives and strategy see Province of Antique, Antique Upland Development Program, "Activity Proposal of the Antique Upland Development Program for the Rainfed Resources Development Project Agroforestry Component," project proposal submitted to the Philippines, Ministry of Natural Resources, Bureau of Forest Development, August 1983, pp. 27-28.

[19] The term "self-sufficient" refers to the ability of the farmer and other household members to provide for all of the family needs, but does not refer to isolated subsistence. There were times when this term was confused with subsistence. Small-time refers to the limited area available to the farmer for agricultural activities and his choice for many small enterprises as opposed to monocropping or single enterprise farming.

environmentally suitable, in the upland environment. There seemed to be a divergence between the opinion of the technical (and mainly lowland agriculturally oriented) planners and what the upland farmers in fact chose to do.

The divergence was presented to the upland farmers in the area by means of a group conference to discuss the direction which the program should take. One option presented was to focus the program on profitable cash crops or enterprises (in mono-crop or single enterprise form), and another option presented was to focus the program on a diversity of crops or enterprises as was the case with most farmers present at the group conference. The farmers themselves chose the option of diversity with the reasoning that if one crop or enterprise failed, the other crops or enterprises could at least provide a means of subsistence security to the household.

The concept of the Self-Sufficient Small-Time Farmer contained four components which addressed the major enterprise divisions of the upland farm--field crops, pasture and livestock, woodlot or tree farm, and homelot.[20]

The field crop component focused on the improvement

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[20] The following discussion of the Self-Sufficient Small-Time Farmer concept is based in part on Province of Antique, "Activity Proposal", pp. 37-38.

of traditional crops of palay, corn, mung bean and peanut by the introduction of more productive varieties and technologies (e.g. upland or rainfed varieties of rice developed by the International Rice Research Institute). This component also stressed the need for improved cultural practices such as bench terracing, legume rotations and strip cropping which were more environmentally suitable to the hilly terrain.

The pasture and livestock component focused mainly on the improvement of the cattle enterprise by the introduction of new and larger breeds (e.g. Red Sindhi) and by the introduction of more nutritious pasture grasses or legumes (e.g. napier grass and siratro). At a later date, this component also incorporated a credit scheme for the acquisition of animals.

The woodlot component focused on the introduction of more perennials or tree crops on the sloping areas of the farm. New tree varieties (e.g. giant ipil-ipil), cash crops (e.g. coffee), and improved cultural practices (e.g. tree strip cropping and artificial flower inducing for fruit trees) were introduced.

The homelot component focused on the development of small vegetable gardens and small livestock enterprises contiguous to the farm house. More productive varieties and a greater diversity of vegetables, and larger breeds of goats (e.g. alpine and saanen) were introduced.

The concept of the Self-Sufficient Small-Time Farmer also incorporated a model for integrating the different components on the farm in an environmentally sound manner. Field crops were seen as being limited to lesser sloping land or to bench terraced land on steeper slopes. Pasture was seen as being located on moderately steep land not suitable for field crops. Tree crops were seen as being located on very steep land which was more prone to erosion and was thus not suitable for either field crops or pasture.

A central support site was established in 1976 on about six hectares (about 15 acres) of hilly land within the pilot area. The support site acted as a center for demonstration of recommended crops and technologies, applied research on recommended crops, plant propagation for dispersal to farmers, a practical training center, and office/living quarters for extension and research personnel assigned to the area. The support center itself was developed using manual and animal labor for land improvements (e.g. bench terracing) and indigenous materials for the buildings in order to keep the center in character with the surrounding pilot area.

Activities such as extension and training utilized farmer's organizations initiated by the program. These farmer's organizations ranged from specialty groups, such as coffee grower's associations, to general barangay based organizations. The general barangay based organizations were the focus of leadership and management training intended to encourage community self development and self direction.

4. AUDP Organization, Style and Funding

The AUDP was organized internally under a provincial board which provided policy and planning guidance. The governor was chairman of the board and the members were the heads of the participating provincial offices of national line agencies and the head of the provincial planning staff.[21]

The program administration was organized with a program manager as head, some field workers seconded from the participating provincial offices of national line agencies, and some field workers from the provincial government. Participating agencies also provided temporary

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[21] The original members of the AUDP Board were the Governor, the head of the Provincial Development Staff, and the provincial heads of office of the Bureau of Agricultural Extension, Bureau of Soils, Bureau of Plant Industry, and Bureau of Animal Industry of the Department of Agriculture, and the Bureau of Forest Development of the Department of Natural Resources.

specialty assistance beyond their seconded personnel as requested by the AUDP Board or the program manager.

Planning for the program was often done informally during discussion sessions over bottles of beer.[22] The AUDP Board acted more as a means of formal legitimization of previously agreed upon decisions which were reached informally among the board members. Planning for the program was also incremental, with decisions as to program content and activities being made as the need arose or a problem was perceived.

Incrementalism also characterized early program operations. First year operations in 1975 were mainly focused on initial planning and learning about the uplands in the pilot area. In 1976, the pilot demonstration site was purchased by the province and greater effort was placed on community organization and extension. It was not until 1977-78 that the four components of the Self-Sufficient Small-Time Farmer were fully integrated into the demonstration center and the extension message.

A small amount of funding for the first year of program operations (mainly planning) in 1975 came from the participating agencies in the form of salaries paid to

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[22]Much serious business in the province was done in informal settings over drinks. This was something that was not perceived by observers outside the province, and the governor at the time purposefully pointed this out to visitors to the province wishing to study the AUDP.

personnel assigned to the project. In 1976, the Ford Foundation provided a small three year grant for program operations and both the province and the participating agencies increased their share of funding. The funding level for operations increased steadily from about 119,000 pesos ($16,000) in 1976 to about 269,000 pesos ($35,400) in 1980. Included in this was another more substantial grant from the Ford Foundation in 1979. In the first six years of operation from 1975 to 1980, operations and capital expenditures for the program totaled about 1,452,000 pesos ($195,361).

Funding for the program jumped in 1981 to about 478,000 pesos ($58,292), increased again to 669,000 pesos ($72,955) in 1982, and fell to about 580,000 pesos ($41,428) in 1983. This again included another grant from the Ford Foundation in 1982 and a Ford Foundation sponsored consultancy in 1981.

Program expenditures from 1975 to 1983 totaled about 3,179,000 pesos ($368,036). Of this amount, 19 percent was provided by participating agencies, 21 percent was provided by the Ford Foundation, 55 percent was provided by the province and about 5 percent came from various other non-governmental sources.[23]

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[23]Budget figures were taken from various files of the Antique Upland Development Program. Budget figures for

5. First Round Geographical Expansion

Up until 1980, the AUDP limited its main program activities to the pilot area in the southern municipality of Hamtic.[24] In 1981, the decision was made to expand the geographical coverage of the program into two other municipalities. The municipalities of Laua-an and Tibiao were chosen mainly due to the interest shown by local government officials, but also to gain a geographical spread in pursuit of an implicit program goal of eventually reaching all upland farmers in the province. Figure 3 shows the location of the two expansion areas.

As noted above, the program expanded funding from a level of 269,000 pesos in 1980 to 478,000 pesos in 1981 and to 669,000 in 1982. Thus geographical expansion and expansion in funding occurred at approximately the same time. However, the relative magnitude of expansion in funding was less than the magnitude of geographical expansion.

1981 and 1983 were adjusted to include rough estimations of contributions of participating agencies which were not reported in those years. The dollar figures in parentheses were calculated using the average exchange rate per year reported in U. S., Bureau of the Census, Statistical Abstract of the United States, year 1978, p. 928; year 1981, p. 897; and year 1985, p. 862.

[24]One barangay was in the adjacent municipality of Dao (now T. Fornier).

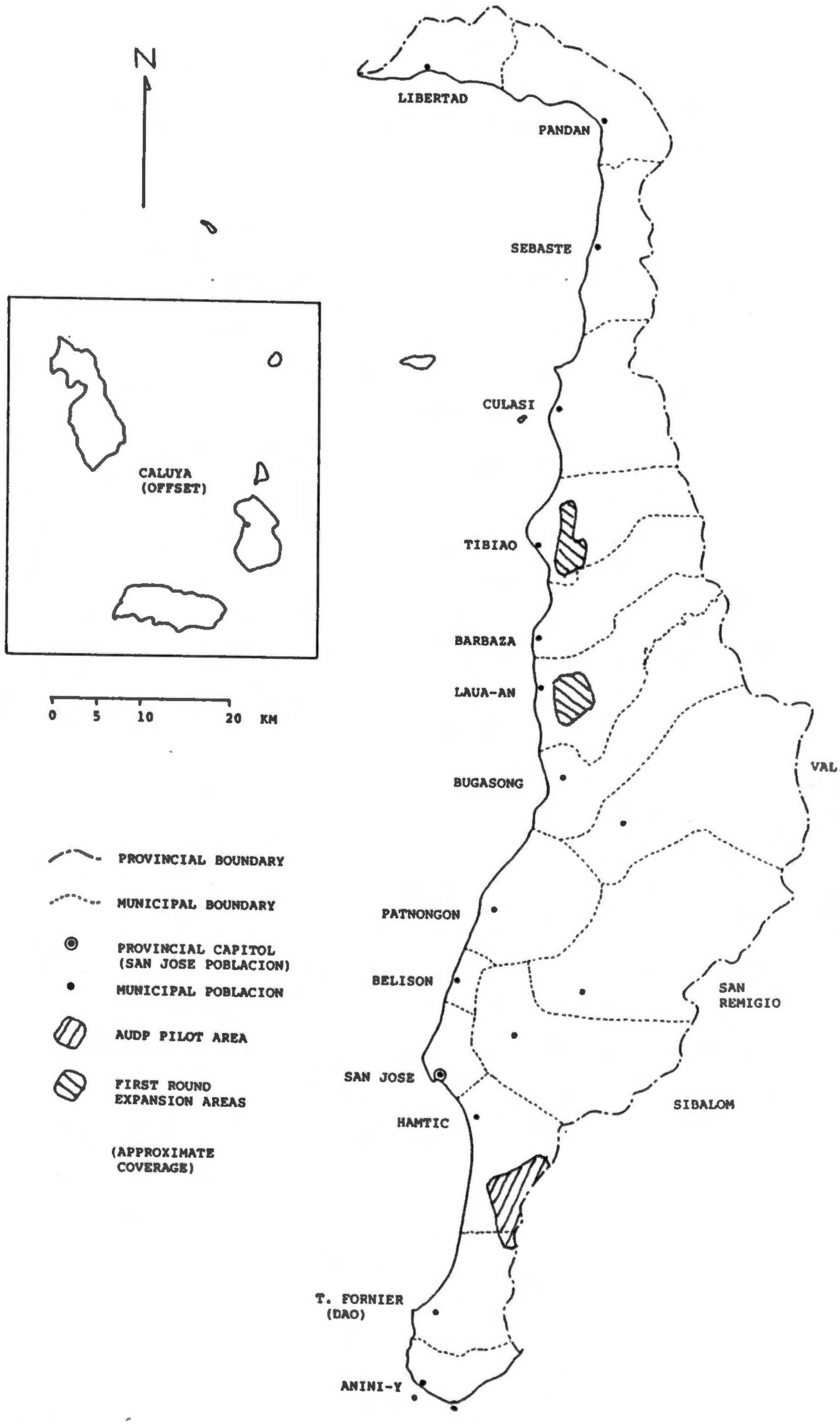

Figure 3. Location map of first round expansion areas and AUDP pilot area.

The expansion of funding was approximately 78 percent from 1980 to 1981, and approximately 149 percent comparing 1980 to 1982 (with no adjustment for inflation). The number of households in the pilot area was 641 in 1980. The number of households in the two expansion areas was initially 850 but was soon increased to 1163 as other villages in the two municipalities sought inclusion in the program coverage.[25] Comparing full expansion of coverage into 1982 to the pilot coverage in 1980, the program faced 181 percent increase in coverage with only 149 percent increase in funding.

The disparity between coverage and funding level was not so great as to cause undue difficulties in the program. Adjustments were made in operations which helped to overcome most difficulties, and the operations of the pilot demonstration center were scaled down without much loss to the demonstration and research function.[26] There

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[25] Population figures from Philippines, 1980 Census of Population by Municipality and Barangay: Antique. The number of households does not reflect true program coverage. It was estimated by field technicians and reported to the author that the participation rate in the three areas was probably greater than 50 percent but less than 70 percent. This varied between barangays but was about the same comparing the three areas. Thus, the population figures were used in this report as a proxy for relative program coverage in comparing pilot to expansion coverage.

[26] It was felt by many in program management at the time that too many personnel were being assigned to the demonstration center and that reassignment to other areas would not harm center operations.

were, however, certain changes just prior to and during the expansion of the program which caused some disruptions to program operations.

One of the biggest changes in the program was the loss of the governor who initiated the program in 1975. Elections were held in 1979 and the governor chose not to run for reelection. The new governor took office in 1980 with a pledge to continue the AUDP as a provincial program. The former governor stayed with the program for a short time after the elections, but left the province in mid-1980.

From the beginning, the former governor took a personal interest in the day-to-day operations of the AUDP, although this was at times erratic as other issues within the province would demand his full attention. He nonetheless provided strong and direct leadership to the program activities from 1975 to 1980.

The newly elected governor in 1980 expressed his support for the AUDP and kept the existing staff intact. However, he did not provide the same type of direct personal leadership and personal interest in day-to-day operations as did the former governor.

The AUDP staff took on a greater independent role in day-to-day operations. Program operations also changed character during 1981 and 1982. This greater staff independence and change in program operations was in part a response to the broader geographical coverage, and in part a result of the Ford Foundation sponsored consultancy in 1981 and a more in-depth consultancy incorporated in the 1982 grant by the Ford Foundation.

In late 1980 and early 1981, the AUDP was requesting the Ford Foundation to extend another grant for program operations to follow on the 1979 grant which terminated in January of 1981. The intention to expand program coverage into Laua-an and Tibiao was made known at the time.

The Ford Foundation representatives had some doubts about the wisdom of expanding the program. These doubts centered on the loss of the former governor's active leadership, the lack of in-depth evaluation of program activities from 1975 to 1981 on which to justify geographical expansion of program activities, and weaknesses in program management which would probably be heightened with geographical expansion of operations.[27]

The Ford Foundation negotiated a linkage between the AUDP and the International Institute for Rural Reconstruction (IIRR) based in Silang, Cavite (near the national capitol region of Manila) and provided funds for the

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[27]The Ford Foundation (Philippine office), Inter-office Memorandum from Christopher Gibbs to Dr. John C. Cool, subject: Antique Upland Development Program, March 20, 1981. (In the files of the Philippine office of The Ford Foundation.)

IIRR to act as consultant to the program. The purpose of the IIRR consultancy was to provide an assessment of the program management and then to design measures, in cooperation with AUDP management and staff, which would make management and operations more efficient and effective. One of the changes in program operations at least in part in response to perceived difficulties in geographical expansion was the introduction of a modified People's School approach developed by the IIRR in their own rural development programs.

Previous to the expansion of the AUDP into Laua-an and Tibiao, the extension, training, and community organization activities were very dependent on the time, efforts, and initiatives of the extension personnel. With the expansion of geographical coverage, the AUDP personnel had to cover much more area, more villages and more households than were covered in the pilot area alone. It became obvious that the intensive use of extension agents in the field could not be continued while at the same time covering such an expanded geographical field of operations. The problem was mitigated somewhat by the hiring of new personnel, but the number of new hires was less than proportional to program expansion.

The introduction of the modified People's School approach was intended, at least in part, to make more extensive use of field personnel by putting more of the responsibility for village level program activities and direction into the hands of the villagers themselves.[28] The responsibility of the barangay organizations was to define their own training and extension needs, to designate members from within the village to act as technology transfer agents (barangay scholars) who would be trained by the program staff, and to organize and operate many of the demonstration and propagation functions of the program as independent village level activities.

The barangay organizations were seen to be more independent of AUDP staff direction under this scheme, thus freeing the field personnel from such time consuming and intensive efforts with individual farmers and the village organizations. With less time having to be spent with each village, the extension agents could cover a larger area. This would in turn decrease the need to allocate scarce resources for hiring new personnel and give a greater efficiency in program resources used per village or household covered.

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[28]For a more complete description of the People's School approach see International Institute of Rural Reconstruction, "Trainors Manual", produced for the Antique Upland Development Program, First Upland Development Trainors Workshop, San Jose, Antique, Philippines, March 1982, pp. 17-55.

At the same time, some program functions became more specialized with specific individuals at the central staff level becoming responsible for separate activities such as training design in response to training needs identified at the village level. Day-to-day supervision of program activities became more decentralized with the designation of three field supervisors in the three program areas.

New political based leadership came with the designation of a senior member of the provincial representative body (Sanguniang Panlalawigan) as Executive Director over the program. The new Executive Director also sat as a member of the AUDP Board.[29]

Leadership within the staff became split between the program manager and the assistant program manager. This split caused some confusion and dissension within the staff and ultimately affected the efficiency of program operations to a certain degree. The Executive Director usually acted as the arbiter in conflicts of staff

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[29]The AUDP Board had changed composition with the provincial head of the newly reorganized Ministry of Agriculture unified provincial operations sitting as the sole member representing the previously four bureau representatives, and the addition of a representative from the provincial office of the Bureau of Lands, Ministry of Natural Resources, and a representative from the provincial research station of the Forest Research Institute.

leadership but did not provide as much personal intervention in day-to-day operations as did the former governor.

The planning style of the program remained informal and incremental. The AUDP Board as a whole took a less active role in planning and policy making, although many of the members of the board still actively participated in the informal planning process. As in the beginning of the program, planning often was conducted over bottles of beer, but in a situation which was more characteristic of an open social club with a core group of regulars.[30] In this informal situation, issues of program content, operations, and direction were raised and discussed and eventually decided.

6. Second Round Geographical Expansion and the Study Problem

In late 1982 and early 1983, another expansion was planned. This was around the time that some of the

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[30] This social gathering was informally christened the Tenten Club and usually met more than once a week at a local cafe after working hours. The core group consisted of the AUDP Executive Director, the head of the provincial planning office, some key staff in the provincial planning office, and some key staff of the AUDP. The author was a frequent member of the gatherings. The gatherings were always open to those interested in discussing provincial development activities (among other subjects) and was frequently visited by those outside the province who wished to discuss the AUDP.

difficulties were being sorted out from the 1981 expansion and the change in program operations were being integrated into the program structure. The municipalities which were chosen for new program activities were Libertad and Culasi in the north, Bugasong and Valderrama in the central portion of the province, and Sibalom and Anini-y in the south. The second round expansion areas are shown in Figure 4.

By the time the 1983 expansion areas were being decided, the program had created a formal administrative division of the province for decentralized operations and had formulated a set of criteria for the selection of municipalities. The administrative divisions were created around the three existing areas with Tibiao becoming the center for expansion in the north of the province up to Libertad, Laua-an becoming the center for expansion in the central portion of the province from Barbaza to Patnongon and inland to Valderrama, and the original pilot area in Hamtic becoming the center for expansion in the south from San Remigio to Anini-y (see Figure 4).[31]

The formal criteria for selection of municipalities

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[31]The municipalities of San Jose and Belison were not usually considered in the zone divisions since they had very little upland area or upland population.

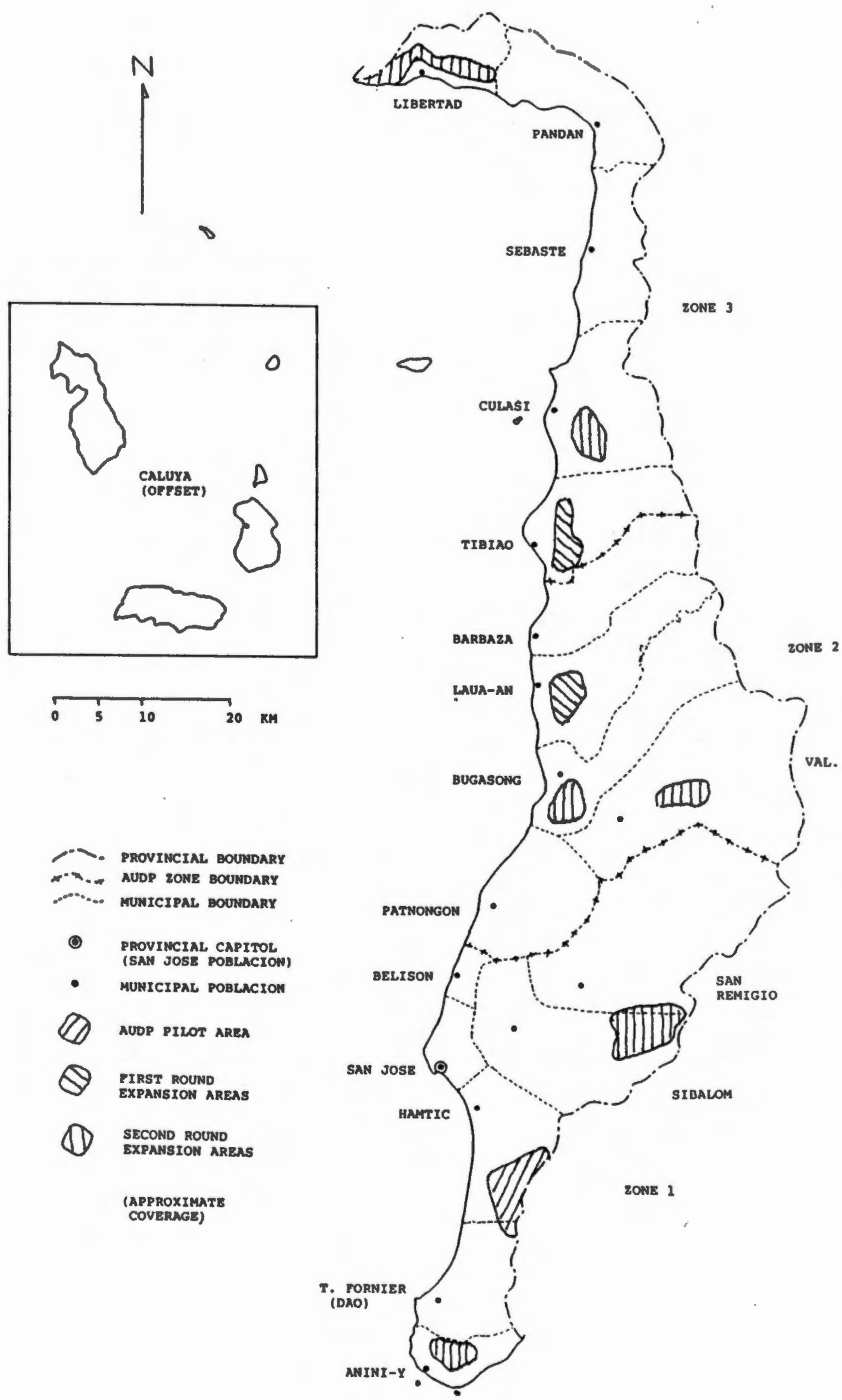

Figure 4. Location map of second round expansion areas, first round expansion areas, and AUDP pilot area.

was contained in a statement of operating procedures prepared by the AUDP staff in late 1982:

> Selection of Municipality: It is assumed that AUDP Project staff and the Board already have sufficient information upon which to select potential municipalities. Criteria which have so far influenced selection include:
>
> i) Geographical representation--North, Central and Southern Antique,
>
> ii) Need--Socio-economic status of people; percentage of uplands and uplanders,
>
> iii) Lack of major factors working against the program,
>
> iv) Local leadership committed to the program.[32]

The two criteria which provided a relationship between geographical factors and the allocation of resources through the selection of expansion municipalities were i) and ii). Criteria i) reflected the arbitrary geographical division of the province for program administrative purposes. Criteria ii) gave some weight to the relative amount of land which could be classified as upland and the relative number of people living on the uplands in each municipality.

Criteria iv) was the same criteria used in selecting the first round expansion municipalities and reflected

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[32]Province of Antique, Antique Upland Development Program, "Operational Guidelines," produced during the annual AUDP assessment and planning workshop, San Jose, Antique, Philippines, November 15-19, 1982, p. 7. (Local mimeographed document in the files of the Antique Upland Development Program.)

the need for local support for the program to succeed. Criteria iii) related in part to local support in that active political opposition by local leaders would be considered as a major factor working against the program. Criteria iii) probably also related to critical peace and order problems which could endanger program personnel in a few municipalities.[33]

The assumption that AUDP staff and the AUDP Board had sufficient information on which to base decisions for geographical program expansion was in a sense incorrect. Geographical information about the uplands of the province on which decisions could be based was not well developed at the time the decisions were made. Information that did exist was either intuitive or, in the case of some of the detailed analyses on which this study was based, not well integrated into the decision making process.

Some in the program, the author especially, argued that the selection of expansion municipalities did not reflect the pattern of uplands and upland agricultural activity in the province. This argument was based on familiarity with maps which the author had developed since 1975 in contexts not directly related to the decision

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[33]This is an interpretation by the author based on conversations with program staff and observation of program decisions. No explanation of criteria iii) was given in the source.

making needs of the AUDP (this work by the author is described in the following two chapters of this study). The maps, however, were not in a form which could be used effectively and directly in the decision making process.

In any event, the argument was made in reaction to the decisions to expand. With both formal and informal commitments to the identified municipalities having been made, the argument did not have much chance of affecting the decision making process.

Given that information about the geographical patterns of upland activity in the province was not sufficient for decision making in the AUDP, criteria ii) could not have carried much weight in the decisions for expansion municipalities. Only criteria i), which was an arbitrary geographical criteria, and criteria iii) and iv), which were not geographically based, were used in making the decisions for expansion. In effect, criteria i) proved to be the major criteria used, and thus the geographical allocation of program resources was based on an arbitrary division of the province which did not necessarily have a basis in real upland geographical patterns.

The effect of the decision to expand into the municipalities identified was to give an equal number of municipalities in the three arbitrary administrative zones. This would have been a geographically equitable coverage if the uplands, and especially the agriculturally active uplands and thus upland population, were evenly spread throughout the province. This, however, was not the case.

All of this was neither widely perceived nor apparent at the time (1983), and other problems related to rapid geographical expansion and external disturbances to the program became the overriding concern of program managers and decision makers. As was noted above, funding for the program decreased from a level of 669,000 pesos in 1982 to approximately 580,000 in 1983. Thus, with a threefold increase in municipal coverage planned (from three to nine), the program faced a decrease in funding. In addition, there was no proportional increase in program personnel to carry out activities in the expanded coverage.

The AUDP was depending on external funding for much of the expansion. The Ford Foundation support ended in 1984 with strong indication from the Foundation that no further grants would be extended.[34] Expectations had been raised among the planners and program managers that

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[34]As explained by Ford Foundation representatives at the time, The Ford Foundation supported the development of innovative rural development activities but did not usually give continued and long-term support for regular program activities. Based on conversations with Ford Foundation representatives, the author concludes that they considered the AUDP as an established provincial program which should develop long-term funding from within the province itself or from more regular sources within the Philippine government.

funding was available from sources in the national government, specifically two national level projects funded in part by the United States Agency for International Development (USAID). One was through the Ministry of Natural Resources (MNR) and the Ministry of Agriculture (MA) and was called the Rainfed Resources Development Project (RRDP), and the other was through the National Economic and Development Authority (NEDA) and was called the Local Resources Management project (LRM).

In the case of the RRDP, which was in part designed using the AUDP experience as an example, the proposal making process was delayed until late 1983 for MNR funding and early 1984 for MA funding, and no decisions were made on either proposal submitted by the AUDP as of late 1984.[35] The LRM funding was more assured, but the expected schedule of funding was delayed[36] and the AUDP shared the lesser

[35] Notification of the proposal process was sent to the province late. The staff of the AUDP found out about the proposal process when a group from the central Forest Research Institute office came to Antique to scout for a site for their own proposal. This was particularly discouraging to the AUDP staff and management since many of the designers of the RRDP came to Antique to gather information about the AUDP for use in designing the project. The designers of the RRDP gave informal indications, but not assurances, that the AUDP would be very favorably considered for funding under the project.

[36] The National Economic and Development Authority, which supervised the LRM project, and the USAID, which provided most of the funding, decided to start operations of the LRM approximately one year earlier than planned. The project ran into problems with budget and government

proportion of total planned funding with a new program of the provincial government directed towards another poverty group--small-scale marine fishermen.[37]

In August 1983, Benigno Aquino, a national political opposition figure, was killed at the Manila International Airport upon return from a self imposed exile in the United States. This caused dramatic political upheavals in the entire nation and in turn affected program operations in the general uncertainty that ensued.

In May 1984, elections took place at the provincial level nationwide for representatives to the national legislative body (Batasang Pambansa). During the campaign leading up to the elections and in the uncertain political aftermath in the Province of Antique, the regular functioning of the AUDP along with the regular functioning of much of the provincial government was affected.

In spite of the uncertain funding situation and the political uncertainties, the program went ahead with initial efforts to expand program activities into the new municipalities. Feedback from the field technicians and

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finance regulations and thus the flow of funds was delayed until bureaucratic accommodations could be reached.

[37]The small-scale marine fishermen program of the province was designed based on the strategies developed in the AUDP and was seen as a sister program of the province directed to the sea as opposed to the uplands.

area managers was that the effectiveness of the program was beginning to suffer with too much coverage being required of existing staff.

As of mid-1984, the program had undertaken at least initial activities in all the six identified expansion municipalities as well as continued operations in the original three program areas. The municipality of Culasi was temporarily dropped in 1983 due to peace and order difficulties in some of the barangays covered.

7. Summary Highlights

The AUDP began in an administrative and decision making environment characterized by direction from the national level, uncoordinated administration of development programs at the local level by a segmented bureaucracy, and limited funds and local expertise for independent development programming. Under the strong leadership and personal guidance of the provincial governor, the various line agencies in the province were able to work together to study the problem of the uplands, formulate a program of action for a small pilot area, and either provide or secure funding for program operations.

The planners of the program addressed a problem in the province which had not been addressed systematically before and which was not well known. Program planning was informal and incremental and relied on both interactions among planners and interaction between planners and the program target population. The planning process became a learning process, and much of the learning occurred as the program was being incrementally implemented in the field.

Funding for the program was of a relatively small magnitude. Political and administrative commitment was shown by the province in taking on more than half of the funding burden. Cooperation from participating agencies was shown by a contribution of almost one-fifth of total program funding and the assignment of agency personnel to program activities for an extended period. Flexibility in program operations was facilitated by a series of grants from the Ford Foundation amounting to approximately one-fifth of total funding.

A pilot area for operations was arbitrarily selected at the beginning of the planning process. The pilot area acted as a real geographical referent of manageable scale, with real people who acted as important sources of both information and program direction. The pilot site became the testing ground for ideas about program content from the time of program inception.

Early program planning was not concerned with the geographical allocation of resources. The main focus of planning was on program content and pilot area activities, and the allocation of resources to activities or functions of the program.

After six years of operation, the program decided to expand its geographical coverage into two other areas. This expansion necessitated some adjustment in program operations and in the relative allocation of program resources to activities and functions.

At about the same time as first round program expansion, the program also faced some major changes in leadership which disrupted program activities and required certain adjustments in planning and management styles. Leadership within the program staff became split and a new position of Executive Director was instituted for overall program leadership. The planning style of the program became more informal and incremental.

After two years of adjusting to the changes necessitated by first round expansion and changes in leadership, the program again set out on a second round of geographical expansion. Funding very quickly became a problem as expected funding sources did not become available. Field staff became overextended and program effectiveness suffered. The program also faced external disturbances in the form of national political upheavals and an election conducted in the province.

Within this second round geographical expansion context, the author and a few others in the program noticed that decisions on where to locate new expansion areas in the province seemed not to be related to actual geographical patterns in the uplands. Specifically, it was noticed that the allocation of program resources was being made based on an arbitrary administrative division of the province which did not reflect actual geographical patterns.

This conclusion followed from experience with map-based information being developed outside of the AUDP planning process. The form and level of refinement of the information was not directly useable in the AUDP planning process at the time, and probably would not have had an effect given that decisions and commitments had already been made. In any event, the problems caused by lack of funding, overextended personnel, and external disturbances to program operations took most of the time of program planners and managers.

Thus, the problem of geographical allocation of program resources was just one of a multitude of planning problems facing the AUDP in its historical development from 1975 to 1984. In perspective, the problem of geographical allocation of resources was not important in the early planning of the program. With decisions to expand geographical coverage, the problem gained more importance but was often obscured by other more immediate problems and program disturbances.

CHAPTER III

THE PLANNING CONTEXT I: DEVELOPMENT OF MAPS

Parallel to the evolution of the problem of allocating program resources to specific areas in the province as described in Chapter II, a set of maps was being developed in response to influences within the provincial planning operations. Although some map-based information existed in the province prior to the beginning of the Antique Upland Development Program (AUDP), it was not used in the initial planning of the program in any identifiable manner. Neither was it in a form or at a stage of development which could be used very effectively in general provincial planning operations.

Soon after the author arrived in the province as a Peace Corps Volunteer fresh out of a U. S. planning school and assigned to the provincial planning staff[1] in April of 1975, he noted weaknesses in the geographical information base on the province and started to gather existing maps and undertaking some simple analyses on his own. From this beginning and over a period of ten years, the author

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[1]The terms "provincial planning staff" or "provincial planning office" are used in this study as a general description of the group of people and office in the provincial government which was concerned with provincial planning. The formal name of the staff and office at the time was Provincial Development Staff.

continued to build a geographical data base in the form of maps of the province. These maps eventually formed the basis for making a geographical analyses of the upland situation in the province and addressing the problem of geographical allocation of program resources in this study.

This chapter describes the context in which a set of map-based information was developed over time in response to a varied set of influences which were often external in origin but which were perceived mainly from within the operations of the provincial planning office. The development of the maps was also conditioned by some real constraints encountered in the planning operations and these constraints also formed a part of the context.

This chapter is divided into six sections corresponding roughly to the historical encounters with the set of influences which conditioned the initial development of a basic set of maps on the province. Section 1 describes the gathering of map-based information in response to the general planning education of the author and the situation in which the author began his work with the province. This influence was very important in setting the general direction of work in responding to the other succeeding influences.

Sections 2 to 5 detail the separate influences encountered during the first four-and-one-half years from

1975 to 1979 that the author was assigned to the provincial planning staff. During that time, three planning operations influenced the development of the map-based information contained in this study. Also during that time, a geomorphological survey and analysis was undertaken by an agency outside of the province. This survey and analysis was incorporated into this study and provided an indirect stimulus and a later framework for synthesis. Just by accident, an opportunity occurred to make a province wide set of aerial slides which were used in making a land use map of the province. Section 6 provides a summary of important points in this chapter.

This chapter relies heavily on experience from the perspective of local government, specifically the Province of Antique. Official literature on the various planning programs which influenced the development of the map-based information often did not mirror actual operations as they occurred in the field. In taking an experience-based perspective, reliance was placed more on actual operations and perceptions from the local level than on official pronouncements of intent.

1. Planning Education

The author was assigned as a Peace Corps Volunteer to the provincial planning staff of the Province of Antique in April of 1975. Just prior to his assignment to the Philippines and Antique, the author had completed a masters degree education in planning.[2] The education was U. S. based and focussed on urban and regional planning. The provincial assignment in the Philippines was neither urban nor regional.[3] Thus much of the education in urban and regional planning had no direct application to the basically rural and local government situation of the assignment. However, the education did focus perceptions about the general planning situation. One gap in the data base for planning was perceived. This gap was a lack of maps, and weaknesses in existing maps, about the province.

After the initial perception that the map-based information on the province was weak, the author independently began to collect map-based information and to make some simple map-based analyses. The biggest constraints at this time were the lack of consistent maps, the lack of data which could be analyzed in map form, and the lack of knowledge on the part of the author of what would be

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[2]Course work completed in 1975 and thesis completed in 1977.

[3]The province had no cities. The largest urban area was the provincial capitol of San Jose which encompassed only about 2000 households at the time. Although the province could theoretically be considered as a region for study purposes, the more definitive region centered around the City of Iloilo (about 100 kilometers distance from San Jose) which acted as the center of an administratively defined region made up of five provinces.

appropriate in the rural situation in which he was assigned (as opposed to the mainly urban orientation of his education).

The existing maps of the province which were in the office of the provincial planning staff were very few, of varying scales, and often inconsistent. The existing maps were mainly of roads and barangay locations and were used more for display than analysis in planning operations. Someone in the province had produced a very generalized land use map which, given its crude construction, was probably meant more for display than analysis. There was also a soils map of the province but it provided little information.[4] Most of the maps were on a non-standard scale of approximately 1:150,000 but with a range from report size maps of approximately 1:400,000 scale to wall display maps of approximately 1:100,000 scale.[5]

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[4]The lack of usefulness was in part a consequence of the author's ignorance on how to use the information in the soils map. In addition, as the author learned later through reading on the subject, the existing soils map in the province dated from a time (ca. 1960) when the methodology of soils survey and description used in the Philippines was not very well developed nor applicable to activities outside the soils science discipline. For a brief discussion of the change and reason for change in soils survey and classification around 1960, see Sanchez, Pedro A., Properties and Management of Soils in the Tropics (New York: John Wiley and Sons, 1976), pp. 52-61.

[5]Scale refers to the relationship between units of measurement on the map to the same units of horizontal measurement on the ground. Thus, 1:50,000 would refer to

Possibly more through errors in successive hand copying, enlarging or reducing the maps than through the use of different sources, the maps showed varying degrees of inconsistency. The most apparent inconsistencies

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one unit on the map (e.g. centimeter or meter) being equal to 50,000 units on the ground (e.g. centimeter or meter respectively again).

"Non-standard scale" is used in this context to refer to the difficulty in measuring more common units on one map in relation to the same common units on another map which is scaled to standard divisions on metric rulers (or architecture scales). For example, on a 1:50,000 scale map, 1 kilometer, a standard whole unit measure, would be equivalent to a ruler measure of 2 centimeters, or two whole unit measures. An even division by two of the 1:50,000 scale to a reduced 1:100,000 scale would give 1 kilometer being equivalent to 1 centimeter on a ruler. Even a fractional division of the 1:50,000 scale by five to a reduced 1:250,000 scale would still allow for a whole decimal relationship of 1 kilometer being equivalent to .40 centimeters on a ruler. However, with 1:150,000 scale, 1 kilometer would be equivalent to an uneven fraction of .667 centimeters which is only approximated on a ruler. The larger and smaller scale maps mentioned in the text were non-standard by virtue of being only rough approximations of the stated scales.

In this study, large and small scale are used as relative terms denoting the comparative size of different maps at different scales. A 1:50,000 scale map would be larger in scale than a 1:100,000 scale map because a map of the same area would be larger in size. A 1:250,000 scale map would be smaller in scale than a 1:100,000 scale map because a map of the same area would be smaller in size. As an example, the entire province of Antique from the southern tip of Anini-y to the northern most tip of Libertad was 157 kilometers on the ground, which could be represented on a 1:50,000 scale map with a north south length of 3.14 meters (about 10.3 feet), which could be represented on a 1:100,000 scale map with a length of 1.57 meters (about 5.2 feet), and which could be represented on a 1:250,000 map with a length of .63 meters (about 2.1 feet).

concerned political boundaries, road locations and barangay locations.

The first task was to gather together as many maps as could be found in other offices in the province, the region and Manila.[6] The maps gathered which proved to be most helpful in the initial stages of analysis were from the National Census and Statistics Office (NCSO) in the province, the Bureau of Lands offices in the province and the region, some maps from the regional National Economic and Development Authority (NEDA) office, and the Bureau of Coast and Geodetic Survey (BCGS) maps division in Manila.

All of these maps had inconsistencies among themselves and in relation to the existing maps in the provincial planning office. The next task undertaken was to try and rectify the inconsistencies. Since no one set of maps stood out as being authoritative in its own right for use as a base for rectifying all of the inconsistencies, separate single sources which were deemed most authoritative for single characteristics were used as the main basis for rectification.

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[6]This gathering of maps was by no means complete. The author found some maps that were perceived as being so general or obviously copied from existing maps that they were not copied for use in the planning office. Other maps were not gathered because they were unknown to the author at the time (e.g. maps of mineral mines). Other maps may have been available in certain offices of the provincial, regional or national bureaucracy but the author was not able to search such a labyrinth of offices.

For political boundaries, the Bureau of Lands maps were used as most authoritative but were modified where obvious or probable mistakes were noted, especially for interior municipal boundaries and the provincial boundary where accurate records of surveys were not available. Barangay locations were rectified by using the set of maps obtained from the NCSO since it was felt that their census operations would allow for a more accurate field level basis for locations. The existing maps in the provincial planning office were used as the most authoritative source for road locations.[7]

A set of BCGS topographic maps were used as the base on which all other sources of information were collated. The BCGS maps were used since they were of the largest scale available at 1:50,000, were probably the most accurate for linear and area measurements, and contained some information on barangay locations and road locations in relation to identifiable geographical landmarks which could be used as checks for accuracy.

In transferring the various information from different scale maps, some problems were encountered in

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[7]These maps were found to be less than authoritative upon field checking. Probably the weakest map of the set was from the NCSO. Some barangay locations were found to be very far from where they should have been placed on a map.

exact locations at the larger scale. Most of these difficulties were overcome by "eye-balling" the locations of boundaries, barangays and roads as best as possible considering natural and known landmarks.

As examples of this, the provincial boundary was for the most part drawn to reflect the natural watershed divide between the province and the other three provinces on the island. Barangay centros (or the main population centers of barangays) were located after consultations with people from the areas or with those who might have knowledge about the relative locations of the barangays along provincial roads or in relation to identifiable landmarks. Roads (mainly interior roads) were located based in part on descriptions provided by drivers in the provincial planning office and the head of the provincial planning staff who at one time worked as an engineer directly involved in road and bridge construction in the provincial government.[8]

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[8]This process of locating characteristics on the larger scale map was hampered by the difficulty many people found in reading the 1:50,000 scale topographic maps. As an example, one person who was trying to identify the location of a barangay would consistently state that the barangay was above (in elevation) another barangay but would consistently point to a location on a map which was at a lower elevation. As it turned out, the person was interpreting "north" to be above and disregarded the elevation contours on the map, even with repeated explanation by the author that the location he was pointing to was below (of lower elevation) than the other barangay.

The 1:50,000 scale maps were reduced manually to standard 1:100,000 and 1:250,000 scale maps to facilitate display and overall provincial level analysis.[9] The exception to this was the topographic maps which were too detailed for reduction by manual means. The BCGS already had a less detailed topographic map at a scale of 1:250,000, thus leaving the map at scale 1:100,000 the only one without a topographic base.

After this process, the province had a first round set of base maps covering topography, political boundaries, barangay or general population locations, and roads. The author felt at this time (approximately nine months after his assignment to the province) that the base maps were at a sufficient level of development to attempt some further map-based analysis.

The first map-based analysis undertaken was of population density. Existing population density figures and maps were available but only on the basis of municipal population to municipal land area.[10] Casual observation of

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[9]These scales were chosen as "standard" due to the ease of comparing distances and other measures between the maps (see footnote 6 above), and for ease of manual reduction using matching square grids at reduced scales.

[10]These maps and figures were available in the 1960, 1970 and 1975 census publications for the province. The maps showed the use of incorrect boundaries and thus the municipal areas used as divisors in computing density were probably incorrect. However, the main weaknesses of the maps was the bias towards lower density for those

the population distribution in the province revealed that there was, within municipalities and thus within the province as a whole, a great variation of population density which could not be adequately represented by such an analysis based on municipal boundaries alone.

To overcome the limitations of using municipal boundaries, an arbitrary square grid with grid cell size of 4 square kilometers (approximately 1.5 square miles) was constructed for the entire province at a scale of 1:100,000.[11] Barangays falling within each grid cell were counted as being completely within the cell and the barangay populations were summed by cell and then divided by the cell land area.

The grid cell size of 4 square kilometers was chosen based on the judgement that a larger cell size would not adequately show population distribution, and on the judgement that a smaller cell size would probably not

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municipalities with large areas of uninhabited mountains as opposed to those municipalities which were mainly lowland. The density of lowland population between municipalities was not as great as indicated in the maps.

[11]The 1:100,000 scale map showed the whole province on one sheet approximately 2 meters long. The 1:50,000 map was made up of 16 separate sheets of about 80 by 50 centimeters (about 2.75 by 1.5 feet) and would make a map of more than 3 meters length if combined. The 1:100,000 scale map was chosen to facilitate table-top work and to construct a uniform and unbroken grid for calculation purposes.

be appropriate to the uncertainties about actual barangay locations. As barangay locations became more certain through adjustments obtained as the result of later activities described in the other sections of this chapter, a finer grid size of 1 square kilometer was used in conjunction with an arbitrary allocation calculation scheme which weighted the cell containing the population heavier than surrounding cells to which a fixed proportion of the population was allocated.[12]

What was obtained from this analysis was a map which gave a visual representation of the relative pattern of population density and population distribution. However, due to the arbitrary manner in which the maps were constructed, they were not amenable to direct and detailed use in planning. Their greatest use was as a basis for visualizing the disaggregated, relative distribution of population in the whole province without regard to arbitrary political boundaries.

A second analysis undertaken was the construction of a slope category map. The immediate stimulus for this was not directly related to provincial planning operations but came in the form of a set of 1:50,000 scale slope

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[12] This more "detailed" map was visually more pleasing but the greater accuracy was an illusion. The map still was based on arbitrary square grid divisions and was further based on an arbitrary allocation algorithm.

category maps produced by the regional NEDA office sometime in 1976. These maps covered the whole province but showed some inconsistencies at map boundaries. They were also limited to a lowest open ended category of 30 % or greater slope.[13]

Based on some informal experience with the now active AUDP, and noting that there were some obvious areas of agriculturally active uplands on slopes greater than 30 %, a separate analysis of the 1:50,000 scale BCGS topographical maps was undertaken to both rectify the noted inconsistencies in the NEDA maps and to give more detail to the slope categories by adding a category of 50 % or greater slope. The choice of 50 % slope was in a sense arbitrary but was also based on informal observations that most agricultural activity declined rapidly and was almost absent at very steep slopes.

This map was produced at a scale of 1:50,000 and reduced to 1:100,000 for unified display. Although not immediately used in any formal planning process in the

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[13]Percent (%) slope refers to the relationship between elevation change over a horizontal distance expressed in percentage terms. This is commonly referred to as rise (elevation) over run (horizontal distance). As an example, a 30 % slope would be a 30 meter change in elevation over a distance of 100 meters, or a 15 meter change in elevation over a distance of 50 meters. Another measure of slope is in degrees or the angle of the slope. A 30 % slope would be 16.7 degrees slope using a formula of: slope in degrees = cotangent (% slope/100).

province, the map and the later measurements of areas by slope, gave a good overall picture of slope variation in the province.

The population density map and the slope map had a very interesting effect when viewed together. Specifically, relationships between population distribution and slope became apparent, with an obvious decline in population density being associated with increasing slope. A similar effect was obtained by viewing each of the maps in relation to the road map, with road density declining with increasing slope and decreasing population density. These relationships were perceived visually by just viewing the maps side-by-side and required no sophisticated or technical methodology to accomplish. The perception of these relationships acted as a stimulus to search out other variables to map and compare in map form.

One of the main variables which was of interest to the author at this time was land use. This interest was again related to the education in urban planning in which the mapping of urban land use was so important. However, there were no adequate sources of disaggregated land use data available.[14] In addition, the author still had to rely

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[14]Land use data available at the time of initial map base construction was very weak and at the most disaggregated level of the municipality with most data being in the form of provincial summaries. Much data collected by the national level used a sampling scheme which allowed

on his U. S. urban and regional planning education background for guidance and did not have necessary perceptions of either the local planning situation or the rural situation in the province which would be appropriate as a guide to his thinking and activities.

2. Provincial Development Assistance Project

The major planning influence during the first four-and-one-half years that the author was assigned to the province was the Provincial Development Assistance Project (PDAP) designed and funded jointly by the Philippine government and the United States Agency for International Development (USAID). The Province of Antique became a participant in the project in 1974,[15] and it was at a training on comprehensive planning sponsored by the PDAP that the author first met some of the members of the provincial planning staff in 1975. Given the importance of the PDAP in defining and shaping the planning operations of the province during the period from 1975 to 1979, a brief description of the project may help to understand the

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only limited statistical precision at the local level. Many statistics were not published for areas smaller than the region or the province.

[15]This date is from memory and could have been in late 1973.

manner in which the PDAP influenced the development of the maps.

The Philippines inherited a unitary form of government from both the Spanish and American colonial experience.[16] In this unitary form of government, local governments were mainly administrative and political appendages of the national government. During the 1950's and into the middle of the 1960's, there was much debate concerning the role of local governments in the national development effort.[17] This debate culminated in a series of legislation aimed at decentralizing some national government administrative and political powers to the lower levels of

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[16]The Philippines was claimed as a territory of Spain in 1521 and was ruled as a colony of Spain until 1898. In 1898, Spain ceded the Philippines to the United States under a treaty ending the Spanish-American War. The U. S. ruled the colony, except for a short Japanese occupation during World War II, until independence in 1946. The colonial governments were set up more for central control (and economic exploitation) than for fostering local autonomy. The political divisions of the Spanish were mainly for administrative or religious control under a unitary national government based in Manila. Under the U. S., the administrative functions of local units were kept but still under strong central control. This did not change with independence.

[17]For a discussion of the debates and the issues at the time, see Raul S. Manglapus, <u>Land of Bondage Land of the Free</u> (Manila: Solidaridad Publishing House, 1967), pp. 109-175; Raul P. de Guzman, "Philippine Local Government Issues, Problems and Trends," <u>Philippine Journal of Public Administration</u> 10 (April-July 1966): 231-241; and Abelardo G. Samonte, "Decentralization and Development: Some Basic Issues," <u>Philippine Journal of Public Administration</u> 11 (April 1967):128-137.

government--provinces, municipalities, and barangays. In actuality, powers were not so much decentralized as shared, with the local governments at least gaining a legitimate and recognized role in defining and administering development within their own jurisdictions.[18]

Along with decentralization or the sharing of powers, it was recognized that the local levels of government were a weak link in the national development effort and needed to build a capability to carry out development activities in their own jurisdictions. The PDAP was designed to develop such capabilities at the provincial level.

Based on the success of an initial experimental project in two provinces,[19] the Philippine government and the USAID initiated the Provincial Development Assistance Project under the National Economic Council (NEC) in December of 1967. During the formative years of PDAP from 1968 to 1972, the project focussed mainly on improving fiscal management, agricultural production, and physical infrastructure, including the development of independent

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[18] For a discussion of partial decentralization or sharing of powers along with a discussion of trends in local government in the Philippines from 1967 to 1974 see Felipe V. Omar and Patria Rivera, "Local Government Developments Since 1966," Philippine Journal of Public Administration 19 (January-April 1975):1-14.

[19] The project was called Operation SPREAD or Systematic Programming for Rural Economic Assistance.

provincial equipment pools capable of constructing and maintaining provincial roads. Development planning was a focus of PDAP, but the main activities were concentrated on the establishment of a working local planning council and a functioning planning office as a staff support to the provincial governor. Included in the program were trainings and some required short term planning activities concerning capital and operations budgets and the building of a statistical data base for longer term planning.[20]

The second phase of the PDAP was characterized as going "From Experimentation to Operationalization".

> The second phase, coinciding with the declaration of martial law in 1972 up to 1976, was characterized as the "most active" period of PDAP with 19 provinces joining PDAP bringing the number to 28 provinces, the maximum number attained. In November 1972, PDAP was transferred from NEDA (successor of NEC) to the Development Management Staff of the Office of the President. PDAP was placed under the supervision of the Executive Secretary.
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> Management of PDAP underwent some significant changes. There was a shift from the management committee . . . to a strong single executive with the appointment of a full-time Executive Director, Col. Gregorio Vigilar. . . . The experimentation which characterized the first phase was replaced by more reliance on procedural controls found in manuals, instructions and guidelines which, together with practical training courses, constituted what Col. Vigilar considered two "tightly-combined

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[20]This first phase of PDAP is discussed in Gabriel U. Iglesias, "Strengthening Local Government Capability: the Case of the Provincial Development Assistance Project," Philippine Journal of Public Administration 27 (October 1983): 459-461.

features" responsible for "PDAP's repeatedly successful program replications."[21]

It was in this phase of more reliance on procedural controls, practical trainings and program replication that the Province of Antique was admitted into the PDAP.

Just prior to the declaration of martial law, there were elections for local government officials, including provincial governors. In Antique, there was a change in administration with the victory of a young, energetic and imaginative lawyer who took over the governorship in 1972 and replaced the previous personnel in the governor's office with his own people.

There was some sort of planning staff in existence prior to the change in administration, but there was not much evidence of their work remaining by the time the author was assigned to the province in 1975.[22] Whatever their work or capabilities, the almost complete turnover of personnel in the governors office did not allow for much continuity of the planning function in the province. Thus the new governor started with a new, mostly young and untried planning staff.

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[21]Ibid., p. 461.

[22]The planning staff as such may not have existed as a formal office but some people were assigned to do planning tasks. Evidence for this was indirect but included the mention by several people that there was a Peace Corps Volunteer assigned to the provincial government in the late 1960's in a capacity similar to that of the author.

Martial law was declared soon after the new governor took office.

> When martial rule was imposed on September 23, 1972, however, centralism which had become restrained in the '50s and '60s began to key up as evidenced by the presidential decrees and memorandum circulars passed during this period. Aquino observes in her thesis on Dimensions of Decentralization and Development in the Philippines that an immediate reaction to martial law was the consolidation of "central control more than in any other time in the past", which has thereby negated whatever gains the local autonomy movement has made in terms of increased political powers and administrative discretion for local units.[23]

At the same time, however, a greater central concern for local governments and administrative decentralization was evidenced in the creation of a separate Department of Local Government and Community Development and the regionalization of certain administrative functions.[24]

It would seem then that the Province of Antique faced a situation allowing less discretion over its own development efforts while at the same time building its planning and development capabilities through the PDAP. The PDAP itself had undergone a transformation from an experimental program to one more characterized by central administrative control based on centrally defined content and procedures.

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[23] Omar and Rivera, "Local Government Developments Since 1968," p. 5.

[24] Ibid.

One of the requirements of provinces participating in PDAP was the collation and analysis of data on the province in the form of a socio-economic profile.[25] The socio-economic profile had an indirect influence on the development of the map-based information and also benefited directly from the analysis. As mentioned previously, the author felt that a land use map of the province would be a desirable addition to the set of maps being developed. The socio-economic profile of the province provided some data on land use, but with the municipality being the lowest level of disaggregation.

In addition, the profile showed, upon closer analysis, that much of the land use data such as hectares in various crops or uses were often inconsistent between different sources. Some of the sources even varied substantialy in the total area recorded within the boundaries of the municipalities. This indicated that one or more, or all, of the data sources had some weakness in the geographical basis of their measurements. This provided an additional indirect stimulus to develop some sort of consistent base of land use in a more disaggregated map form.

The socio-economic profile also benefited directly

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[25]Members of the planning staff had undergone PDAP sponsored training in the production of a Socio-Economic Profile (official title) before the author began work with the province.

from the previous map-based analysis. This benefit was in the form of measurements by municipality of slope categories and an alternative, though not official, set of measurements of municipal area. The independent measurement of municipal area based on the political boundaries as developed in the initial base maps provided an independent check for deviations of the published sources in the profile and at least raised the consciousness of some of the staff that their data base for planning was questionable in certain respects.[26]

The maps did not have much direct effect on the planning operations of the province through the socio-economic profile. This was probably due to three reasons. First, the maps were not at a very high level of development at the time. Second, the author had been working on the maps independent of any definable provincial planning operation and no other staff member was directly involved in the development of the maps. Third, the highly structured manner in which the socio-economic profile was introduced into the provincial planning operations through

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[26]This consciousness that the data base for planning was weak was not widespread in the staff but was confined mainly to those holding higher positions such as division chiefs. The consciousness did not lead to any great effort to improve the data included in the socio-economic profile and a later profile (ca. 1983) included many of the same inaccuracies as the first (ca. 1975).

PDAP requirements did not facilitate a very close look at either the inconsistencies in the data or the need for developing an independently verifiable basis for judging the adequacy of the various data sources. In addition, the way that the socio-economic profile was formatted in PDAP relied almost exclusively on tables and not maps for the presentation of data.[27]

A second PDAP planning activity which had an indirect influence on the development of the map-based information was comprehensive planning. As mentioned previously, the author began his work with the province at the time that the planning staff was undergoing training in comprehensive planning in early 1975 under the sponsorship of PDAP. This training was very structured and based closely on a centrally designed manual[28] which detailed

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[27]This was true even of a recent profile (ca. 1983) which contained only one map of the province which, much to the author's dismay, was an old copy and did not include the corrections made by the author from his initial work on improving the map base. It surprised the author that only one (incorrect) map was used even though a set of corrected maps were widely available in the planning office, and even though four of the corrected maps were previously used in a publication for the yearly provincial festival. Compare Province of Antique, Profile of the Province of Antique, (San Jose, Antique, Philippines, ca. 1982); with Province of Antique, Binirayan '82: Antique Report & Directory, (San Jose, Antique, Philippines, 1982), pp. 54-63.

[28]This manual was not available to the author at the time of writing, thus the following discussion of the use of the manual in provincial comprehensive planning is from memory. The manual was cited as: "Urner, John B.,

the steps which should be taken to meet this new PDAP requirement for participating provinces.

The indirect influence of this activity came from the manual itself and not from the activities involved in trying to follow the manual in provincial planning operations. The manual mentioned in several places the need to develop maps for use in the planning process. Unfortunately, neither the manual nor the training specified how the maps were to be developed or how they were to be used in the planning process.[29]

The planning operations began in mid- or late 1975 and extended into late 1976.[30] Activities were organized along sectoral lines with the provincial planning council being divided into sectoral task forces.[31] Analyses within

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Provincial Comprehensive Plan for Misamis Oriental (Manual of Procedures), Provincial Development Assistance Project, USAID/Philippines, May 1976," in James E. Bogle "Consultation Report: Peace Corps Philippines Planning Program," (Manila: Peace Corps/Philippines, December 1976), p. 15. The manual used by the province was a 1974 or 1975 version.

[29]The author did not attend all of the training sessions on comprehensive planning. The manual definitely did not provide much guidance on the development and use of maps, and the author found no evidence from other planning staff members in the province that the training covered the subject either.

[30]The dates are approximate and reflect the author's recollection of the period of most intense effort on comprehensive planning in the province.

[31]These sectoral task forces were based on broad

the task forces were consequently conducted along sectoral divisions. The main data base for planning was the socio-economic profile which, as mentioned previously, was neither conducive to nor based on mapped information.

The lack of specific guidance for the development and use of maps in the planning operation did, however, provide an indirect stimulus to thinking on how map based analyses could be developed and used in provincial planning. This was in the form of a perceived lack of use at the time and not on a direct stimulus to use the existing maps in the planning process. In addition, the maps themselves were not at a stage of development which facilitated their direct use in comprehensive planning.

The comprehensive planning process in the province eventually was discontinued in 1977 without producing a comprehensive plan. The main problem limiting the process was the difficulty in coordinating the numerous participating agencies in the planning council[32] and the lack of

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divisions of development effort and bureaucratic divisions in the province such as agriculture, education, public administration, infrastructure (mainly roads and bridges), social services and health.

[32]All agencies such as provincial offices of national level Departments and Bureaus were members of the planning council. The problem of coordinating such a large number of agencies in a planning council under the PDAP program is also discussed in Iglesias, "Strengthening Local Government Capability," pp. 468; and Raul P. de Guzman, et al., "Increasing the Administrative Capacity

understanding on how to translate the detailed manual into an actual planning process suited to the needs of the province.[33] In addition, the requirement of a comprehensive plan for continued participation in the PDAP was considerably relaxed to the point of being no requirement at all after 1976.

A third required PDAP planning activity which provided a much greater and direct stimulus to the development of map based analyses and which more directly used the previous maps was Road Network Development Planning (RNDP). The planning staff along with participants in the activity from the provincial office of the Department of Agriculture and the Provincial Engineer's Office underwent training in RNDP in late 1976. Planning operations began in late 1976 and continued into 1978.[34]

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of Provincial Governments for Development: A Study of the Provincial Development Assistance Project in the Philippines," Philippine Journal of Public Administration 17 (July 1973): 366.

[33]This is an opinion of the author based on observations of the planning staff and the use of the manual as a guide for planning. The staff was young and had little direct experience or training in planning, much less comprehensive planning. They relied heavily on the manual. The manual itself, by being so detailed in the steps which should be taken, did not allow much room for imaginative adjustments in procedures. When a procedure or step did not work as designed, the succeeding procedures and steps suffered by being so defined that they were not easily adjusted to the local situation.

[34]Dates are approximate and reflect the author's

As with the training on comprehensive planning, the training on RNDP was very structured and based closely on a centrally designed manual[35] which detailed the steps which should be followed to produce a road network plan for the province. The manual was of much greater detail than that used in comprehensive planning. Almost all steps were minutely defined with corresponding formats to be used in data analysis. The exception was the steps to be taken to develop and use suggested maps in the analysis.

Maps were to be used in two separate but related tracks in the RNDP process. The first track used maps in defining zones and stations for a province-wide origin and destination survey (O & D survey), mapping traffic density between zones, and allocating present and future traffic on all road segments in the province. For this, the previously developed map for roads provided the initial map base, and a separate province-wide road survey was conducted in late 1978 (oddly enough at least one year after

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recollection of the period of most intense effort on road network planning.

[35]While having a copy available at the time of writing, the copy that the author used had lost its cover on which title and publication information were contained. To the best of the author's recollection, the manual should be referred to as Philippines, Provincial Development Assistance Project, Road Network Development Planning Manual of Procedures, (Manila, ca. 1976). (Locally published official document.)

the O & D survey) which provided an opportunity to check the location of almost all road segments on the 1:50,000 scale topographical map prior to allocation of traffic by segments.

The field survey of roads had a secondary benefit in allowing the author to field check the locations of barangays along or near the roads. It was at this time that the author noted some minor discrepancies between previously mapped road locations and actual locations, but some major discrepancies between previously mapped and actual locations of barangays.[36]

The field survey of roads improved the previous base maps considerably, but this improvement was mainly in the lowlands of the province where the road network was the most dense. The location of many upland barangays not covered in the road survey were held suspect as a consequence of not being field verified.

The mapping of the existing road network, the mapping of existing traffic density and the allocation of

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[36] The amount of discrepancy between map locations and field locations was striking in some instances. Not only were barangays transposed in locational order along the roads, some interior barangays were off their correct locations by up to 10 kilometers. As a general observation, barangays were more correctly located in the lowlands and along major roads and less correctly located in the uplands along secondary and penetration roads. Road locations in the lowlands were fairly accurate but secondary and penetration roads into the uplands showed a much higher level of inaccurate map location.

existing traffic to road segments was fairly straightforward. The difficulties came in trying to produce maps for the second track of the RNDP process. The second track of the process concerned analyzing the existing agricultural situation in the province and projecting trends in sufficient detail to predict future agriculturally related traffic generation.

In the second track, the approach to analysis was based on both tables and maps. The table based analysis was seemingly straightforward and explained in detail in the manual. However, as the agricultural task force attempted to produce the analyses, it was noticed that existing data for municipalities were weak and inconsistent between various sources. This difficulty was overcome in part by some arbitrary assumptions concerning which sources were the most reliable and by adjusting existing data by the use of judgement.

The manual also specified the use of barangay based land use data. These data did not exist. Thus the work of the agricultural task force was considerably limited by the detail of data available.[37]

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[37] The only reliable data generally available at the barangay level was population and number of households from the census. Agricultural and land use data was generally not published below the provincial level although there were some data available at the municipal level.

The use of maps was also referred to in the manual, but the level of detail on how the maps were to be produced and how they were to be used was very much less than the level of detail on the production and use of the tables. Formats and examples of the production and use of tables were provided throughout the manual. There were no formats or examples of the production and use of maps.

The manual was at times specific on what maps should be produced at the stage of analyzing the existing agricultural situation:

> The suggested specific documents to be produced at this stage are the following: . . .
> c. Topographic map (scale - 1:100,000 m);
> d. Soil map showing soil types, classification and fertility levels (scale - 1:100,000 m);
> e. Present crop production and distribution (land use) - tabulations and maps . . .
> h. Irrigation map showing present and potential irrigable areas (scale - 1:100,000 m) . . .
> J. Location map showing present fishery and potential areas (scale - 1:100,000 m);
> k. Forestry map showing forest reserves by classification, steep and slope (sic) areas, idle and abandoned agricultural areas, and potential agricultural areas (scale - 1:100,000 m).[38]

The manual was also fairly specific on what maps should be produced for future land use.

> STEP E.6 PREPARATION OF FUTURE LAND USE MAP
> The Special Work Group proceeds with the preparation of the future land use maps scaled at 1:100,000 meters on the basis of the adopted (sic, tables) and charts reflecting future agricultural situation of the province. Three maps are required

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[38]Philippines, Road Network Development Planning Manual, pp. D-13 to D-14.

> for this purpose. The first map shall be the +5, Land Use Map, and the second, +10 Land Use map; and the third, +20 Land Use Map. (sic)
>
> It is very important future land use maps should bear distinguishable marks indicating the following:
>
> a. Present areas devoted to crop, livestock, poultry and fish production by categories;
>
> b. Expansion areas devoted to crop, livestock, poultry and fish production by categories;
>
> c. Present and expansion areas under irrigation facilities by categories;
>
> d. Newly opened agricultural areas utilized for crop poultry and livestock production; and
>
> e. Proposed linkages between envisioned agricultural infrastructure (warehouse, mills, canning, and processing plants, etc.) in compact areas of surplus production, and the major road network system.[39]

Beyond these specific requirements, there was little that the manual provided in the way of guidance on mapping of land use.

The manual, and those persons from PDAP who were sent to the province periodically for consultation and supervision, did not evidence an awareness of the constraints involved in land use mapping in the province. As examples, the topographic map at 1:100,000 scale did not exist in the province and, as mentioned previously, the difficulty of reducing the existing 1:50,000 scale topographic maps was too great using the manual reduction techniques available to the province. Land use data were disaggregated only to the level of the municipality and

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[39]Ibid., pp. E-37 to E-38. The +5, +10 and +20 refers to 5, 10 and 20 years into the future.

were not suitable for any detailed mapping. The manual gave no indication of how tabular data were to be translated into mapped data for future land use.

When asked about these matters and for some guidance in overcoming the constraints, the PDAP personnel, including some of those who wrote the manual,[40] could not give specific answers. Often the answers were "Well, I just don't know" or "Just do the best you can."

The RNDP process was abandoned after considerable effort in 1979. Much analysis and calculation had been accomplished, but the magnitude of the data analysis problem and the lack of coherent guidance in overcoming the problems eventually led to a dead end. In addition, as with comprehensive planning, the requirement of an RNDP was considerably relaxed after 1976 and was completely dropped after 1981.

The PDAP entered a "Period of Uncertainty" from 1976 to 1981. In 1976, the PDAP was transferred from the Office of the President to the Department of Local Government and Community Development (DLGCD). The special nature of the project was considerably reduced with incorporation into a more regular bureaucratic environment.

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[40]The team who wrote the manual was composed mainly of filipino PDAP personnel but included a Peace Corps Volunteer from the province which acted as a pilot test of the procedures and an American consultant working through USAID.

Central control through direct requirements for program participation was reduced. More emphasis was placed on special projects geared towards the provision of infrastructure to rural areas and the improvement of fiscal administration than to the overall planning characterized by the comprehensive planning or RNDP process. PDAP as a separate and identifiable program was phased out in 1981.[41]

The above discussion of PDAP as it related to the development of map-based information in the province may leave the impression that PDAP was not successful in improving the planning and management capability of the province. This was far from the case. Although the evaluations of PDAP were mixed,[42] the author noted a definite improvement in awareness of the need for planning, the capability to undertake short term planning (especially

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[41]Iglesias, "Strengthening Local Government Capability," pp. 462-463.

[42]Although there were official and unofficial evaluations of PDAP, none were available to the author at the time of writing. A partial evaluation is contained in de Guzman, et al., "Increasing the Administrative Capacity of Provincial Governments for Development," pp. 366-368. The author can recall there being two general evaluation conclusions by various agencies and individuals. One group focussed on the meeting of internal goals and concluded that PDAP was successful in meeting project goals. Another group focussed on a comparative analysis and raised questions about the degree to which PDAP intervention was itself responsible for changes in provincial development operations.

through the budgeting process), the improvement in fiscal management through improved budgeting procedures and real property tax procedures, and a considerable improvement in the capability of the province to independently undertake physical infrastructure projects through the Provincial Engineer's Office (mainly roads but also rural waterworks projects at a later date). Also of importance, the author noted a growing confidence among the planning staff that they could undertake complex planning tasks and act as equals in relation to planners at the regional and national levels.

Although the comprehensive planning process and the RNDP process were never completed, the staff began to look at the province in more than just isolated project terms. They also gained a greater awareness of the limitations to the provincial planning data base. Unfortunately, the two planning processes did not provide much guidance in overcoming the data problems.

This was especially true for map-based data--specifically land use. Nonetheless, the two planning processes, along with the socio-economic profile, which defined much of the planning operations of the province during the author's assignment with the planning staff from 1975 to 1979, did provide some significant stimuli to improve the map-based information for provincial planning use.

3. Town Planning Housing and Zoning

Another centrally defined planning program in which the author and a few members of the planning staff were involved from mid- to late 1977 was comprehensive urban development planning and zoning for two municipalities in the province--San Jose and Belison. This planning process was sponsored and directed by the National Coordinating Council for Town Planning Housing and Zoning (TPHZ) under the Human Settlements Commission (HSC) and in cooperation with the regional NEDA offices. The Human Settlements Commission, which was later transformed into the Ministry of Human Settlements, was concerned mainly with physical and urban planning as a compliment to the mainly sectoral and aggregate economic planning orientation of the NEDA.

The use of the term "urban development planning" was only partially correct in reference to the two municipalities covered by the program at the time. Only the Municipality of San Jose, also the provincial capitol and having the largest poblacion (or municipal administrative and population center) in the province, had an urban area of any significance and most of the municipality was rural. The Municipality of Belison was very small and very rural and had a poblacion which was only slightly larger than the largest barangay in San Jose. Although in San Jose the final plan focussed on the poblacion area, or the municipal urban center, to a greater degree than in Belison, both plans could be more accurately described as rural town plans.

The planning process itself took on the character of a "crash" program and was applied nationwide.[43] From the first training conducted in the region in July of 1977, the selected municipalities were given only about three months to finish both a comprehensive town plan and a zoning ordinance approved by the municipal legislative body. This was a very tall order for a municipality such as Belison where there was essentially a one man staff in the municipal planning office. The situation in San Jose was not much better as far as personnel was concerned.

Under the TPHZ program, the HSC was to field some of its own personnel, called "techno-aids," to assist the municipalities in the planning process. The regional NEDA and the provincial planning office were also tapped for assistance.

The "techno-aids" fielded by the HSC turned out to be very young, inexperienced, usually fresh college graduates who did not have a grasp of the local situation and who knew little more about the program than the local

[43] This was characteristic of many of the programs of the Ministry of Human Settlements where pilot testing seemed to be very rare, and widespread results were often pushed on a short time schedule.

level planners. The planning assistance from the regional NEDA office was intermittent and lacked depth. The municipalities turned mainly to the provincial planning office for assistance, although San Jose also hired an architect to design much of the municipal town plan.

The training and documentation showed evidence of hurried design. The author cannot remember having a manual for this planning operation. Most of the process was transferred in the form of the trainings and separate ad hoc hand-outs on certain aspects of the planning activities. Most of the hand-outs and the training sessions were concerned with the organizational structure of the nation wide process, the time table and deadlines which must be met, a model zoning ordinance, and very general, urban oriented planning concepts and methodologies.[44]

At the municipal level, the process was very rushed and often disorganized. Surprisingly, though, a plan and a zoning ordinance were produced on schedule for both municipalities.[45]

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[44]The planning content seemed to the author to be very U. S. urban planning oriented and not very applicable to the local rural situation in the province.

[45]Both the plans and the zoning ordinances were not of very high quality, with the zoning ordinance being essentially a copy of the model zoning ordinance without much adaptation to local conditions. Still, it was a surprise to the author that the plans, even with their weaknesses, were produced on time. Unlike the PDAP

As with any town plan, especially one with an accompanying zoning ordinance, the planning process required land use maps. The immediacy of the deadlines necessitated a rather hurried, but fairly accurate, general land use survey of the municipalities. Fortunately, the land use of both municipalities was easy to define due to the small land area involved (the two municipalities had the smallest land areas in the province) and the lack of great diversity in land uses. Most of the land area of the municipalities was irrigated rice land with some easily identifiable areas of coconut and sugar. The urban areas were small enough in both cases to do a general land use survey by just walking the streets and noting uses on a large scale map of the poblacion street pattern.

This rather hurried planning exercise gave the author his first real experience with land use planning in the province. It also provided a learning experience about rural land use and how this type of land use might be mapped. Specifically, it was learned that some agricultural uses may be mapped as uniform crop cover, but some uses in the rural setting, especially in the very small sloping areas in both municipalities, were mixed to such a degree that no single designation could be drawn on

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planning schedule, the TPHZ schedule at least forced the local governments to come up with something.

the scale of maps available (largest scale of 1:10,000 produced specifically for this program by the provincial planning staff by manually enlarging the 1:50,000 scale topographic maps).[46]

The author also learned that an elevated perspective of extensive rural land use was much preferred to a ground level perspective. This was learned as a result of climbing a hill in Belison to try and identify the patterns of agricultural land use in the lowlands of the municipality. What was only hinted at ground level and on an irrigation map was very apparent from the more elevated perspective.[47]

This was much different from the situation in the urbanized poblacion where the street pattern gave structure to the land use analysis. In rural-agricultural areas, an arbitrary structure such as a street pattern is usually not present and land use follows a more natural

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[46]The 1:10,000 scale maps, being enlargements of the 1:50,000 scale maps, did not provide any increase in detail over existing maps. Even on 1:10,000 scale maps, the great variation in small plot agriculture was too difficult to depict by uniform crop boundaries.

[47]The Municipality of Belison was covered by a large irrigation system and a map of the system was available at the time of the TPHZ. On the irrigation map, areas which were not irrigated due to slight elevation variations in the lowlands were easy to identify and were usually in either coconut or sugar cane as opposed to paddy rice. This pattern became more evident from an elevated perspective.

and larger scale pattern not always evident without identifiable ground level referents.

Although this planning process provided some direct experience with land use planning in the province, the area covered was only slightly greater than 2 percent of the provincial land area and was not characteristic of most of the area of the province which was upland. The perspectives learned would be of use in other work that the author undertook but had very little promise of broader provincial level use at the time.

4. BS/UNDP Land Resources Evaluation

From April to September of 1978, the Bureau of Soils (BS) with financial and expert assistance from the United Nations Development Program (UNDP) undertook a field level survey of the Island of Panay of which Antique was one of four provincial divisions. The survey was undertaken to evaluate the land resources of Panay for agriculture and included the identification of land systems and land mapping units as descriptive divisions of the island land area at the level of regional reconnaissance.[48]

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[48] Philippines, Ministry of Agriculture, Bureau of Soils, Land Resources Evaluation of Panay for Agriculture (Manila, 1981). (Accompanied by Land Systems Map and other maps.) The purpose of a reconnaissance survey was "To

The author informally and intermittently followed the progress of the survey since it showed promise of providing some needed additions to the map base in the province. The survey also had some indirect influence on the author's thinking about the problem of land use mapping in the province.

Through informal discussions with the UNDP experts working in the survey, some insight was gained into what was involved in conducting a geographical analysis of land systems. This did not have much immediate impact since the author was not familiar with the field of geography and many of the concepts were not understood. However, the conversations did have an influence at a much later date when the author was able to obtain a final report of the survey along with a complete set of maps. These maps provided a very important source for integrating much of the other map-based information developed in the province.

The author was also able to view some aerial photographs of the province taken in the early 1950's at a scale of approximately 1:49,000. The author was aware that

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obtain broad data on the land resources of large areas; Guide for regional/national development planning, especially in the selection of potential areas and possibilities for development." (p. 5) The mapping for the study was done at scales equal to or smaller than 1:50,000. The author observed both 1:50,000 and 1:250,000 scale maps being used in the survey.

these photographs existed and were under the supervision of the military, but understood that access was limited due to some administrative and security restrictions. The restrictions seem to have been somewhat relaxed at the time and the foreign experts allowed the author to view the photographs in their office, but not copy or take copies out of the office.

The photographs provided a new perspective on the province, especially when viewed with a stereoscope.[49] Unfortunately, informal viewing was the only access allowed and no direct use could be made of the photographs given the restrictions of use.

The author was able to obtain some preliminary maps on land systems and geology before he left the Philippines in 1979. These maps provided only a limited amount of information since the final descriptions of the land systems had not been written in report form. However, the maps did provide another map-based perspective on the province. Specifically, the province was divided into more natural land systems which distinguished some of the underlying constraints and influences on land use.

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[49] Stereoscopic viewing of overlapping vertical aerial photographs provides a perspective view of elevation with mountains and hills being perceived as if the observer were in an airplane looking straight down.

5. Luck and Aerial Slides

Even with all of the influences from the planning operations of the province, no realistic method of gaining detailed, geographically disaggregated data for land use mapping could be formulated. A method such as used in the Municipality of Belison was considered but it soon became apparent that climbing all the hills in the province presented severe logistical and time constraint problems. Controlled aerial photographs were also considered but this proved to be too expensive.[50]

Thus a detailed land use map seemed to be out of reach. However, this changed dramatically with the chance occurrence of a long dry season lasting into July of 1978 (rains usually started in May). The province requested for a rain making operation over the province from the Philippine Air Force.[51]

An airplane and crew arrived in the province for a one week rainmaking operation in July of 1978. The first

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[50] A cost figure reported to the author at the time (ca. 1977) was around 70,000 pesos (approximately 10,000 dollars). It is not certain if this cost referred to the acquisition of existing aerial photos or to new coverage of the province.

[51] The Philippine Air Force has a special group of planes (two as reported to the author) which are fitted with equipment to seed clouds with iodine salts and which may be requested by local governments through the Ministry of Agriculture.

day was cloudless and the crew, at the governor's request, took the governor and the author on an observation flight. This led to an ad hoc creation of a plan to photograph the province for the purpose of making a land use map.

During the first flight over the province, the author had only one roll of black-and-white film and one roll of color slide film. This did not provide much coverage, and the flight path was very erratic with the governor directing a weaving path across the southern portion of the province.[52]

The plane and crew were assigned to the province for one week. During that time, five more flights were made. On the first and second photographic flights, cloud cover obscured much of the landscape and dulled the contrast of the remainder by blocking out the sun. On these flights, the rain making objective of the crew was accomplished in limited areas.[53]

For the remaining three photographic flights, a rough flight path of the province was designed to direct

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[52]Even the small coverage offered was not very good due to the extreme state of unease felt by the author who was prone to motion sickness. On subsequent flights, dramamine helped substantially towards building the author's intestinal fortitude.

[53]The areas covered during the rainy days were covered again during sunny days as the crew and airplane were able to concentrate on taking pictures and not on finding clouds to seed.

coverage and to minimize wastage of time and film.[54] Luckily, though not for the farmers who needed the rain, the remaining three days of flight were sunny and with very few clouds. Most of the province was photographed in the three days with the notable exception of some areas in the north of the province which still had heavy cloud cover, and some areas near to high mountains where air current conditions were not safe for the small aircraft. The total area of the island Municipality of Caluya was excluded due to time constraints and distance from the main provincial land area.

The rain making plane returned in December of 1978 with a continuation of the dry weather. Again, the author and some of the planning staff were able to make flights and take pictures over the province. These flights provided the opportunity to cover areas which were not covered in July or which were not covered in very much detail.

Eventually, approximately 800 color slides were

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[54]On such short notice it was difficult to find a sufficient supply of color slide film in San Jose. The author had to make a 100 kilometer trip to Iloilo (the regional city) one afternoon to purchase extra film. Even then, personal funds were used since it was too difficult to get paperwork through the provincial bureaucracy in such a short time, though the funds were later reimbursed. This limited the amount of film purchased at the time, but proved to be adequate to the task given efforts to conserve film by planning the flight paths.

taken of the province from the air.[55] These slides were taken with only a vague notion of how applicable they would be in land use mapping.[56] The methodology of aerial photography from the windows of the airplane was designed in an ad hoc manner in order to take advantage of an opportunity that by chance presented itself. There was no indication at the time of how useful the aerial slides would be in regard to detail of land surface characteristics. Some attempt was made to provide complete coverage of the province by designing a series of flight paths which were considered dense enough to allow some overlap and thus more control of detail. The altitude of the flights was also controlled to a degree (from about 200 feet to 1500 feet but usually around 500 feet elevation) to hopefully provide detail in the slides.

As it turned out, the coverage of the province was almost complete with a sufficient amount of detail in the slides that projection on a small screen gave an image which could be used in identifying specific land uses. The task then became one of devising a method for interpreting the slides.

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[55] About 650 of the slides were taken during July and about 150 were taken in December.

[56] In this regard, the governor and the head of the planning staff gave very good support to what was an unknown venture. For this, the author was very grateful.

The method for interpreting the slides did not spring full-blown after the slides were taken. The first task was to identify the locations corresponding to the slides. For this, the 1:50,000 scale topographic maps provided landmarks such as hills and valleys in sufficient detail to identify almost all slides as to location in the province.[57] This task occupied approximately three months from August to October of 1978. The slides taken in December of 1978 were located in a similar fashion but the process took much less time due to the familiarity gained in locating the first set of slides.

After collating the slides from the July flights, a roughly edited slide presentation of the province was assembled (excluding the Municipality of Caluya). This presentation was shown one night to some members of the planning staff and a few other provincial officials. The presentation elicited many comments from those present and illustrated the very powerful and direct impact that the aerial slides could have in providing a basis for thinking

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[57]The slides showed that the topographic maps were very accurate in presenting the features of the provincial land forms, even to relatively minor details such as small stream beds and hills. The main deficiencies of the topographic maps was in manmade features and some vegetation cover. This was probably due to the fact that the maps were constructed using photographs and information from the early 1950's.

about the province in other than limited ground level perspectives.[58]

During the process of locating the slides in relation to the 1:50,000 scale topographic map, the author was also thinking about how to interpret the photographs in a usable form for mapping. The method of interpretation was arrived at by trial and error. The first method considered was to delineate boundaries on the 1:50,000 scale map corresponding to major identifiable land use or vegetative cover. This was felt to be unsatisfactory especially in the uplands where agricultural use and non-productive vegetative cover were scattered in very small contiguous areas.

Another method considered was to define broadly similar areas and interpret land use as percentage of area covered in different categories. Defining broad areas of similar characteristics was found to be difficult given the diversity of characteristics observed even within small areas (e.g. slope, river and stream patterns, and density of land use by type). It was also felt that density of land use was an important variable which should

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[58]An illustration of this was a comment by the head of the Bureau of Agricultural Extension who said (approximately) "This is the first time that I have been able to see the province as a whole." Discussion at the presentation was very lively and indicated that most present could relate to the locations being viewed from the air.

be emphasized in geographic detail in the maps. Defining broad areas tended to mask internal variation of land use density.

The method finally developed relied on a relatively fine division of the province into approximately 11,200 arbitrarily defined square grid cells of 25 hectares each. Within each grid cell, the land use was interpreted as a percent of total cell area.

The aerial slides also had a secondary benefit in allowing more accurate mapping of upland barangay locations. Many barangays which were not covered by the road survey were located from the slides. However, the locations were not complete nor were they necessarily completely accurate. Some barangays were so dispersed that no identifialble clustering of houses could be identified as a barangay centro. Some barangay centros were not clearly visible due to cover of trees, although the clustering of fruit trees was an indirect indication of clustering of households in some instances where the surrounding areas were mainly agricultural fields or grasslands. In addition, there was no indication in the slides about the relative location of barangays. Thus some barangays might be transposed with other barangays on the map.

The task of land use interpretation occupied most of the author's time from January to August 1979 when he left the province upon completion of his Peace Corps assignment. Although the interpretation was completed, there was no time left for the analysis of the rough interpretation map and production of usable maps for planning purposes.

6. Summary Highlights

The initial influence for focusing on maps and the geographical distribution of variables in the province was a U. S. planning education which for the most part was not appropriate to the rural situation in which the author was assigned to work. Upon noting the weaknesses in existing map based information in the province, maps from different sources were collected and collated to form a basic set of maps on political boundaries, barangay or population locations, roads, and topography.

From this set of base maps, two secondary analyses were developed for disaggregated population density and slope. The simple viewing of the two secondary analysis maps and the road map allowed a province-wide comparison of variables which showed definite relationships and correlation.

Based on the perception of these relationships, other variables were sought which could also be mapped and compared. Chief among these was land use, but the level of data disaggregation did not allow further map based analysis. In addition, the author still had to rely on his U. S.

urban and regional planning education background for guidance and did not have necessary perceptions of either the local planning situation or the rural situation in the province which would be appropriate as a guide to his thinking and activities.

As the author began to participate more fully in the planning operations of the province, he became aware of the lack of guidance concerning the development and use of maps in planning. This was evident in a set of planning activities under a project designed specifically to improve the planning and management capabilities of the province. This project was highly structured and relied on trainings and manuals which, while mentioning or requiring map based information, did not provide much guidance in how to develop or use the information in the planning process.

Two important general planning operations in the project provided a stimulus to think about how to develop and use maps more fully in the planning process. The operation concerning road network planning provided the greatest stimulus and provided a means of greatly improving the existing maps in the province. However, neither activity was carried to completion and thus did not provide a continuing influence on the development and use of the maps.

Another separate planning operation provided an opportunity to apply the previously developed maps and to also conduct a general land use study in the province. This provided the author an opportunity to become acquainted more fully with rural land use and its map related characteristics. However, the focus of the planning operations was on only two small municipalities which were not characteristic of the province as a whole.

A land resources evaluation of the Island of Panay, of which the province was a part, provided an initial introduction to a geographical information and map resource base which would become very important at a later date in this study. This evaluation was conducted by a national level agency outside the planning operations of the province and employed several foreign expert geographers. Informal discussions with the experts provided the author an opportunity to become familiar, to a degree, with the process of developing a land systems map.

Within the province, the development of a land use map was a continuing problem and one which could not be overcome with the resources and capabilities at hand. Just by chance, an opportunity was presented to make an almost complete set of aerial slides of the province. These slides provided the raw data to make a land use map.

The method for producing the land use interpretation and mapping was developed by trial and error, but the final result gave a very detailed representation of present land use suitable for use in the planning process.

The author left the province before the interpretation map could be put into final production form.

Generally, the place of map-based information in the provincial planning process was not well defined during the period from 1975 to 1979. Part of the problem was the low level of development of map-based information which limited its usefulness in planning. Another part of the problem was the lack of guidance within the planning process itself. Nonetheless, a set of basic maps on the province were developed in response to stimuli within the planning process.

CHAPTER IV

THE PLANNING CONTEXT II: PLACE OF MAPS IN PLANNING

The previous chapter emphasized the contexts in which the maps used in this study were developed. This chapter emphasizes the contexts in which the maps gained greater use and found a clearer place in provincial planning. Although there was no clear historical break between the development of the maps and the use of the maps, there was a greater opportunity for the use of maps after they had been developed, refined, and expanded in content. This chapter also starts at a natural break in the author's association with the province with his departure in 1979.

The association with the province described in the previous chapter was at times confusing and disjointed in relation to the development and use of maps in provincial planning. The planning contexts themselves provided some indication of how the maps could be used, but the planning processes involved were often restricted and without overall direction. In addition, many of the planning processes were either discontinued before completion or so structured that the existing level of map development could not find clear application.

In this chapter, new planning contexts are described which were encountered within the province and which provided much clearer direction in the use and further development of the maps. These contexts at the same time provide an opportunity to more clearly relate the use of map-based information to the larger development concerns of the Philippines and to the central focus of this study which is the geographical allocation of rural development resources at the local government level.

This chapter is divided into eight sections. The first section describes the further development and use of the maps in an academic setting. Section 2 describes the further use and development of the maps in the province again prior to encounters with two important programs in the Philippines which provided opportunities to use the maps in planning for both the AUDP and the province as a whole. Section 3 describes the use of the maps in a project proposal submitted by the AUDP for national funding under a program directed specifically to the uplands.

Sections 4 to 7 describe a planning context which was similar to the PDAP context but which provided much more direction and a much clearer connection with the larger development situation in the Philippines. It was within this context that the previously developed maps found their greatest use, and it was this context which provided the greatest stimulus to develop the maps further.

Section 8 describes the process of refinement, further development, and initial synthesis of the maps after the author left the province again in 1984. This section also provides a cumulative summary and synthesis of the previously described planning contexts as a prelude to focusing on the geographical patterns in the uplands contained in the succeeding chapters.

1. Land Use Map Refined

Shortly after returning to the United States from his Peace Corps assignment, the author enrolled in a masters degree program in agricultural economics.[1] A thesis topic was chosen which focussed on the use of map based information to plan rural roads in a local government situation such as in the Province of Antique. The objective of the thesis was to further develop the maps of the province and to use the maps in addressing the problem of planning rural road locations.

The rough interpretation map of land use and vegetative cover described in Section 5 of the previous chapter was refined into separate land use and vegetative cover maps at 1:50,000 scale corresponding to the seven major categories of land use defined for interpretation of the aerial slides. An aggregate agricultural land use map

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[1]In the Department of Agricultural Economics and Rural Sociology at the University of Tennessee, Knoxville.

was also constructed combining the four categories of productive agricultural land use. These large scale maps were reduced manually to separate 1:100,000 scale maps using a coding scheme based on percent cover in each of the original grid cells.[2]

The aggregate agricultural land use map was compared with the maps of roads and slope by viewing the maps side-by-side as was previously done for other maps developed in the province.[3] In addition, the maps were overlayed to get a more precise view of relationships between the variables.

In studying the overlay maps together, a pattern of high density of roads was associated with a high density of agricultural land use in the lowlands. However, in the uplands, as defined in the slope map by all land above 8 % slope, the relationship between road density and density of agricultural use was less apparent. Many areas of high density agriculture in the uplands had road access, but many also did not.

The thesis on planning rural roads in the province was never completed. The author interrupted his education

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[2]The method of constructing the aggregate agricultural land use map is discussed in Chapter V on methodology.

[3]The author did not bring a population density map from the Philippines, thus the comparison of maps lacked a comparison with population.

in July of 1981 to return to the Philippines and again work with the province and to work specifically with the AUDP.

2. In the Province Again

The author returned to the Philippines in 1981 to work as a Research Fellow with the Panay Island Consortium for Research and Development (PICRAD) but was allowed increasing time to work again directly with the Province of Antique.[4] Formal connection with the province was through the AUDP.

At about this time, the AUDP had begun the first round of expansion of its program activities into other areas of the province (see Section 5 of Chapter II). It was in this initial context that the previous maps, and especially the aerial slides, began to be incorporated into AUDP activities.

The AUDP had become a focus of much study by individuals designing programs at the national level directed

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[4]The PICRAD was a consortium of five colleges and universities on the Island of Panay. The PICRAD was funded in part by the Ford Foundation and it was through this connection and a grant from the Ford Foundation that the author had an opportunity to work again in the Philippines. The Research Fellowship was explicitly structured so that during the three years with PICRAD, the author's time spent with the Province of Antique grew from about one-third in the first year to full-time during the third year.

to the upland problem in the Philippines. To facilitate discussions of some of the problems of the uplands in the province and to provide a broad provincial level introduction to the uplands, an informal slide and map presentation of the three AUDP sites and the general upland situation was developed. The slide and map presentation was shown numerous times to groups visiting the province during the period from about September 1981 to July 1984.[5] Although the presentations provided some input to those interested in developing programs in the Philippines, the presentations were not directed to personnel within the province and thus did not have much of an impact on planning within the AUDP.

The maps used in the presentations were refined over a period of about two years. At first, the initial maps developed between 1975 to 1979 were used. These maps and the aggregate agricultural land use map were gradually refined at scales of 1:250,000 and 1:100,000 in color to visually present the upland situation in the province. In addition, a LANDSAT satellite image was copied at the

[5]These groups varied greatly from researchers and academic institutions to other local governments, regional and national government line agencies and international development organizations.

same two scales and proved effective in providing a good overall visual image of the province and the uplands.[6]

Some of the maps that had been developed were published in 1982. The road network map, a simplified slope map, a simplified aggregate agricultural density map, and a revised population density map were published in a report and directory of the province which was also used as a program for the provincial fiesta.[7]

A copy of the Land Resources Evaluation of Panay for Agriculture, along with a set of accompanying maps, by the Bureau of Soils in Manila was obtained in late 1981 and proved useful in understanding the previous maps which

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[6]The copying of the satellite image or photograph (image is the more appropriate word for an electronically produced picture) is a story in itself. Briefly, a copy of the image for Antique was found and several attempts were made to copy the image using a hand held camera and close-up lenses. After several attempts to get a copy of the image to even approximate scale in relation to maps in the province, the author calculated a means of using a bellows attachment and tripod to control for scale in the final photographs. This calculation was done to obtain a final photographic image at scales of 1:250,000 and 1:100,000.

The original image was at a scale of 1:250,000 which was usually the largest scale produced by the National Aeronautics and Space Administration (NASA) in the United States. Since the whole satellite image could not be covered in one photograph at these scales, the image was divided into overlapping sections which were photographed separately and then made into a mosaic for a final photographic image. Although not used directly in planning, the mosaics did provide a very good view of the province which was easier to relate to than some of the maps. It also provided a striking visual impact during briefings on the province.

[7]Province of Antique, Binirayan '82.

the author obtained from the survey team (see Section 4 of Chapter III). However, a greater usefulness of the report and the maps came only later as other planning problems in the province became apparent.

The Bureau of Soils also provided another stimulus to develop and use the maps further. In May of 1983, the Bureau of Soils and the regional Ministry of Agriculture office sponsored and conducted a seminar-workshop on "Land Classification, Mapping and Agricultural Land Use Planning" for all of the provinces in the region.[8]

At the seminar-workshop, each province was required to formulate a rough analysis of the agricultural situation and to map the present agricultural land use pattern. In this, the previously developed maps proved very useful and the Land Resources Evaluation maps were also used to integrate some of the previous information. However, the map analyses produced were not used further in any planning process.[9]

Beyond some other minor uses of the maps, not much use of any consequence was made of geographical

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[8] A conference, seminar and workshop held in Bacolod City from May 16-19, 1983.

[9] This was probably due to their hurried construction and specific application to the seminar/workshop. The maps were not very precise and needed revision to be useful but other matters demanded more attention at the time.

information in provincial planning until two nationally sponsored programs were initiated which held some promise of additional development funding for the province. These two programs were the Rainfed Resources Development Project and the Local Resource Management project. Both were participated in by the author as an advisor to the AUDP and both provided some strong influences on how the maps previously developed were used and further developed.

3. Rainfed Resources Development Project

The Rainfed Resources Development Project (RRDP) was jointly designed and funded by the government of the Philippines and the United States Agency for International Development (USAID). The two implementing agencies in the Philippines were the Ministry of Agriculture and the Bureau of Forest Development of the Ministry of Natural Resources (MNR). Proposals were written by the AUDP for funding under each sponsor (see Section 6 of Chapter II). Only the proposal for MNR funding used the maps previously developed.[10]

The MNR proposal had a long history dating back to 1978 when the author and other members of the planning staff conducted a survey of an upland area in the

[10]Province of Antique, "Activity Proposal."

Municipality of Sibalom which was chosen as an area for road expansion.[11] The upland area of Sibalom was striking in its concentration of agricultural activities on bunded and terraced sloping land. It was felt by some of the planners at the time that the area would be a good prospect for expansion of the AUDP. The aerial photographs taken in 1978 strengthened the perception that the area had a high concentration of upland agricultural activity and should be considered as a potential expansion site.[12]

It was not until late 1981 to mid 1982 that the author and others in the AUDP began serious efforts to designate the area for expansion of program activities. These efforts took the form of slide and map presentations to the municipal officials in Sibalom and some internal lobbying to include the site in second round expansion. The efforts also included a slide presentation of the area to visiting teams from USAID who were designing the RRDP.

The area was informally accepted as an AUDP second round expansion site with the understanding that the site would be funded under the RRDP. As a consequence, a team

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[11]The survey was undertaken to establish baseline data for future impact evaluation.

[12]This was another case where an elevated perspective reinforced a ground level perspective, similar to the case in the Municipality of Belison where a hill top perspective aided in the construction of the municipal land use map (see Section 3 of Chapter III).

from the planning staff and the AUDP made a reconnaissance visit in early 1983 and again in mid 1983 to the five barangays initially identified for coverage.

Also as a consequence of the informal acceptance of the area for expansion, the province was able to direct the efforts of an international research team into the area in April of 1983. This group from the International Course on development oriented Research in Agriculture (ICRA) conducted a study of the farming systems in a larger geographical area which included the area finally designated for funding under RRDP.[13]

As a preliminary orientation of the ICRA research group, a set of maps of the area at a scale of 1:50,000 were produced along with a slide presentation. The maps (reduced to 1:100,000 scale) as well as the research results were later incorporated into the proposal submitted to the MNR.

Beyond the use of the maps as background information in the RRDP proposal, the maps were also used directly in identifying the specific area to be covered by the proposed project. The MNR had set as a criterion for acceptance of projects that the projects be situated on

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[13] Louis Bockel, et al., Farming Systems in the Maoit River Catchment Areas, Antique, The Philippines, ICRA Bulletin 13 (Wageningen, The Netherlands: International Course for development oriented Research in Agriculture, December 1983).

areas at an elevation of 300 meters or greater. This was a specific geographical criterion that could only be determined by reference to the topographic maps of the province. Luckily, the general area in Sibalom which had been informally designated as an expansion site also had a substantial area of agricultural activity above 300 meters elevation. It was this area which was finally chosen for expansion under the funding of RRDP.

As was reported in Section 6 of Chapter II, the RRDP funding was not realized by the time that the author left the province in mid-1984. Although the maps and much other analysis were used in the proposal, the circumstances of national level funding decisions did not allow the effort to pay off in expanded project activities.

Eventually, the AUDP began some limited operations in a barangay below 300 meters elevation and outside of the proposed RRDP area. In this decision for expanded AUDP activities, the maps did not play a very important role.

4. Local Resources Management--Development Context and Approach

The Local Resources Management (LRM) project was jointly designed and funded by the government of the Philippines and the USAID. This project had some similarities with the PDAP discussed in Section 2 of Chapter III but included some new and major challenges to develop map-based information of the province further. Also like the PDAP, the LRM provided the major planning influence during the last two years that the author worked in the province. Given the importance of the LRM in the later development of the maps and analysis contained in this study and its importance in provincial planning, a description of the project may help to understand its influence. The description of the LRM also provides an opportunity to explore larger development concerns within the Philippines as they have a bearing on the use of maps and geographical analysis in planning for development.

Since the discussion of the LRM project is detailed and covers a broad range of concerns, the discussion is divided into four sections. This section describes the Philippine development context in which the general LRM approach was designed. Section 5 describes the LRM program content. Section 6 provides a link between the LRM approach, which included an explicit geographical focus, and this study. Section 7 describes the use of previously developed maps in the provincial planning process under the LRM project.

In 1980, the USAID shifted its strategy of development assistance to focus on specific poverty groups. This shift of emphasis was contained in the Philippine Country

Development Strategy Statement FY 82[14] and generally focussed more on a basic human needs approach to development.

Although previous USAID development strategies were focussed on the alleviation of poverty, the new emphasis recognized that, "In its broadest sense, poverty means that certain basic human needs go unmet."[15] The analysis contained in the Country Development Strategy Statement (CDSS) identified underemployment among the rural poor as the key among a variety of factors to understanding the poverty situation in the country. In disaggregating the analysis of rural poverty, the CDSS focused on four main poverty groups in the Philippines: the upland farmer, the paddy rice farmer, the landless agricultural worker, and the small-scale artisanal fisherman.

Survival was identified as the main concern of the poor households. In pursuing survival, the main goal of the household is to produce enough to eat, either by providing a food income in-kind or by earning enough to eat. There are a number of means open to the household for

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[14] U. S., Agency for International Development, (Philippine Mission), Philippines Country Development Strategy Statement FY 82 (Manila, January 1980). Note the difference between the CDSS year and the publication date. The CDSS was a prospective planning document two years advanced in the planning process.

[15] Ibid., p. 1.

coping with the problems inherent in meeting the goal. One means of coping is the traditional village support system which revolves around kinship ties and reciprocal arrangements. The household may also do with less by cutting down on consumption. A more frequent means of coping is to diversify employment activities, mainly by temporary employment either within the community or in other rural areas. If the situation becomes too serious, the household may choose to leave the village and migrate permanently to other areas, especially urban areas, in search of work.[16]

In comparing the rural poor groups, the landless agricultural laborer was identified as the most disadvantaged with income at about half of the poverty threshold.[17] They have essentially no productive assets but themselves. Furthermore,

> The landless' survival is undermined by their low level of skills and education, seasonal employment, declining real wages, the lack of alternative employment opportunities, and the increasing competition for jobs that are available.[18]

The landless laborer was also identified as being the fastest growing group of rural poor through natural

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[16]Ibid., pp. 3-7.

[17]Ibid., p. 7. The poverty threshold was defined as an income in cash and kind which would meet minimum nutritional requirements of a household.

[18]Ibid., p. 8.

increase and the increasing number of households which are displaced from the other groups.[19]

The upland farmers were identified as being at a poverty level almost as low as landless workers with income being 33 percent below the poverty threshold. The land which the upland farmer tills gives only a marginal existence due to past and present degradation and subsequent declines in productivity. In this situation, "Off-farm employment provides a major portion of total income." However, "This adds to the competition for available work and thus pits them against the landless agricultural workers."[20]

Artisanal fishing households have incomes about 25 percent below the poverty threshold. Traditional mechanisms for sharing catch cushion the survival situation of the fishing household, but the catch itself is generally in decline due mainly to overexploitation of the fishing grounds. This group also competes with the landless and upland farmers in search for alternative employment although only about one-third of the households seek work in agriculture and services. Given that the fishing grounds probably cannot continue to support an increasing

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[19]Ibid.

[20]Ibid., pp. 8-10.

fishing household population, this group will probably increase its displacement into alternative jobs.[21]

Paddy rice farmers, both irrigated and rainfed, were the least disadvantaged among the groups with incomes about 20 percent below the poverty threshold. Their pressure on alternative jobs was slight, but the continued fragmentation of land may lead to a situation in the future where "Once the threshold of a minimally viable plot is passed the paddy farmer's livelihood is directly at risk."[22]

The general conclusion of the analysis was that the resource base available to the poor is limited and can no longer sufficiently absorb labor. The first level of finding alternative jobs is in lowland paddy agriculture which can absorb much more labor but which cannot absorb the total. In addition, the increasing competition for work in the agricultural sector tendes to depress wages and increase underemployment. Those ultimately displaced from the agricultural sector migrate to the urban areas and join an increasing number of workers competing in the urban informal sector. Their prospects for joining in the modern formal sector are limited by their lack of skill and education and the limited job opportunities in

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[21]Ibid., p. 10.

[22]Ibid., p. 10-11.

the formal sector. In both the rural and the urban sectors, there are not enough jobs to support the population above the poverty line. "Hence, the society's inability to create enough jobs for its people is a direct cause of poverty."[23]

Past development policies were reviewed and related to the structure of the Philippine economy and the impact of the structure on the rural poor. For the past three decades (from approximately the end of World War II) the development policies of the Philippines have favored capital intensive and import substitution industries. These industries catered to the upper income population and were usually urban based--especially concentrated in the Metro Manila area. The agricultural sector was developed mainly for its ability to provide foreign exchange, through export crops such as sugar and coconut, for financing industrial development.[24]

With policies being focused on urban based industrialization and export oriented agriculture, the rural sector in general and traditional food crop agriculture in

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[23]Ibid., pp. 16-17.

[24]Ibid., pp. 22-23. Similar analyses of the national development situation may be found in United Nations, International Labour Office, Sharing in Development: A Programme of Employment, Equity and Growth for the Philippines (Geneva: International Labour Office, 1974).

particular was not developed at the same rate and lost ground within the overall economy. A highly skewed development pattern resulted in a dualistic economy with a few in the population controlling most of the wealth and/or gaining most of the income while the majority of the population remained in or sank deeper into poverty.

In addition, the particular type of capital intensive industrial development with only weak backward linkages to the rural sector limited the benefits of industrialization accruing to the rural poor. As the CDSS states:

> The structure of the economy with its heavy reliance on primary agriculture product exports to finance relatively capital-intensive industrialization and a rising energy bill, undercuts the poor's efforts to survive. . . . While the poor households are the major producers of these primary products, the returns accrue disproportionately to marketing and banking concerns. More tragic, however, is the fact that profits are not reinvested in the expansion of rural employment and productivity. Instead they go to finance urban-based capital intensive industry in which few jobs are created.[25]

The national five year development plan at the time (CY 1978-82) was also reviewed. The strategy of the plan was growth with equity and contained two main components:

> . . .(1) the mobilization of the rural sector to expand labor-intensive agricultural production and labor intensive small and medium-scale industry to serve rural demand, and (2) expansion of labor-

[25]Ibid., p. 23.

intensive export products to earn needed foreign exchange.[26]

The plan also featured decentralization of large-scale industry, the recognition of the need for substantial public investment for infrastructure and social services in the rural sector itself, and an emphasis on population control and environmental conservation.[27]

The concern for equity and the generation of employment in the rural sector was an outgrowth of a progressive interest on basic human needs in Philippine development planning. However, as the CDSS noted,

> BHN (basic human needs) considerations are taken seriously in development planning and resource allocation, but are not overriding. Rather they are balanced (and even compromised) against purely economic growth, balance of payments, and regime maintenance concerns. Relative to the magnitude of the equity problem, government commitment still needs to be strengthened and translated more effectively into programs and investments with broad distributional impact.[28]

In reviewing the Philippine's capacity to absorb foreign assistance and debt to meet its development needs, the CDSS noted that there were increasing difficulties with the debt service capacity of the economy. In addition, the CDSS identified three institutional constraints to the effective use of assistance resources: 1) numerous,

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[26]Ibid., p. 28.

[27]Ibid., p. 29.

[28]Ibid., p. 34.

often overlapping and competing implementing agencies, 2) uneven administrative capacity both within levels of the government and between levels of the government, and 3) overly centralized decision-making, planning and administrative control. The centralized nature of the government structure and functioning had adverse effects on the effectiveness of development programs by limiting ability to adjust to the diverse geographical conditions in the nation, and by limiting the ". . . involvement of local and regional governments which could significantly expand overall government capacity."[29]

Based on the above analysis, the CDSS identified the major problem to be addressed, a broad strategy for addressing the problem, the target groups of the strategy, objectives to guide the strategy, and program elements of the strategy. The major problem to be addressed was,

> . . . underemployment (low paid, low productive, and less than full employment) as the key problem undercutting the poor's ability to go beyond day-to-day survival and attain a minimum standard of living.[30]

The CDSS then identified the broad strategy which included:

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[29]Ibid., pp. 36-37. Similarities should be noted between this analysis and Section 2 of Chapter III on the PDAP.

[30]Ibid., p. 40.

1) Intensified and diversified food production by small producers so as to provide expanded agricultural employment, while raising rural income and demand for domestically produced goods.

2) Labor intensive rural industry to provide off-farm non-agricultural jobs, while producing for domestic consumption.

3) Labor intensive, geographically dispersed manufacturing for export.

4) Rural infrastructure development in support of elements 1 through 3.

5) Decentralized planning, implementation, resource mobilization and allocation to enable achievement of elements 1 through 4.

6) Structural and policy reform for elements 1 through 3.

7) Population/health/nutrition/education/ as integral parts of elements 1 through 3.

8) Local institutional development to support elements 1 through 5.[31]

The target groups of the strategy were identified as the landless agricultural worker, the upland farmer and the artisanal fisherman. The rainfed paddy farmers were also identified for inclusion not so much due to their poverty situation but more due to their potential for generating agricultural jobs in the near and mid-term. Paddy farmers on irrigated land were specifically excluded due to the past and continued national and international assistance focused on this group.[32]

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[31]Ibid., p. 41.

[32]Ibid., pp. 41-43.

The two objectives identified to guide the strategy were:

1. To promote more productive agricultural employment in rainfed areas (upland as well as lowland); and

2. To create off-farm employment opportunities for those who are not productively employed in agriculture, including women.[33]

Based on the above, five major program areas or elements were identified. These were:

1) rainfed crop intensification and diversification; 2) rural small-scale enterprise development; 3) local institution building; 4) fertility reduction: and 5) improved food distribution and nutrition.[34]

The rationale for the selection of these five program areas were as follows:

1) the recognition that potential for extensive expansion of cultivation was limited and thus intensification or diversification on the rainfed areas would probably be more appropriate for employment generation within agriculture,

2) rural small-scale industries can generate employment and at the same time satisfy domestic consumption demand,

3) local level planning and administration in the

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[33]Ibid., p. 43.

[34]Ibid., pp. 46-47.

allocation and use of resources should be strengthened to strengthen the overall development effort of the nation,

4) population growth, if not contained, can lead to dissipation of development gains by placing too great a burden on existing and growing resources, and

5) the support of the nutritional needs of the population may need short-term direct assistance until internal mechanisms for support can be developed.[35]

5. Local Resources Management--Project Content

In the succeeding year Country Development Strategy Statement FY 1983 Philippines[36] more detail was given to the strategy and program elements previously identified. While retaining the two main objectives focusing on rain-fed agriculture and non-farm employment, the CDSS added one more objective to guide the strategy. As the CDSS stated,

> As we gave more thought to the strategy during the course of the year we realized that these objectives dealt only with the supply side (i.e., jobs) and that we needed to make explicit our equal concern for the demand side (i.e., the size

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[35] Ibid., pp. 47-52.

[36] U. S., Agency for International Development, (Philippine Mission), Country Development Strategy Statement FY 1983 Philippines (Manila, January 1981). (Annex B was also circulated separately.) Note again the difference between the CDSS year and the date of publication.

of the labor force and its productivity). Thus the third objective is:

3. To develop a more productive rural labor force for the future by focusing on the current generation of infants and pre-schoolers.[37]

The CDSS then refined the poverty group oriented employment strategy further by noting that the more conventional strategies directed at employment generation in the modern sector of the economy would probably not be appropriate for the short and mid-term. A more appropriate strategy direction would be direct employment generation within the traditional rural sector by building on the resourcefulness of the population in meeting their own needs within the household and the community. This was more in keeping with the basic human needs approach since, "Such an approach to employment squarely places the welfare of poor households up front."[38]

Four core program elements were identified in support of the strategy: 1) Rainfed Resources Development, 2) Local Resources Management, 3) Rural Enterprise Development, and 4) Fertility and Infant/Child Mortality Reduction. The first program element was directed to the objective of promoting employment in the rainfed areas. This program element was subsequently refined into the Rainfed Resources Development Project mentioned in Section 3 of

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[37] Ibid., p. 5.

[38] Ibid., pp. 26-27.

this chapter. Program element three was directed to the objective of expanding non-farm employment in the rural areas. Program element four was directed to the new objective of developing a productive rural labor force. Local Resources Management spanned all three objectives as an integrative program element at the local level.[39]

Relating the Local Resources Management element to the overall strategy the CDSS stated,

> The strategy implies substantial decentralization of decision making and devolution of authorities to allow responsiveness to local needs. It also seeks to involve beneficiaries more directly in the planning and implementation of development efforts to broaden their impact. Improving local government capacities to generate local and nationally allocated resources and to manage them more effectively is integral to all strategy elements.[40]

The CDSS then goes on to give more detail to the program element.

> The planned approach is to test, promote, and institutionalize a set of processes involving: diagnosis of local poverty conditions; local strategy formulation; identification of local actions supportive of their chosen strategy; revenue generation, resource mobilization, budgeting and financial management; local project implementation and evaluation.[41]

Based on the identification of the program element,

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[39]This was most clearly illustrated in a diagram on page 28 of the CDSS FY 1983.

[40]Ibid., p. 45.

[41]Ibid.

the USAID mission in the Philippines developed a Project Identification Document (PID) which was approved in June of 1981. With this approval, the mission developed a detailed Project Paper (PP) as a basis for implementation.[42]

The Project Paper explicitly recognized the past efforts at strengthening local governments and used the PDAP as a learning experience in identifying some of the specific LRM project concerns. Quoting extensively from the LRM Project Paper:

> The experience with the PDAP program activities and the expanded special projects has demonstrated a number of concerns and development issues which need to be taken into account during the design of local development projects:
>
> Organization - Special authorities or organizational structures created outside of permanent organizations specifically for flexibility and convenience of implementation of a particular project provide only short term solutions to longer term needs of institution building. Development projects should be integrated, to the maximum degree possible, into existing systems from the start.
>
> Decentralization - Provincial capacities have been strengthened and provincial bargaining power enhanced under PDAP. However, there has been still inadequate devolution of authority and responsibility to date. The national government recognizes this in general policy announcements, but the

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[42] U. S., Agency for International Development, Philippine Mission, Local Resources Management, Project Paper 492-0358 (Manila, June 1982). (Annexes printed under separate cover.) The project paper was the culmination of the process started in the CDSS FY 82.

challenge is operationalizing the policy. There clearly is a need to enlarge the scope of actions for which provinces have primary decision making responsibility in order to make the required development impact.

Planning - PDAP invested heavily in blue print planning--advance programming--based on engineering and compliance requirements appropriate specifically to infrastructure. However, there is little experience in dealing with social and environmental problems. The next step is to move to more open, responsive planning and into a broader range of local projects.

Reaching the Poor - PDAP was somewhat untargeted, relying on indirect benefits to the rural population generally. Local development programs need to move toward direct targeting on groups of people or poor areas. . . .

Fiscal Administration - Local financial resource mobilization is weak and increased financial capacity and accountability is the key to decentralization. Real property tax is still the single most important resource but other tax resources and approaches need to be developed and integrated. . . .

Experimental/Innovation/Institutional Learning - PDAP moved too quickly from an early experimentation mode in favor of quick expansion of uniform procedures for project development. This limited the discretion and potential of local governments to expand development efforts to other types of activities. Local development projects currently being designed for implementation will have to resist pressure toward uniform procedures in order to retain responsiveness to locally established priorities.[43]

These concerns were addressed in a number of ways. The concern of organization was addressed by a commitment to work through the existing National Economic and Development Authority (NEDA) structure as the lead national and

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[43]Ibid., Annex C, pp. 1-2.

regional implementing agency and through existing provincial governments at the local level.[44] Decentralization of authority and responsibility was addressed by including funds within the project which could be programmed by the provinces at the local level and tying the programming of national funds through the NEDA regional and national budget approval mechanism based on locally identified priorities.[45] Fiscal administration was addressed through an emphasis on improving the local tax base to generate needed development funds and improving the ability of the local government to effectively budget resources.[46]

The concerns of planning, reaching the poor, and institutional learning were addressed in similar and interconnected ways. Although not very well addressed in the Project Paper, the FY 1983 CDSS provides the underlying rationale for flexibility in both planning and reaching the poor.

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[44]Ibid., pp. 24-26. The municipal level of government was also considered as a local level participant but it was recognized that municipal planning and management capacities were very weak and that the only local level of government having the necessary capacities in the near future was the provincial level. See particularly p. 8.

[45]Ibid., various places throughout the Project Paper and from personal experience.

[46]Ibid., p. 12.

> The project-by-project approach as followed in the past may not be the most appropriate way to transfer assistance resources. . . . In most cases, the specification in advance of precise models or complete implementation details when designating projects will not be possible or desirable from the standpoint of encouraging local participation and allowing for needed adjustments in implementation as experience is gained.[47]

Further,

> It will be necessary to approach institutional capacity building and local project activities through a learning process, refining both the definition of the problem and means of addressing it as experience is gained.[48]

This recognized the difficulties of previous methods of project development in incorporating local level input, and especially beneficiary input, into project design. It also recognized the lack of experience with direct involvement of beneficiaries in the project development, planning and implementation process. Thus an incremental institutional learning process was deemed more appropriate than the traditional blueprint planning process.[49]

The concerns of planning and reaching the rural

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[47] U. S., Agency for International Development, Country Development Strategy Statement FY 1983 Philippines, pp. 56-57.

[48] Ibid., p. 36.

[49] The use of the learning process approach was in large part due to the involvement of David C. Korten. See particularly David C. Korten, "Community Organization and Rural Development: A Learning Process Approach," Public Administration Review 40 (September/October, 1980): 480-511.

poor can best be viewed in relation to the specific program tracks identified for implementation. The three tracks were: 1) provincial strategy and local project development, 2) local financial administration, and 3) beneficiary participation. Local financial administration has been covered adequately above and was considered as less directly related to the main concerns of the LRM project. The other two tracks were seen as being more directly related.[50]

Referring to the LRM, "The ultimate (goal) objective of the program is to promote greater self-reliance, productive employment, and real income among the disadvantaged residents in rural areas."[51] In pursuing this, the Project Paper recognized that,

> Participation--especially in the design and planning stage of the project--will foster a sense of ownership, vested interest, and responsibility in the beneficiaries. People will tend to view a particular project as their own and will feel they have a personal stake in its success or failure. This attitude should ultimately result in successful and sustainable development projects.[52]

Beneficiary participation was viewed as a process

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[50] Based on personal observations, the financial administration track seemed to be the least understood and weakest track in the LRM project. Much more detailed interest and effort was directed to the other two tracks.

[51] U. S., Agency for International Development, <u>Local Resources Management</u>, p. 2.

[52] Ibid., p. 28.

of incorporating beneficiary-identified concerns into the local project development and planning process as well as more direct participation in the implementation process. This was to be accomplished through the organization of the beneficiaries and the use of private organizations, such as cooperatives and other private development oriented organizations, to act as catalysts in building communication channels and, ultimately, collaborative linkages between the beneficiary groups and the local governments. As the CDSS stated, "The main purpose of this component will be to test the feasibility of integrating bottom-up planning approaches with provincial and regional planning and budgeting systems."[53]

This in turn ". . . will require provincial governments to move beyond their current top-down, 'blueprint' approach to a more open, flexible, and adaptive mode of planning and project implementation."[54] The provincial strategy and local project development track was designed to accomplish this. This track was viewed as the central component of the LRM. "It seeks to find a workable balance between bottom-up and top-down planning processes."[55]

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[53]Ibid., p. 13.

[54]Ibid., p. 8.

[55]Ibid., p. 10.

6. Local Resources Management--Regional, Provincial and Geographical Focus

Referring to past planning processes at the local level,

> The concept of a strategy represents an evolution over the current project listing approach. LRM's interest in supporting the formulation of a strategy is to enable provinces to explicitly define broad intervention areas in support of a target group as a framework for project identification and priority resource allocation.[56]

Further,

> LRM will be especially concerned with developing appropriate planning approaches for translating research findings and staff analysis into sensible provincial strategies for assisting selected target groups, given available resources and provincial development priorities.[57]

In specific reference to the use of research in the provincial planning process, the Project Paper states,

> At the provincial level, initial research efforts will be directed at answering such questions as which beneficiary groups in the province represent sizeable populations and have a high incidence of poverty, and where these groups are concentrated geographically within the province. This will involve not only determining where households belonging to the group(s) are concentrated, but also how their distribution relates to physical resources, topography and administrative boundaries.[58]

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[56] Ibid.

[57] Ibid., p. 11.

[58] Ibid., Annex F, p. 11.

The emphasized portions (added by the author) of the above quotes provide the linkage of this study to both the planning effort in the Province of Antique and the development concerns of the nation.

Specific recognition was given to the geographical dimension of planning at the local level under the LRM project. Unlike the emphasis on the geographical distribution of physical resources and production which characterized the previous planning contexts such as PDAP, the LRM emphasized the geographical distribution of the human population, specifically the poor within the population. Furthermore, the focus of planning for development at the local level shifted from an emphasis on infrastructure such as roads in support of production, to the poor population to which such items as roads would be directed as a support to people centered development in meeting basic human needs through employment generation.

Implicit in the focus on the geographical distribution of the poor groups were criteria for planning the allocation of development resources. First was relative poverty among the rural poor groups. Second was the location of the poor groups. Third was the relative geographical concentration of the poor groups.

The CDSS (both FY 82 and FY 83) identified the poor groups which would be the main focus of development efforts and thus the main focus for the allocation of resources. The CDSS FY 82 provided an analysis by region of the characteristics of the poor groups. This regional analysis of the country was based on regional administrative divisions of the country. However, the regional divisions were also gross, but arbitrary, geographical divisions by being constituent parts of a geographical whole--the Philippines.

Within the CDSS analysis, the national poverty situation was spatially disaggregated to thirteen administrative regions. Of the thirteen regions, three were classed as high need based on extent of poverty, five were classed as having medium high need, four were classed as having medium low need, and two (Central Luzon and Metro Manila) were classed as having low need. The Western Visayas region which includes the Province of Antique was classed as a medium high need region.[59]

The CDSS recognized that the USAID development assistance would be limited and that to have an impact the assistance would best be concentrated. In addition to the concentration on specific poverty groups, the CDSS identified regional concentration within the Philippines as being appropriate. The reason for the regional concen-

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[59] U. S., Agency for International Development, Philippine Country Development Strategy Statement FY 82, pp. 21-22 (including table with no page number). See also Annex A.

tration approach to allocating assistance resources was based on the geographically dispersed population (presumably referring to the population on scattered islands), the specific and localized differences within the country, the need for testing approaches before recommending nationwide application, and the mutual reinforcement that could occur between program elements if concentrated geographically.[60]

The specific regions for assistance were not identified until 1981 within the CDSS FY 1983. Based on discussions between the USAID and the National Economic and Development Authority (NEDA), three core regions were identified. Two were from the regions classed as high need in the FY 1982 CDSS, and one region was chosen from the medium high need group. The medium high need region chosen was Western Visayas which includes the Province of Antique.[61] This identification of three regions for initial concentration of development effort thus provided a first level of planned regional/geographic allocation of development resources.

The CDSS FY 1983 also provided an analysis of the

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[60] Ibid., pp. 42-43.

[61] U. S., Agency for International Development, Country Development Strategy Statement FY 1983 Philippines, pp. 1-3.

poverty situation in the Western Visayas region. The goal of the analysis was to bring the national level analysis to a more refined and detailed level within one of the selected regions. As the CDSS stated, "In doing so we are explicitly recognizing the location specific nature of poverty."[62] The analysis proved both instructive and instrumental in further refining the geographical allocation of resources.

In similar fashion to the national analysis, underemployment was again identified as an underlying cause of poverty among all the poor groups.

> In the region, the underemployment encompasses both seasonal unemployment and underutilization of labor during working months. Two-thirds of the region's labor force can be considered underemployed. The underemployed are found mainly in the farm labor force. One-third work only a few weeks per year at the peak periods . . . The remainder work between five to eight months per year depending on occupation. Fishermen and non-farm workers show the longest period of employment (i.e., eight months). However, actual hours worked during periods of employment vary substantially by occupation.[63]

Also in a similar fashion to the national analysis, underemployment was found to follow a familiar pattern.

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[62]Ibid., p. 21. The CDSS also mentioned that analyses of the poverty situation in the other two selected regions was also being made, but that the Western Visayas region was far advanced in analysis and was thus used as an example.

[63]Ibid., Annex B, p. 24.

> Population pressure and an eroding resource base are pushing people into the job market at a faster rate than can be absorbed by agriculture. Meanwhile, local industry has been slow to develop and create new jobs. . . . Thus a labor surplus situation prevails, maintaining wages low and competition high for available work.[64]

In addition to the above analysis which was a reflection of the national situation, the CDSS found that the underlying relationships of a highly skewed income distribution in the region also may act as a factor in perpetuating poverty. The most obvious relationship was found in the sugar producing areas which represented only 5 percent of the farms but 92 percent of the agricultural product in the region. The income from sugar accrued mainly to the relatively few large sugar producing households (i.e., owners of large sugar farms). In the rice producing areas, the skewed income was the result of tenancy relationships with owners having more than ten times the income of tenants. In coastal areas containing the fishing communities, there was also a highly skewed income distribution but this was not explained in the CDSS. One factor which may explain the skewed distribution would be the concentration of urban population also in the coastal areas.

Upland areas containing, predictably, the highest concentration of upland farming households showed the

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[64]Ibid., Annex B, p. 25.

lowest income of the groups analyzed (save for landless laborers) and also the least skewed income distribution. This may be explained by the lower tenancy rate in the uplands. The landless were again identified as having the lowest income of all within the rural population.[65]

Generally, and on the regional level, the determinants of poverty were fairly clear.

> Poverty levels differ from group to group and within household groups depending on climate, topography, farm size, tenure, irrigation, market access, and the average months gainfully employed by household members. Household survival strategies depending on resource availabilities respond to these local conditions and to calculations of food scarcity requirements, risk and ties to community and patrons. In general, the outcomes are fairly predictable. Household income declines as one moves from: a) the wetter climate . . . to the dryer climate . . . ; b) the lowlands to the uplands, reflecting more marginal soil quality and increasing market isolation; c) larger to smaller size farms where tenancy is highest; and d) the irrigated to non-irrigated areas.[66]

While this conclusion includes social determinants of poverty, it also brings into the analysis physical and geographical determinants such as topography (lowlands to uplands), soil (marginal soil quality in the uplands), climate which varies geographically from relatively wet to relatively dry, distance (market access), and the geo-

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[65] Ibid., Annex B, p. 27.

[66] Ibid., Annex B, pp. 17-20.

graphical incidence of supporting infrastructure (irrigated to non-irrigated areas).

The Western Visayas region was not the poorest of the regions selected for development assistance in the CDSS. This relatively greater prosperity was due mainly to the concentration in the region of a major national export crop--sugar. It was also due to the effects of gains in rice production under a national program based on new high yielding varieties and improved irrigated agricultural management practices. Also of significance was the relative concentration of urban population in the region with the Western Visayas having the highest percent of urban population of the regions selected. On all three counts, the factors which accounted for the relative prosperity of the region as a whole were concentrated in only two of the five provinces--Iloilo and Negros Occidental--which make up the region.[67]

Notwithstanding the relative prosperity of the region,

> . . . two-thirds of the region's 675,000 families fall below the regional poverty threshold . . . This attests to the more highly skewed income distribution that characterizes Western Visayas in relation to the other selected regions and to the degree of poverty hidden under the regional aggregate statistics.[68]

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[67]Ibid., Annex B, p. 1.

[68]Ibid., Annex B, p. 2.

In analyzing the region by disaggregating to the provincial level, the CDSS also provided an understanding of the geographical distribution of both poverty and the poor groups within the region.

> If we rank the provinces in terms of the incidence of poorer households found in each, Antique emerges as the poorest with 84 percent of all rural households in the province composed of the poor groups we have identified. Capiz and Aklan follow with 65 percent and 62 percent, respectively, of provincial households made up by these groups. On the other hand, measured against absolute numbers of poor households (in the region) Iloilo ranks poorest with 35 percent of all the households found in our poor groups, followed by Negros Occidental which has 31 percent of the poorer households. Thus provincial targeting is not appropriate. Rather, it is the poor groups keeping in mind provincial concentration that is the relevant focus for assistance.[69]

In relative terms at the provincial level, the CDSS found the following concentration by province: 1) landless sugar workers in Negros Occidental, 2) single crop rainfed rice farmers in Iloilo, 3) double crop rainfed rice farmers in Capiz, and 4) artisanal fishermen in Antique.[70]

Thus the Province of Antique was identified as not only the poorest province in the region,[71] but also as

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[69]Ibid., Annex B, p. 7.

[70]Ibid.

[71]The Province of Antique was identified in several other analyses as one of the poorest provinces in the entire nation. See especially Gelia T. Castillo, Beyond Manila: Philippine Rural Problems in Perspective

having the largest concentration of artisanal fishermen. Both in terms of geographical concentration of poverty and concentration of a specific poverty group, Antique was identified as a likely prospect for development assistance under LRM.

The formal selection of the province for the LRM project was not made until after the approval of the Project Paper and formal signing of agreements between the government of the Philippines and the USAID. However, informally, the province was designated as the pilot regional LRM province even before the Project Paper was completed.[72]

It was no surprise that Antique was chosen as a pilot LRM project since interest in the province's development activities dated back to 1980. Some of those within the Philippine government and the USAID who were responsible for the two CDSS analyses and the LRM project design had visited the province and had paid special attention to the AUDP. The AUDP was even mentioned as a good source of preliminary information for appropriate

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(Ottowa, Ontario: International Development Research Centre, 1979), pp. 11-12.

[72]U. S., Agency for International Development, Local Resources Management, p. 51.

development approaches under the Rainfed Resources Development element identified in the CDSS.[73]

The LRM Project Paper mentioned the province in four contexts as an example of what development might be under LRM. First was the mention of a private cooperative organization which provided lessons in how to involve beneficiary groups in development. The AUDP was also mentioned in regards to involving beneficiaries in government sponsored development efforts. Second, the province was identified as a provincial government both already committed to the LRM approach to development and having a very effective PDAP assisted planning and management staff capable of carrying out LRM type development planning activities. Third, the AUDP was specifically identified and described in the Project Paper as the type of project with an impact on a specific poverty group that the LRM was looking for. Fourth, the province was used as an example of how the provincial strategy process from research to project identification might proceed if focussed on the artisanal fishing communities. In addition, the province was mentioned as already being tentatively identified as the first pilot project for LRM and it was noted that the province had already started on a poverty group

[73] U. S., Agency for International Development, Country Development Strategy Statement FY 1983 Philippines, p. 32.

strategy formulation for the artisanal fishing group in anticipation of project approval.[74]

Thus was the planned allocation of development resources made specific to the provincial level within a regional and national context. The Province of Antique began formal work on poverty group analysis and provincial strategy formulation in mid 1982 as a member of the LRM project. The next section describes how the maps previously developed were initially used within the LRM oriented research and strategy formulation process as it evolved in the province.

7. Local Resources Management--Use of Maps in Provincial Planning

The CDSS documents and the LRM Project Paper ended their analyses and identification of both poverty groups and geographical concentration at the provincial level. Recognition was given to the need to analyze the dynamics of poverty within and among the groups further and to the need to answer the question "Where are they located specifically?"[75] As mentioned in the above section, this

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[74] U. S., Agency for International Development, Local Resources Management, various places throughout the Project Paper.

[75] U. S., Agency for International Development, Country Development Strategy Statement FY 1983 Philippines, Annex B, p. 20.

was to be an integral part of the provincial strategy process which would lead to specific geographical allocation of development resources through projects at the local level. Implicit recognition was also given to the need for each province participating in the LRM to make its own identification of the specific poverty group or groups to which it would direct its development efforts.

Even before the LRM project began implementation, the province had identified two poverty groups to which development efforts would be directed. These were the upland farmers and the artisanal marine fishermen. The choice of the upland farmers was based on the past efforts of the AUDP and the need of additional funding for the program expansion going on at the time (see Section 6 of Chapter II).

The governor of the province at the time[76] owned and operated medium-scale fishing operations in the northern municipalities of Pandan and Libertad. From his association with fishing, he was able to observe the plight of the small-scale subsistence fishermen in the coastal communities. From this, he identified the fishing population of the province as a group to which a program similar to

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[76]Governor Enrique A. Zaldivar who took office after the originator of the AUDP, Governor Evelio B. Javier.

the AUDP should be directed. The program was initially named the Antique Marine Development Program and was seen as a sister program of the AUDP, but directed to the sea as opposed to the uplands.

The LRM provided the opportunity to plan for further funding of the AUDP while at the same time designing the new marine fishing program. In planning under the LRM, the previously developed maps of the province found a use which was more directed than in any other planning situation before.

The first use of the maps in the provincial strategy and local project development process was directed not to the uplands but to the new marine fishing program. Being a newly conceived program, the province and the LRM management at the regional and national NEDA, with the concurrence of USAID, felt that an initial LRM type of research should be integrated into the program design.[77]

Beginning in September of 1982, the author and members of the provincial planning office with the assistance of two research consultants from the Panay Island

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[77]The research was funded from three sources: 1) the Province of Antique with 15,000 pesos, 2) the NEDA/USAID with 15,000 pesos, and the PICRAD with 10,000 pesos. The original budget was only 35,000 pesos, but official cost overruns of about 4000 pesos were covered by the province. Unofficial cost overruns of approximately 3000 pesos (conservative estimate) were covered by the author.

Consortium for Research and Development began the process of a province-wide survey design. The survey was designed to focus on measuring the extent of poverty within coastal marine fishing households. The survey was also designed to gain an understanding of some underlying determinants of poverty such as education, resource control, production, and alternative employment strategies.

In addition to focusing on the poverty group and its characteristics as a means of gaining a locally specific understanding of the poverty situation, the survey was also designed to give geographical specificity to the results through a stratification by municipality. The LRM Project Paper provided some indication that the municipal level would be an appropriate level of disaggregation within the province but did not set this level as a standard.[78] The NEDA personnel responsible for implementing the LRM both at the national and regional levels indicated that a geographical disaggregation to the barangay or even household level would be more desirable.

A household level specificity would have required a complete enumeration of the fishing households in the province. This would have been both very expensive and time consuming and would have required a very detailed

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[78] U. S., Agency for International Development, Local Resources Management, Annex F, p. 19.

level of mapping household locations. The barangay level would have required a large number of sample households to retain a desired level of statistical significance in each barangay and this would again have been very expensive.

The choice of geographical specificity was ultimately based on the limits of both time and research funding. It was decided that the municipal level would provide sufficient geographical detail to the provincial analysis and would require a number of sample households which could be surveyed within the financial and time constraints of the research project. The stratification was simply accomplished by dividing the provincial coastline into strata by municipal boundaries on a map of the province.

The barangay location map of the province was used further to identify the specific barangays to be covered by the survey. An identification of coastal marine barangays was made using an arbitrary criteria. The location on the map of a barangay centro less than or equal to one kilometer from the shoreline was chosen to define coastal marine barangays. The definition proved to be fairly accurate since barangays located near to the coast were concentrated within one kilometer of the shoreline, and in visits to the barangays as part of the survey process, some of the barangays identified which were at the limit of the one kilometer distance were found to contain no marine fishermen. A total of 184 barangays were ultimately identified as coastal marine fishing barangays.

Each barangay identified was visited by a provincial staff member and a list of all fishing households in the barangay was made. The aggregation of these lists for each municipality formed the sampling frame for each stratum in the survey. From these frames, independent sample sizes were calculated by municipality/stratum and the sample households were identified by systematic sampling with a random start. The total number of fishing households identified in the fifteen municipalities having a coastline was 8960 of which 1800 were selected as sample households or a little more than 100 households per municipality covered.[79]

The interview process was accomplished in late November and early December of 1982. Due to the detail of the interview schedule and the number of sample households, the province chose to analyze the survey results by computer. The analysis proved to be more difficult than expected and the research project fell behind schedule.

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[79]Province of Antique, "Report on the Survey of Coastal Marine Fishing Households in the Municipalities of Antique Province," (San Jose, Antique, Philippines: March 1984). This was a write-up of the results used in the LRM strategy formulation process.

The provincial strategy and project identification process was at the same time falling under a time constraint to meet regional and national budget process deadlines. This constraint was at least in part due to the decision to advance implementation of the LRM process in order to start provincial level project activities in 1984. A special accommodation for this purpose was sought at the national level but budgeting requirements could not be adjusted in time. Thus the provinces under the LRM had to identify projects for funding and introduce them within the regular budgeting process which started in 1983.

In order to provide some input into the strategy and project identification process, a municipally weighted subsample of 100 households from the larger sample was selected for a provincial level analysis. This limited analysis of the survey did not allow for geographical specification of the results to the municipal level. However, the sampling frame constructed by municipality did allow some analysis of geographical concentration of fishing households by dividing the number of households by length of municipal coastline.

Thus the map of the province was used in the research for the provincial strategy and project identification process. The process itself was so rushed that much of the potential geographically specific analysis was lost. Unfortunately, the subsequent attempt to analyze the whole sample was further delayed by difficulties encountered in computer analysis. The whole research was not completed at the time the author left the province in July of 1984, but the results of one municipality were completed.[80]

The upland poverty situation was also analyzed for the provincial strategy and project identification process but only previously conducted surveys, other secondary data and general familiarity with the uplands were used. Instead of an attempt at detailed and quantitative geographical analysis of the upland population, a qualitative description of the uplands was relied on to provide some indication of relative concentration of upland farmers in the province.

The author took on the responsibility of writing the qualitative analysis of the upland poverty situation.[81]

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[80]The author, as principle research coordinator, must take the major portion of responsibility for the delays and the ultimate non-completion of the analysis. The research as designed proved to be too ambitious given the capacities within the province, and the use of computers for analysis proved to be much more complicated than originally expected.

[81]The circumstance of the author taking on responsibility for this task is also instructive. The person who was initially engaged in the task complained that he could not integrate his considerable knowledge of the uplands into a geographical perspective. Basically, he was familiar with many areas in the uplands but could not view them all in relation to the whole province. The

In writing the analysis, familiarity with the previously developed maps was of great help but the maps themselves were not used directly in the process. The analysis fairly accurately identified the general distribution of upland activity in the province. However, as reported in Section 6 of Chapter II, the province was already committed to certain municipalities and sites. In addition, the AUDP had already formulated its strategy of development through eight years of field experience. Thus the analysis of the upland situation only formed a background for the presentation of decisions made beforehand and was not used directly in the process of either strategy formulation or project identification.

Within the LRM process as designed for provincial implementation, there was a provision for the identification of research projects to be used in refinement of the provincial strategy. The province chose to take advantage of this opportunity by proposing a research project entitled "A Planning Framework Survey of the Province of

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author used his familiarity with the maps of the province to provide the geographical integration of the analysis. Due to the rushed nature of the process and the other responsibilities that the author had in the process at the time, the analysis was written in only a few hours in one sitting. Without the previous work with the maps and the familiarity of the province gained, the analysis could not have been written in such a short time and may not have included a geographical perspective at all.

Antique with Focus on Geographical Poverty Analysis and Agricultural Activities."[82] The author was responsible for writing the proposal.

The design was rather hurriedly done due to the rushed nature of the whole LRM process in the province at the time. Nonetheless, a basic structure for a geographically disaggregate research into the rural sector of the province was outlined. The proposal focussed more on the uplands than on the lowlands since the upland farmers were the identified poverty group for the provincial strategy.

The rough research design was basically a geographically stratified sample survey focusing on many of the variables identified in the survey of fishermen. The geographical stratification was of much greater detail however. In addition to a municipal level stratification, a cross stratification by characteristic land types was also proposed.

In identifying the characteristic land types, the slope map previously constructed, the topographic maps obtained from the Bureau of Coast and Geodetic Survey, and a land systems map of the province contained as part of the previously mentioned Land Resources Evaluation of Panay for Agriculture were used. The land systems map was

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[82] Submitted by the Province of Antique to the National Economic and Development Authority/LRM Project, as a part of the Provincial Strategy Statement, 1983.

particularly helpful in identifying more general land types for the proposal. Basically, a land systems map shows the distribution of geographical areas which have similar associations of land characteristics such as slope, hill or mountain formations, river and stream patterns, rainfall and underlying geology.[83]

In order to keep the sample size relatively small and thus within the capacity of the province to administer, the base geographical division of the province was by groups of two or three municipalities and very generalized land types. The basic land type division for the uplands at this level was above and below 18 percent slope. The sample size was calculated at this level by using the location of barangays, from the barangay location map, associated with the land types and groups of municipalities, and the 1980 population associated with each barangay. A total of about 5000 households out of a population of about 64,000 households was calculated as a necessary sample size for the given level of statistical significance at this level of geographical specification. The total sample by geographical cross division was allocated downward to greater geographical specificity at the

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[83]This is covered in greater detail in the next chapter with discussions about methodology of the map analysis used in this study.

municipal and more specific land type level, but with an uneven loss of statistical significance.

The total estimated cost of the survey was about 284,000 pesos (about 15,800 dollars at the time). Both the estimated cost figure and the difficulties experienced by the province in conducting the fishing household survey probably led to the non-funding of the project.[84] Nonetheless, the previously developed maps were used directly in the research proposal in a manner which recognized the need for geographical specificity for provincial planning. More particularly, the geographical specificity was related to population.

The rush to get the LRM project implemented not only had an effect on the strategy formulation and project identification process in the province, it also had the effect of throwing the whole LRM process off of its designed path. Ideally, the planning process in the province would have been tied to consultations with the intended beneficiaries. While this occurred to a certain degree both within the fishing household survey and in some other isolated incidences, the inclusion of the beneficiaries in the process was only incidental to getting a

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[84] This is the author's opinion. There was also some confusion or lack of clarity in the definition of the research component under the LRM at the time,

strategy statement and a listing of projects completed to meet external deadlines.

The rush to meet the deadlines also forced the project out of its normal learning process mode and into a production mode. Although there were some lessons learned, they were conditioned by the unusual circumstances and pressures.

Even with all the difficulties encountered, the province did produce an initial provincial strategy statement and identified projects to be directed toward the poverty groups. This was an accomplishment in itself given the lack of a finished product under the PDAP planning processes (see Section 2 of Chapter III).

As mentioned in Section 6 of Chapter II, the AUDP was depending on the LRM project, along with the RRDP, to supply some badly needed funding for program operations. In identifying the fishing households as a poverty group in the province, the AUDP was forced to share the development resources available with another program. This was expected. However, what was not expected was the difference in resource allocation with the new fishing household program getting more of the programmed resources than the AUDP.

The reasons for this were not clear to the author at the time but some indication of why this occurred may be found in the CDSS on which the LRM project was based.

As indicated in the previous section, the CDSS FY 1983 identified the Province of Antique as having a greater concentration of artisanal fishermen than the other provinces in the region. The USAID and NEDA personnel involved in the initial implementation of LRM seemed to stress this to the province on several occasions and to encourage the efforts of the province in identifying projects for this group.

Within the province, the new program, just by being new, seemed to get more attention than the old, established AUDP. The encouragement by the USAID and the NEDA reinforced this.

In addition, the LRM was designed to test pilot approaches, and this was a criterion used in judging the province's performance. These pilot approaches, in specific area and project form, were initially to be confined to one poverty group and at a limited scale. This was supposed to encourage a learning process before expansion of development efforts. The province, in identifying two poverty groups, seemed to be taking on too much of a development burden. Some in USAID and NEDA advocated that the province focus only on the artisanal fishermen and phase the upland group in at a later date. It took a considerable amount of discussion with USAID and the NEDA to convince the project designers and implementors that the AUDP was well into the learning process and should not be considered as a burden on the capacity of the provincial government to implement development programs.

The rapid developments in the LRM project, the continuing difficulties with the fishing survey, and the mounting problems with the AUDP began to absorb more and more of the time of the planning staff, the AUDP staff and the author. In addition to internal day-to-day distractions, the political upheavals in association with the killing of the national opposition leader Benigno Aquino in August 1983 and a locally hard fought election in May of 1984 disrupted normal government functions at the local level. In the day-to-day stresses and strains that were occurring, the further development and use of the maps was set aside. It was only after leaving the province in July of 1984 that the author was able to reflect on his planning experience, both within the AUDP and within the provincial government as a whole, and begin to put together a more complete basis for using the maps in planning.

8. Post-Provincial Reflection and Synthesis

Soon after returning to the United States in 1984, the author re-enrolled in the agricultural economics degree program he left in 1981. The old thesis had become cold and a new thesis topic was sought. After some deliberation, a topic was chosen which was totally unrelated to this present study. While undertaking the preliminary research for the new topic, the author also began to put together a synthesis of the mapped information on the uplands of the province. This resulted in a preliminary draft of a paper entitled "Upland Geographical Patterns in the Province of Antique: A Provincial Level Map Based Analysis with Program Planning Implications."[85] In the process of writing the paper, the new thesis topic was pushed aside and the result was this study.

The draft paper, from which most of the map based analysis in the following chapters was adapted, focussed mainly on the patterns of the physical landscape. The paper was somewhat isolated from the planning experience from which the maps used in the analysis were forged. It lacked a sense of overall purpose as to why the analysis was done in the first place and how it could be useful in provincial planning.

In a very real sense, the author had participated in a learning process at the local level in the Province of Antique. The experience in the province became a resource for understanding more fully the place of the maps in development and how they could be used.

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[85]The paper, in draft form only, was sent to selected individuals in the province and the Philippines and thus had some limited circulation.

For the lessons which were learned by experience to be useful to others, they have to be shared. To do this in a form such as this paper, they have to be documented. This chapter and the previous two chapters have provided such a documentation. It was in the process of documentation that the lessons were made clear and became more than vague memories. Given the very diverse experiences which were contained in the process documentation, it would be appropriate to provide a synthesis as a prelude to exploring the geographical patterns of the uplands in the province.

The particular form and underlying reason for this study may be viewed as a result of three historical paths which converged at a time providing an opportunity to exploit all three. These three historical paths were the development of the Antique Upland Development Program, a change in the model used to guide development decisions, and a change in the model used to structure planning at the local level in the Philippines. The two changes in models used in development and planning were related and were reflected in both the development of the AUDP and in the application to the Local Resources Management project which encompassed the AUDP at a later date.

Since the 1950's when development of third world countries became an important aspect of international and national development concerns, many models of development have been designed and tried. Those designed and tried in the 1950's and 1960's were found wanting in certain important respects.

Most of the models were focused on economic development of the nation and emphasized the modern formal sector, particularly industry. The main measure of development was gross national product or GNP. Many countries showed good progress using this measure and established a considerable industrial infrastructure.

However, as development efforts and accomplishments progressed, many began to note a widening of the gap between both different sectors in the population and different regions within national boundaries. In short, the main goal of development which was the improvement of the life of the population was not occurring evenly. Some were reaping the benefits of development while others, usually the majority of the population, were not or were only reaping a small amount of benefit. In addition, the pattern of development was not even within the geographical confines of nations.

A change began to occur in the models of development in the early 1970's. This change was based on a dissatisfaction with the results of previous, mainly industrial oriented models. This dissatisfaction led to a new model of development focusing on meeting the basic human needs of the population. The lead in this change was the United Nations, and particularly the International Labour Organization.[86]

The change began to become apparent in the mid-70's and gained wide acceptance, in various forms, in the 1980's. It was this shift in the model of development which formed the basis for the shift in USAID development strategy. Of particular importance was a shift away from focusing on physical and industrial resources to a focus on the population. In the particular strategy designed by USAID, the population was further divided into typical groups and those having the greatest incidence of poverty were targeted for development efforts.

Both the population and the relative incidence of poverty were not evenly spread within the Philippines. In addition to focusing on poverty groups, the USAID chose to focus on specific regions within the country which evidenced a higher incidence of poverty than others.

In making choices concerning the specific groups and regions to be covered, the USAID based their analysis

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[86]The literature on the change in development model and the basic human needs approach to development may be found in many recent publications after about 1975. Two available to the author were D. P. Ghai, et al., The Basic-Needs Approach to Development (International Labour Office: Geneva, Switzerland, 1977); and Michael Hopkins and Rolph Van Der Hoeven, Basic Needs in Development Planning (Gower Publishing Company: Hampshire, England, 1983).

on the characteristics of the population. This was a reflection, in the methodology used for analysis, of the change which had occurred in the model of development.

Thus, resource allocation criteria shifted from an emphasis on physical and industrial concerns to population concerns. Resources were allocated based on specific groups in the population and on their relative distribution within the country. This resulted in both a socially based and geographically based allocation of development resources.

Included within the development strategy of USAID in the Philippines was an emphasis on the use of local governments to both make development processes more specific to the various situations within the country and to bring the development processes closer to the people. Based on past efforts at decentralization of planning and administration, the level of government chosen was the province.

Planning within the province also underwent a change which paralleled the change in the development model. Prior to about 1968, planning at the local level in the Philippines was almost non-existent. In 1968, the USAID and the government of the Philippines set out to improve the planning and administrative capabilities of local governments so that they could manage the decentralization of responsibility for development and become a partner in the national development effort.

The innovative vehicle for this transformation of the provincial level of government was the Provincial Development Assistance Project. Although the PDAP had a positive impact on provincial planning and administration capabilities, the specific approach used had its limitations. First, the approach to planning was centrally defined and very structured. This did not leave much room for the provinces to adapt the prescribed planning methods to their own situations. Second, the focus of planning was on infrastructure and sectoral concerns which proved very difficult to plan for with the methods prescribed. The focus of planning was further limited to indirect measures in providing the benefits of development to the population. In the end, the planning exercises started in the province did not proceed to completion.

Other planning operations also occurred in the province, but these too proved to be mainly focused on the physical aspects of development. In addition, all of the planning exercises, including those under the PDAP, were mainly geared to producing a blueprint document of development.

The planning model changed with the Local Resources Management project. Instead of a blueprint approach to planning, the LRM recognized that planning was a process closely related to a specific type of development model.

Unlike the PDAP approach to planning which was very structured and closed, the LRM approach was flexible in order to be open to a learning process involving not only the planners but the intended beneficiaries of development. In focusing development on specific groups and their basic human needs, the LRM defined the beneficiaries which would be included in the planning process.

Planning in the province thus changed from a focus on physical infrastructure and sectors to a focus on specific poverty groups. The two groups identified in the province were artisanal fishermen and upland farmers.

Upland farmers had been targeted long before the LRM project. From a small beginning in 1975, the province incrementally designed a program for the development of the upland farming population in the province. The planning of the Antique Upland Development Program was very much a learning process over time involving not only planners but also the upland farmers themselves.

The historical development of the program showed an incremental and flexible approach to planning and program design. Early efforts were limited to a small pilot area within the province, but as the content of the program became more defined and integrated into a working program structure, the AUDP decided to expand its operations into other upland areas within the province.

First round expansion into two additional municipalities posed some difficulties to the operations of the program but were overcome by internal adjustments. A more ambitious second round of expansion into six more municipalities was undertaken in a situation which was characterized by internal problems, most notably limited funding. The limits to funding caused some big problems in the operations of the program as resources became spread too thinly. In addition, some severe external disruptions worsened the situation.

It was this context of second round expansion difficulties in which the problem of this study was initially identified. It seemed at the time that resources were being allocated within the province to areas which had relatively less upland agricultural activities in relation to other areas in the province.

At about the same time, the AUDP was incorporated into the larger LRM process. With the AUDP strategy being already formulated and focused on a particular poverty group, the program did not benefit much from the planning process under LRM. The main goal for inclusion was additional funding.

A component of the LRM planning process was the geographical specification of development efforts at the local level. This was a natural continuation of the geographical allocation of resources to specific regions and to specific provinces within those regions. The planning process at the provincial level was to identify specific locations in which local project activities would occur.

The criteria for allocating resources at the local level were similar to those used in allocating to the regional and provincial level. First, allocation to specific poverty groups. Second, the general location of the poor groups. Third the allocation of resources based on relative, geographically specific concentration of the poor groups.

Within the LRM planning process, an initial attempt was made to analyze the geographical patterns in the uplands to give some indication about the relative concentration of the upland population. Due to time constraints imposed on the process and the limited development of geographical information in the province, only a qualitative analysis was undertaken. Even this did not have an impact on decisions for allocation of resources since most of the decisions had been made previous to the LRM planning process, and the lack of funds within the AUDP at the time forced allocation to meet previously unfulfilled program needs.

Throughout the ten years from 1975 to 1984, the author had been developing and collecting a set of maps of the province within the context of provincial planning operations. Work on the maps began as a consequence of previous education in planning and a perception that the map-based information on the province was weak. The development of the maps was conditioned by stimuli encountered in the actual planning operations of the province but found only limited use due to the nature of specific planning exercises and the continuing weaknesses in the map-based information.

One of the main weaknesses in the maps was that they were not synthesized into a useable whole appropriate to a specific planning problem. As was mentioned at the beginning of this section, after leaving the province in 1984, the author undertook a synthesis of the maps focussing on the uplands. However, the synthesis was limited by a lack of overall purpose and development direction.

It was only on reflections of past experience that the value of the maps for planning in the province became apparent. This was provided by the specific experiences in and development rationale of the Local Resources Management approach to development.

Specific geographical focus and criteria were provided in the LRM project for the allocation of development resources. The basis for allocation was directly related to the poverty groups within the provincial population. The LRM process, through inclusion of the AUDP, also provided a specific group of the provincial population on which to focus--the upland farmers.

Thus the maps of the province developed over many years gained a defined context for use in development. It is now appropriate to turn to the specific analysis of the geographical patterns of the uplands and the implications of the analysis for the allocation of AUDP program resources.

CHAPTER V

METHODOLOGY OF MAP-BASED ANALYSIS

The maps used in the analysis of the geographical patterns in the uplands of the province were developed or collected over a number of years in an incremental manner. Most of the methods of map analysis were created within the context of provincial planning in response to stimuli within the planning operations of the province, or to take advantage of opportunities which would increase the data base of the province in map form.

One limitation of the methods used in this type of situation was the lack of guidance from the literature on geography and cartography which could have been used to organize efforts a little more efficiently. The greatest strength of the methods used was that they were created in direct response to a real planning situation and to the limitations found within that situation. Thus, by their close association with actual situations in the province they became methods appropriate to planning in a local government situation, but may have been limited by a lack of knowledge about alternative methods.

During the phase of analysis which was termed "post-provincial reflections" in this study (see Section 8 of the previous chapter), the literature on geography and cartography was searched in order first to try to find if the methods used could also find a basis of support in the methods developed and used by others, and second to try to find avenues for improving the maps further. There proved to be a very wide range of methods used in both geography and cartography which could be applied in a rural planning situation.

However, much of the modern literature in the two fields was focussed more on sophisticated statistical techniques which usually require the use of computers. This may be appropriate in the more developed countries or at the national level within a country such as the Philippines, but they would not be appropriate to a local government situation such as in the Province of Antique. Besides the cost of a computer-based mapping system which would often be outside the financial capacity of a local government, the data available or reasonably within the capabilities of local governments to collect were not at a level of complexity requiring computerized manipulation.[1]

The methods used in this study were of necessity simple. These methods are described in this chapter.

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[1]This does not rule out the potential usefulness of computers in geographical analysis at the local government level in the Philippines. With more wide-spread availability of large capacity microcomputers, cost becomes less of a limiting factor, but the difficulties inherent in the use of available data may still provide the greatest limits.

Fortunately, the literature in geography and cartography also include descriptions of simple methods of map analysis. This literature is cited in this study not as a basis for the choice of methods, but in support of the methods developed and used in the province and to provide alternatives which might also be appropriate in the local government situation.

Both primary and secondary data were used in this study. For the most part, the methods used in the gathering of secondary data are not covered in this chapter but comments on the reliability of the data are included where possible. The methods of primary data collection are covered in detail and an assessment of the data is also included.

Methods of organizing and analyzing the data further are the central concern of this chapter. The maps provide the vehicle for organizing the data and the relation of different mapped information constitutes the analysis.

One weakness of the analysis prior to the formal definition of this study was the analysis of population. Thus greater emphasis has been placed in this study on relating existing population data to the maps previously developed. This is in response to the importance of population in the development model described in the previous chapter and forms the main basis for drawing implications for the planning of resource allocation.

Since the analysis contained in the succeeding chapter on the upland geographical patterns in the province is based on specific maps, the discussion of methodology contained in this chapter is mainly organized in reference to these specific maps. The discussion of methodology is focussed on why the particular maps were chosen for the analysis and how they were developed. Some methods are common to all or most of the maps used in this study and these methods are discussed in general.

This study was not conducted in response to prescriptions within an academic discipline. The basis for this study was an actual planning situation. However, given that the analysis of the province focuses on geographical patterns, it may be helpful to relate the analysis to the general discipline and subdisciplines of geography in order to gain a perspective on the academic basis of the methods used. This is covered in a separate section of this chapter only to present a further context of this study in addition to the real planning and program contexts described in the preceding three chapters.

This chapter is divided into five sections. The first section discusses the context of geography as an academic discipline and how this study relates to the academic discipline. The second section discusses the methods common to all or most of the maps. Section 3 discusses the methods used to construct and analyze the maps depicting the physical landscape. Sections 4 and 5 discuss methods particular to maps of agricultural activity and population respectively.

1. Relation of this Study to Geography

As with most fields of study, those practicing geography have been concerned with defining what the discipline is. A very general definition of geography is the study of aerial differentiation. By this is meant a study of the differences between places on the earth's surface. In a landmark study on the nature of geography, Hartshorn notes some misunderstanding in the use of the phrase "aerial differentiation" and offers an alternative definition of geography, ". . . simply that geography is concerned to provide accurate, orderly, and rational description and interpretation of the variable character of the earth's surface."[2]

This study is concerned with the variable character of the earth's surface in a particular part of that surface--the Province of Antique. Thus it may be seen as

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[2]Richard Hartshorn, Perspectives on the Nature of Geography (n.p.: The Association of American Geographers, 1959), p. 21. Unless otherwise noted, the following discussion of divisions of geography were based on this work.

being a part of geography. However, this study finds its limits by being concerned mainly with description of the variable character of the earth's surface. Much activity in geography is concerned with building a scientific structure of theories based on the interpretation of phenomena. This study is concerned with answering a specific planning question--where to locate rural development program resources--which is not related to building on a body of theory in geography.

Beyond the simple definition of geography, the discipline is divided in many different ways to help identify the focus of individual geographers and groups of geographers concerned with similar phenomena or conceptual orientations. Many of the divisions prove to be vague in actuality and at times tend to obscure the integrated nature of the discipline. However, the divisions can be used to further define the relation of this study to the various concerns of geography.

One very broad division is into physical and human geography. Physical geography is concerned more with the variation of physical phenomena over the earth's surface while human geography is concerned more with the variation of human activity over the earth's surface. The two are often related in that human activity has in many cases changed the face of the physical earth, and the physical earth is the surface on which humans carry out their activities. This study, by being focussed on population, is more related to human geography than physical geography, but describes the physical setting as both a context of population variation and as a practical means of dividing the earth's surface to analyze the variation itself.

Another broad division of the discipline is into regional, and systematic or topical geography. Regional geography focuses on a single region of the earth's surface and is concerned with describing, and at times interpreting, the multitude of phenomena which vary over that particular region. Systematic or topical geography is concerned more with one or a few phenomena and how they are related generally over geographical space without specific regard to any one region of the earth's surface. Again, the distinction is somewhat blurred in that some regional geographers try to produce general interpretations of phenomena from the study of specific regions, and systematic or topical geographers often have to focus on a specific region or specific regions in order to make their general interpretations.

This study is more oriented to regional geography in having a specific region defined for study. The term region is used here not in relation to administrative regions such as those defined by NEDA in the Philippines.

The term refers to any major division of the earth's surface based on defined criteria.

In this study, the first level of region is the province based on an administrative criterion of being the area of planning responsibility of the provincial government. This broader region is divided into upland and lowland based on criteria of slope, a physical criterion, and the presence of upland farmers, a human criterion. The uplands of the province are thus the ultimate regional focus of this study. However, in focusing on population as the main concern of the analysis, this study has some characteristics of a topical geography.

In choosing the specific phenomena to be studied, the main criterion of choice was availability of information. A complete geography of the province could not be undertaken due to the limited information available and the specific nature of the study problem. In this regard, this study may be characterized as a "compage" as the term is defined in <u>Regional Geography</u> by Minshull.

The term "compage" refers to a literary integration of analysis on a limited number of phenomena based on the purpose of the study and, generally, the availability of information. As defined by Minshull, the compage is a more flexible form of regional geography, more appropriate to the kind of situation in which this study was developed. The concept itself has not found much circulation in the field of regional geography and, as Minshull notes, the literary form of analysis is usually confined to academic undertakings.[3]

The information available for this study may be related to two specific fields or subdisciplines of geography of importance to development planning. The first is geomorphology or land evaluation and the second is population geography.

Geomorphology or land evaluation is concerned mainly with the physical aspect of the land and how it may be evaluated in relation to the goals of human activities, usually economic activities. The land systems map mentioned in the previous chapters is an example of the type of product that this field of geography produces. Generally, as applied in development planning, the studies coming from this subdiscipline focus on physical land resource inventories and the evaluation of land for economic activities. As such, the focus within development is on production and economics and not on the people inhabiting the land. Although this study uses a land systems map of the province as a basis for analyzing population distribution,

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[3]Roger Minshull, Regional Geography: Theory and Practice (Chicago: Aldine Publishing Company, 1967).

this study is not a land evaluation study of the province.[4]

Of more direct relation is the field of population geography. Population geography is concerned with many of the same phenomena studied by demographers but with a distinct focus on comparing the same variables between different geographical areas. Some of the phenomena studied are population distribution, population density, mortality, fertility, and migration. This study focuses on population distribution and density as a basis for the allocation of resources and thus may be seen as a limited form of population geography.[5]

There are other fields or subdisciplines of geography, and even economics, which are concerned with development and the geographical allocation of resources. The field of regional economics has been used extensively, usually at a level higher than the local government, in providing a framework for the allocation of development

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[4] A very good discussion of geomorphology is H. Th. Verstappen, Applied Geomorphology: Geomorphological Surveys for Environmental Development (New York: Elsevier, 1983).

[5] Two good works in population geography are John I. Clarke, ed., Geography and Population: Approaches and Applications (New York: Pergamon Press, 1984); and R. C. Chandna and M. S. Sidhu, Introduction to Population Geography (New Delhi, India: Kalyani Publishers, 1980). The work by Chandna and Sidhu is particularly interesting in being based on experiences in India and Malaysia.

resources. Studies within this field often utilize sophisticated mathematical models or procedures to help decision makers allocate resources to specific regions of a country based mainly on the criteria of economic efficiency. Besides requiring a level of data sophistication not found in the province, and thus being inappropriate on practical grounds, the focus of these types of studies does not directly address the concern of this study which is the poor population.

There is a body of literature in geography which is concerned with human settlement systems or systems of urban hierarchies which has recently found application in development planning. This type of literature is not clearly related to any defined subdiscipline in geography and many who work on the problems of urban settlement systems are not geographers but planners and economists.

The concept of urban hierarchy dates back to the classic theoretical studies by August Losch and Walter Christaller. The ideas of these two were developed over the years and found use in a landmark study by E. A. J. Johnson entitled The Organization of Space in Developing Countries.[6] The analysis of urban hierarchies or systems of human settlements has found use in the analysis of

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[6]E. A. J. Johnson, The Organization of Space in Developing Countries (Cambridge: Harvard University Press, 1976).

regional and rural development in the Philippines through the works of Dennis Rondinelli, a planner, and others.[7] One work by Rondinelli and Ruddle, Urbanization and Rural Development: A Spatial Policy for Equitable Growth, is particularly interesting in integrating the study of urban systems with the problem of meeting basic human needs.

Although a case could be made for studying the uplands in the province in the light of connections with urban centers, the limitations of time, lack of information on urban places in the province, lack of urban places within the uplands, and the specific problem addressed put such an analysis outside the scope of this study. Nonetheless, some general comments are included in this study concerning the relation of the upland population to the urban centers of the province in the analysis of population distribution.

There is a very small body of recent literature on the implications of the basic human needs strategy of

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[7]Most notably Dennis A. Rondinelli, Spatial Analysis for Regional Development: A Case Study in the Bicol River Basin of the Philippines, Resource Systems Theory and Methodology Series, No. 2 (Tokyo: The United Nations University, 1980); Dennis A Rondinelli and Kenneth Ruddle, Urbanization and Rural Development: A Spatial Policy for Equitable Growth (New York: Praeger Publishers, 1978); and Center for Policy and Development Studies, Urban Functions in Rural Development: A Research Project in Spatial Analysis and Planning (College, Laguna, Philippines: University of the Philippines at Los Banos, May 1978).

development to the development process as it manifests itself in geographical space. Most notable is the work of Akin L. Mabogunje, a geographer.[8] Mabogunje's work is of particular interest in relating the concerns of decentralization and beneficiary participation to the need for geographical specificity in development efforts. The previous three background chapters fall within this type of analysis and are thus related to a relatively new focus within geography. The next two chapters on upland geographical patterns and planning implications is a specific application within this new focus.

2. General Methods of Map Construction and Analysis

Cartography is one of the main tools of geography and has developed into a discipline in its own right. Generally, "Cartography is a technique fundamentally concerned with reducing the spatial characteristics of a large area . . . and putting it into a form that makes it observable."[9] The form of reduction is called a map which

> . . . allows us to extend the normal range of vision, so to speak, and makes it possible for us

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[8] Akin L. Mabogunje, The Development Process: A Spatial Perspective (New York: Holms & Meier Publishers, 1981).

[9] Arthur Robinson, Randall Sale, and Joel Morrison, Elements of Cartography (New York: John Wiley & Sons, 1978), p. 1.

> to see the broader spatial relations that exist over large areas.
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> A drawn geographical map is much more than a mere reduction. If it is well made, it is a carefully designed instrument for recording, calculating, displaying, analyzing and, in general, understanding the interrelation of things in their spatial relationship. . . . to add to the geographical understanding of the viewer.[10]

In this study, maps are used as the main tool for providing a geographical framework for the allocation of resources in a rural area to a specific poverty group of the population. The analysis of the geographical incidence of poverty and the poor groups in Section 6 of the previous chapter was of such a broad national, regional and provincial focus that the use of maps was not of major concern. However, within the provincial level, geographical specificity becomes more important as actual projects are identified which have to be located in particular areas of the province. This need for specificity demands a more detailed means of geographical analysis which can best be provided by maps.

The methods available for constructing maps range from the very sophisticated to the very simple. Recently, the use of computers in cartography has become an important method of map construction. This method is very expensive and requires a high degree of training not appropriate to the planning situation in the Province of

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[10]Ibid., p. 2.

Antique. There are other relatively sophisticated methods which require complex mechanical aids and are usually specific to certain types of maps such as the construction of topographic maps. These methods are also not appropriate to the situation of the province, again due to cost and the need for highly skilled manpower and the availability of important maps, such as topographic maps, which might have been constructed using such methods.

Most of the simpler methods of map construction require a manual manipulation of geographic information using relatively simple mechanical aids for constructing maps. Most of these aids were not known to the author at the time that the maps were being constructed in the province and thus were not used. The methods of map construction used in the province were very simple and relied on manual manipulation of the geographical information with the use of locally available materials.

The basic materials used in map construction were tracing paper, metric and non-metric graph paper, pencils, drafting pens, a ruler, a metric drafting scale (or a metric ruler), a T-square, a 35 mm camera, a slide projector, and a programmable calculator. Any available table was used for work space. In the latter development and construction of the maps, a simple light table was constructed consisting of an old kitchen table with the center leaf removed, a pane of window glass placed over the gap, and a table lamp below providing the illumination. What was characteristic of these materials was that they were all easily available or could be easily constructed in the province. They were also relatively inexpensive.

There was one set of base maps which proved to be common to the analysis and construction of most of the maps. This was a set of 1:50,000 scale topographic maps covering the entire province in 16 map sheets. These maps were available from the Bureau of Coast and Geodetic Survey (BCGS) in the Coast Guard Building on Barraca Street, San Nicolas district, Manila. The map sheets used were the following by code number and quadrant: 3451 III and IV, 3452 I, II, III and IV, 3454 III and IV, 3355 II and III, 3255 I and III, and 3256 II.

The particular topographic maps used in this study had an overprint of a universal transverse mercator grid of one square kilometer grid cells. These maps were much more convenient than the non-gridded maps in providing a ready-made and standard grid reference for both map analysis and manual map reduction. However, they were only available by special request and were not generally available through the BCGS. Local governments should not have much difficulty in obtaining copies for official use.

The 1:50,000 scale referent provided by the topographic maps was the largest scale referent available in the province. To provide as much detail to the analysis as possible, this scale was chosen for the organization and analysis of all geographical information. Most geographical information was either available or developed at the 1:50,000 scale and other information was transferred to this scale, usually from 1:250,000 scale maps, for comparable analysis.

The 1:50,000 scale maps were not appropriate for direct presentation in this study since they were too large to provide an integrated provincial perspective. To provide a provincial perspective, the maps were reduced to fit the page size of this study. The reduction process was accomplished through two steps.

The first step of reduction was from the 1:50,000 scale maps to a smaller scale map of approximately 1:392,000 scale. This was accomplished by using a smaller grid system on common graph paper proportionately matched with the grid overprint of the topographic maps. The boundaries of the province and the boundaries drawn to delimit the geographical phenomena under study were hand drawn from the larger grid map onto the smaller scale in relation to the reduced grid. Some distortion of boundaries was inevitable using this method but the grid system reduced the distortion overall and provided maps suitable for illustrative purposes as in this study.[11]

The reduction also required some amount of map simplification and generalization in order to provide readable maps without undue complexity in pattern. This involved the removal of small areas or the incorporation of small areas within larger surrounding areas. The use of personal judgement was required in this process, but since the analysis was based on the larger scale maps, the loss of information and possible small distortions were not important in the final product.

In this regard, it should be kept in mind that the maps presented in this study are for illustration and should not be used directly in planning. The more appropriate scales for the direct use of maps in the province are 1:250,000 or greater, with the 1:50,000 scale maps providing the best basis for detailed provincial planning.

The 1:392,000 scale was chosen as an intermediate scale to provide a map fitting an 11 by 17 inches paper size which was the largest size paper acceptable for xerographic reduction on the machines available at the time of writing. The intermediate map was reduced by two stage xerographic reduction of 65 and 74 percent of

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[11] This technique is also described in Robinson, Elements of Cartography, p. 88.

original in two respective runs. This gave a map of approximately 1:815,000 scale suitable for the paper size used in this study.[12]

Another method common to many of the maps and analysis was the measurement of area. There are relatively simple methods available for measuring map areas using a planimeter. Limited use of a planimeter was made in the province but it proved to be very tedious to use in the measurement of many small map areas. An alternative and acceptable method of measuring area is by grid overlay if precise measurements are not required. Precise measurements of area were not deemed critical in this study and the detail of grid overlay used provided an acceptable degree of accuracy given the level of detail in the maps to be measured.[13]

To measure area, a grid covering the entire provincial map area was constructed with cell size of 25 hectares or one-fourth of a square kilometer. The grid was

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[12]Xerographic reproduction machines with reduction capabilities are also available in most larger cities in the Philippines.

[13]Although no specific references to this method of area measurement was found at the time of writing, the author has observed the method being used by the Division of Forestry, Fisheries and Wildlife, Tennessee Valley Authority, Norris, Tennessee. The TVA personnel using the method mentioned studies which show that the degree of error, on the average, using this method is small when the grid cell sizes are substantially smaller than the land areas being measured.

constructed to match the grid of the topographic maps by simply dividing the larger kilometer square grid cells into four parts. The number of grid cells thus constructed was approximately 11,200 which provided a very detailed division of the provincial map area.

The grid was overlaid on the maps to be measured and each cell was assessed by noting the characteristic of the mapped area under the midpoint of the grid cell. This cell was then counted as being within the area being measured. The cumulative count of all cells counted in an area being measured was multiplied by the cell area factor of 25 hectares to get the total area of the mapped characteristic.

This method was used in measuring the area of municipalities, slope categories and land systems. A different method of measuring area of agricultural land use was used based on the same 25 hectare grid base but calculating the area by grid cell based upon the percent of the cell interpreted as being cultivated. This method of measurement is discussed further in the discussion of the land use map in Section 4 below.

Common to most of the analysis of geographical patterns were the divisions of the province used to gain geographical specificity. There were three methods used to divide the province for detailed analysis.

First was by municipality which gave an arbitrary division of the province based on an administrative criterion. The municipal division was chosen to conform to other common divisions of data on the province and to conform to the approach of the Antique Upland Development Program which generally organized operations in relation to municipalities.

There were 18 municipalities in the province but only 17 were consistently covered in the analysis. The island-based municipality of Caluya was considered to be of such minor importance in the analysis of upland patterns that it was excluded from specific analysis in most cases. This was due to the fact that the agricultural activities on the islands making up the municipality were mainly on slopes of less than 8 % and to the fact that most of the population was involved in artisanal fishing and would be better served by focusing on that activity in defining the poverty situation of the population.

Second was a division of the province by upland and lowland. This division was based on the focus of this study which was the uplands and the upland farmers. The definition of uplands was any land having slope of 8 % or greater and including small embedded areas within larger areas so defined having less than 8 % slope.

The criterion of 8 % slope was somewhat arbitrary since slope is a continuous phenomenon. The choice of 8 % slope was based mainly on the categories chosen for the construction of the slope map and on informal observations that land having less than 8 % slope was more characteristic of lowland agriculture. The 8 % slope criterion also finds some support in the literature by being close to the slope, actually slightly less, which divides mainly depositional land from mainly erosional land.[14]

Third was a division of the province into land systems based on the "Land Systems Map of Panay" published by the Bureau of Soils in Manila. This division provided a basis for a more detailed analysis of upland patterns by dividing the general upland area into smaller areas for analysis. Generally, the division was based on land forms of similar land characteristics. The basic characteristics were slope, elevation, and smaller recurring patterns over larger areas.

In dividing the uplands based on land systems, the strict definition of uplands presented based on slope was relaxed to a certain degree. This was due to the definition of land systems such as hills which began from a base of less than 8 % slope and progressed up elevation to generally greater slopes, and rivers which at times had terrace formations on slopes greater than 8 %. This

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[14]E. A. Olofin, "Classification of Slope Angles for Land Planning Purposes," The Journal of Tropical Geography 39 (December 1974): 74.

distortion of the upland definition was not considered critical since the general pattern of upland lowland division was retained and the area of distortion was small.

In presenting results in tabular form, the three divisions were cross tabulated where appropriate. In addition, summaries of the information were made based on the zones defined by the AUDP for administrative purposes. These zones were not considered as basic divisions of the province but provide a more general basis for reporting results and comparing the results with actual AUDP activity.

Since the administrative division of the province into municipalities is arbitrary and has no direct relation to the definition of the uplands, a description of the methods used in constructing the map of political divisions is appropriate at this point. The construction of a map of political divisions ideally should be based on officially defined boundaries. However, as mentioned in Section 1 of Chapter III, the political boundaries of the province were not consistent between existing maps of the province. In order to provide a consistent map of political boundaries, the maps had to be rectified in some way. This was done by a process of comparing the existing maps and drawing boundaries based on general similarities and relation to known patterns in the province.

The provincial boundary was constructed using

Bureau of Lands and National Census and Statistics Office base maps along with some old Provincial Development Staff base maps as guides. The map sources conflicted as to the exact location of the provincial boundary, but they generally followed the crest of the mountains between Antique and the three adjacent provinces.

The provincial boundary used in this study follows the crest of the mountains with the exception of three small areas which contain barangays belonging in the province or which contain areas traditionally claimed by Antique. These areas are the eastern most curve of Pandan, a small portion of Culasi, and a sizable portion of T. Fornier along with a small portion of Hamtic.

Municipal boundaries were constructed using the same source maps as for the provincial boundary, but coastal boundary locations were field checked and some municipal boundaries were taken directly from an incomplete set of base maps used for real property tax administration in the Provincial Assessor's Office. Again the map sources conflicted (sometimes to a great degree). Where no tax administration base map was available, either a visual averaging of the boundary locations was used, or reasonable adjustments were made to encompass all barangays falling within the municipality. The boundaries used in this paper should be suitable for general planning work but should not be considered as official for legal purposes.

3. Methods of Analyzing the Physical Landscape

The maps used to analyze the physical landscape in this study were maps of slope, elevation, and land systems. The reasons for choosing these maps for analysis were the obvious relation of slope to the definition of uplands, the related use of elevation in some other definitions of uplands current in the Philippines, and the availability of the land systems map which integrated both slope and elevation along with other important information on the physical landscape. The land systems map also provided an important means of dividing the uplands for analysis of other variables.

The methods used in constructing and analyzing each map are presented in this section. Both the slope map and the elevation map were constructed by the author. The land systems map was constructed by the Bureau of Soils in Manila and only a secondary discussion of methodology is presented in this study.

Slope is a general term for the inclination of the land and is often classed as an attribute of a more general land quality termed relief. Relief is a more general concept in explicitly recognizing elevation and land form in addition to the simple inclination of the land. Brandes provides a summary of many methods of analyzing and mapping relief and identifies the type of method used in this study to be a morphometric analysis of slope value, or average steepness of slope, in map form.[15]

Both Garnier, and Thrower and Cooke[16] provide a description of the general method of constructing such a map. The method starts with a topographic map of known elevation contour intervals. The spacing of the contour intervals are measured directly and areas are delimited corresponding to specified slopes or slope categories which in turn correspond to the spacing of the contour intervals. This method is based on the concept of slope which is rise in elevation divided by length of horizontal run. On a topographic map, a steeper slope shows a greater rise over run corresponding to more closely spaced contour lines.

In separate studies in Malaysia, both Swan and Olofin provide an alternative method of measuring slope.[17]

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[15]Donald Brandes, "Sources of Relief Representation Techniques," The Cartographic Journal 20 (December 1983): 88.

[16]B. J. Garnier, Practical Work in Geography, (London: Edward Arnold, 1963); and Norman J. W. Thrower and Ronald U. Cook, "Scales for Determining Slope from Topographic Maps," The Professional Geographer 20 (May 1968): 181-186.

[17]S. B. St. Swan, "Land Surface Mapping, Johor, West Malaysia," The Journal of Tropical Geography 31 (December

Swan was interested in describing the land forms of his study area and utilized a method of measuring slope within a grid of a relatively large cell size (6000 by 6000 feet or approximately 1800 by 1800 meters). Within these grid cells he calculated slope in a manner not clearly defined in his paper but generally relying on the difference in elevation within each grid cell. This method proved to be inaccurate due to the large size of the grid cells. Olofin used a much smaller grid cell size of 300 by 300 meters and obtained much more accurate results.

The method used by Olofin is of particular interest in that the scale and detail of the topographic maps he used were similar to the scale and detail of the maps used in this study (1:63,360 in Olofin and 1:50,000 in this study). The size of the grid cell used by Olofin was approximately 9 hectares as opposed to the smallest grid cell size used in other maps in this study of 25 hectares. Keeping in mind that the larger the grid cell size in relation to the scale of the map, the larger the probable error in measurement, such a method may also be considered as a viable alternative to the method used in this study. If the grid cell size of 25 hectare were further divided into quadrants, thus giving approximately 45,000 cells

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1970): 91-103; and Olofin, "Classification of Slope Angles."

covering the province, the accuracy achieved by Olofin could be obtained but at a cost in measurement and calculation time.

There are usually two ways of presenting slope measures. One is by reference to the angle of the slope from horizontal and is expressed in geometric degrees. Another way is by reference to the rise over the run in percentage terms and is referred to as percent (%) slope. A third way not often used is by reference to the rise in elevation in relation to a constant horizontal distance, such as a rise in elevation of 100 meters per kilometer. Slope is presented in this study in terms of percent (%) slope since this type of measure is more common in the Philippines.

The slope map was constructed by analyzing Bureau of Coast and Geodetic Survey (BCGS) topographic maps at 1:50,000 scale. The maps were analyzed by defining slope category boundaries, calculating the distance between topographic contours for each category boundary, marking the appropriate contour distances on a paper guide, visually interpreting the contour lines on the topographic maps using the guide, and delineating boundaries for the respective areas falling within the slope categories.

The accuracy of this method is dependent on three main factors. First is the accuracy of the base topographic maps used. The BCGS topographic maps proved to be very accurate in depicting land form in comparison with the aerial photographs used in constructing the land use map described in the next section (see also Section 5 of Chapter III). The exact accuracy of the contours is not known, but given the accuracy in land form depiction, it may be assumed that the contours are accurate overall.

Second is the level of detail of the topographic maps. The level of detail is dependent on the contour intervals used. The larger the contour intervals, the more likely that inter-contour variation in land form will not be captured. This is a weakness in the use of any map which represents a continuous phenomenon such as elevation in discrete form such as contour lines. Thus, accuracy of the maps is relative. Since the 1:50,000 scale maps with contour intervals of 20 meters were the most detailed maps available, there was no means of controlling for error in relation to base map detail. While some micro level inaccuracies may be present in the analysis, the overall pattern of slope in the province should be fairly accurate.

Third is the accuracy of the map interpreter. Although a physical guide was used to interpret the contour spacing, a certain amount of subjectivity inevitably occurred at the slope category boundaries. Thus, the precise boundaries of the slope categories may be inaccurate, but the overall pattern of slope variation should still result from this method.

The slope categories used in this study were based on those used by the Bureau of Forest Development around 1976 and used subsequently by the NEDA Region VI to make a regional slope category map. The slope categories were as follows: 0 % to < 3 %, 3 % to < 8 %, 8 % to < 18 %, 18 % to < 30 %, and 30 % or greater slope. An additional category of slopes greater than 50 % was added for the map used in this study. This was done to delineate areas which were considered as extremely unsuitable for upland agricultural activity and to delineate transition areas of between 30 % and 50 % which might have upland agricultural activity and be suitable for more constrained cultivation or other upland productive use. The map produced in this paper was done independent of the NEDA map and does not necessarily conform to the boundaries of the NEDA map.

In presenting the results of the slope analysis, categories were combined to simplify the presentation, to reduce the complexity of the mapped patterns so that general patterns could more easily be discerned, and to more easily relate the slope characteristics of the land to other information. The categories of presentation in this study are 0 % to < 8 % to conform to the definition of the uplands and lowlands used in this study, 8 % to < 30 % based on other patterns in the uplands which conformed to the patterns of this category, and 30 % and greater slope since the extra division did not prove critical for mapping purposes and the effects of slope variation above 30 % could adequately be covered in the text without complicating the map presentation.

The construction of the elevation map was straightforward and simple. Elevation contours were traced from Bureau of Coast and Geodetic Survey topographic maps at 1:50,000 scale. Only four contours were used in this study to both highlight the pattern of elevation in the province and to relate other factors to elevation. The 20 meter contour was chosen since it defines most of the coastal lowland plains. The 1200 meter contour was arbitrarily chosen to give greater definition to higher elevations in the province. Two intermediate contours were chosen based on definitions of uplands contained in two publications which used 300 meters and 600 meters respectively in defining upland areas in the Philippines.

The accuracy of the contour lines in depicting elevation was a minor point since no basis for comparison was available to evaluate accuracy. It was assumed that the contours were accurate enough for the purpose of analysis.

The land systems map integrates information on both slope and elevation and provides much more information in relation to land system categories. Most of this map was taken directly from the "Land Systems Map of Panay" published by the Bureau of Soils in Manila along with a report entitled _Land Resources Evaluation of Panay for Agriculture._ Both the map and the report were done under a United Nations Development Programme project and with assistance from UNDP personnel.

The land systems map was used in this study for a purpose slightly different from the purpose of its construction. In order to understand both the difference in use and the applicability of the map to this study, a brief review of what a land systems map is and the methods used in its construction would be helpful.

The Bureau of Soils report did not provide a full account of the methods used in constructing the land systems map. Other literature in geomorphology and a related applied field of land evaluation provides a more complete overview.[18]

Geomorphology as a discipline of geography (and geology) is concerned with the description of land forms and the ways in which land forms were developed through geologic time. The time periods involved range from the recent, focusing on more immediate land forming processes, to the very long term reaching back into distant

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[18] See Verstappen, _Applied Geomorphology_; and United Nations, Food and Agriculture Organization, _A Framework for Land Evaluation_, Soils Bulletin 32 (Rome: 1976).

geological epochs in studying the major processes of land formation.

In its application to development, geomorphology provides a practical means of dividing the earth's surface into smaller areas based on genesis and land form characteristics. Of particular interest to development planners is the immediate land resource base, its characteristics and its potential for development. The utility of a geomorphological division of the earth's surface lies in the association of different land form types with different characteristics which either enhance or limit the potential of land for development.

The land system is one such way of dividing the earth's surface and relating characteristics of the land to particular areas. A land system

> . . . generally refers to an area with a recurring pattern of soils, topography and vegetation, and is generally used to delineate mapping units in reconnaissance level of land resources evaluation surveys.[19]

Being a recurring pattern, the land system is not a uniform characteristic of the land but is made up of smaller units of more uniform characteristics.

As an example, a series of low lying hills of gentle slope in association with narrow valleys may be

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[19] Philippines, Bureau of Soils, Land Resources Evaluation of Panay for Agriculture, p. 18.

grouped together in one land system by being similar in pattern over a larger area than any one hill or valley can encompass. The variation of other characteristics within this land system is usually related to the recurring pattern of the basic elements. For example, soils in the valleys will probably be more fertile than soils on the hills, but the variation in soil fertility between the different valleys or the different hills in the land system will not be great.

In evaluating the land systems in relation to development potential, the division of the landscape provides a means of identifying the geographical distribution of different land capabilities. This is usually done in land resource surveys for rural development by evaluating the different land systems in relation to the agronomic requirements and economic returns of specific crops on a theoretically sustained basis. Thus, within a land system, valleys may be identified as being suitable for certain crops such as rice while hillsides might be identified as being less suitable for rice due to greater slope or lower soil fertility which would limit both economic returns and sustained use.

Between land systems, the evaluation procedure defines the overall pattern of suitability for different crops. In the aggregate, this can form the basis of decisions for land use planning within the area analyzed.

Both the specificity of the land evaluation and the specificity of the land systems divisions are related to the geographic level and purpose of the survey. The survey of the Island of Panay was done at the largest scale of 1:50,000 generally deemed appropriate for regional reconnaissance. The suitability evaluation was qualitative in relation to a limited number of specific crops. The qualitative nature of the evaluation was necessitated by the lack of detailed information on the specific potentials and limitations of the land systems and the lack of detailed economic data on the different crops. The purpose of the survey was accomplished even with these limitations since the level of decision making in which the results were to be used was the region (the whole Island of Panay in NEDA Region VI).

This may have implications for accuracy at the provincial level, but two factors weigh in favor of the overall accuracy of the map: 1) there were no major discrepancies between the map and other data drawn independently and presented in other maps in this study, and 2) most of the land systems in the province constituted a substantial proportion of the regional land area in each land system category and thus should have been adequately represented in data gathering. There were exceptions to this and the specific exceptions are covered in the next chapter in relation to the analysis.

The purpose for which the land systems map was constructed is in any event not directly relevant to this study. The purpose of this study relates to population and not land suitability. In this regard, the land systems map provides a convenient means of dividing the province into smaller units in which the distribution and density of population may be analyzed. It is assumed that the same factors of variation in land characteristics which form the basis of land evaluation will also be factors which are associated with variation in population distribution and density. A secondary benefit of using the land systems map for this purpose is the ability to relate at least generally and qualitatively, though not definitively, population distribution and density to characteristics of the land resource base.

Based on personal observations by the author (see Section 4 of Chapter III) and a reading of the literature, the land systems boundaries were constructed using 1:50,000 scale topographic maps, aerial photographs at approximately 1:49,000 scale, and LANDSAT satellite images of 1:250,000 scale. The major criteria for identifying boundaries was slope, land form associations, and elevation. The more detailed characteristics of the land systems, such as soils and geology, were collected or verified by field survey. Land evaluation was a multidisciplinary effort resulting in qualitative suitabilities for selected crops.

The publication map was at a scale of 1:250,000 and it was this map which was available for this study. To conform to the scale of maps used for analysis in this study, the 1:250,000 scale map was manually enlarged to 1:50,000 scale by means of proportionate grids, with the 1:50,000 scale grid being overlaid on the base topographic maps. The overall patterns of land systems divisions were apparent in the underlying topographic maps but there may have been some slight distortion of boundaries in enlargement. No increase in accuracy was accomplished in enlargement, thus any map simplification involved in the construction of the 1:250,000 scale map was retained.

4. Methods of Analyzing Agricultural Activity

The maps of slope, elevation and land systems provide only the physical context of the main focus of analysis which is population. In this study, population distribution and density are measured by both agricultural activity and census figures.

The reasons for using agricultural activity as a proxy for population are two. First, the direct analysis of population figures was limited by the ordering of available census data by barangay. As mentioned in Section 1 of Chapter III, barangays could only be mapped as point locations, thus the direct relationship with land area was not possible without some arbitrary manipulation. Second, the agricultural land use data developed from the interpretation of the aerial slides mentioned in Section 5 of Chapter III provided the most geographically detailed distribution of an activity of the population which should be closely related to the distribution of population itself.

In using agricultural activity as an indirect measure of population, three assumptions were made. First, that the distribution of population is related to the distribution of agricultural use. This is a fairly reasonable assumption given the subsistence orientation of upland farmers and the relatively close geographical association of upland farm households with the land they cultivate. Second, that the relationship between population and agricultural land area is constant, on the average, throughout the uplands of the province. This assumption may not hold between different areas with different land characteristics, but the variation should not be very great. Third, that the distribution of agricultural land use is measured accurately. This matter is discussed below in evaluating the accuracy of the agricultural land use data.

There are many ways of analyzing and mapping land use data. The first step is to capture the data on land use in some form either by direct observation and measurement in the field or by indirect methods such as aerial photography. As mentioned in Section 5 of Chapter III, direct field observation and measurement of land use in the uplands was deemed not feasible given the large area covered and the difficulties of ground level perspective. Also, conventional aerial photographs were deemed too expensive at the time. Fortunately, and just by chance, an opportunity was presented to photograph the province from the windows of a small airplane.

Most methods of land use analysis utilize controlled photographs taken from an angle perpendicular to the overall surface of the earth with the camera in a vertical position. This would be like taking a photograph of a map by standing directly over the map and looking straight down. In using the method of taking pictures out of the windows of an airplane, vertical photography was not possible (except when the plane was making a sharp turn) and the resulting photographs were at an oblique angle from the surface.

The use of oblique photography in land use surveys is generally not covered in the literature. However, support for such a method comes from urban planning in a monograph entitled "Oblique Aerial Photography for Comprehensive Urban Planning" which notes:

> Oblique aerial photography, when used in conjunction with other techniques and approaches,

> has proven to be an effective tool for communication and analysis in land-use planning. Requiring only hand-held and relatively inexpensive camera equipment--compared to the more complex equipment required for most vertical photography--it can be accomplished with no special skills other than normal competency in photography.[20]

Bowden and Brooner, geographers, describe a "Do It Yourself Photography" requiring only hand-held cameras and a light, high-winged aircraft to take oblique photographs for, among other purposes, studying patterns of vegetative cover. They note that this method was sufficient for their purposes and cost only about 3 percent of what commercial vertical photography would cost.[21] Bennet, also a geographer, used oblique aerial photography as a supplement to direct map interpretation of land use from a light aircraft in Panama where the logistics of a ground level survey were prohibitive.[22]

Thus the method of data capture which presented itself just by chance proved to be the one most appropriate for local level use given both the constraints of

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[20] Frank E. Reynolds, Oblique Aerial Photography for Comprehensive Urban Planning, Planning Advisory Report Number 361 (Chicago: American Planning Association, 1981).

[21] L. W. Bowden and W. G. Brooner, "Aerial Photography: A Diversified Tool," Geoforum No. 2 (1970): 19-32.

[22] Charles F. Bennett, Jr., "Notes on the Use of Light Aircraft in Mapping Vegetation in the American Tropics," The Professional Geographer 15 (November 1963): 21-24.

logistics involved in a ground level survey and the constraints of finance.

The raw data for land cover or use was gathered in the form of almost 800 oblique aerial slides of the province taken from the windows of a single-engine, high-winged airplane in July and December of 1977. Color slides were taken by the author and members of the Provincial Development Staff using hand held cameras and 35 mm film. Most sequences of slides overlapped along the flight path to provide continuity in identifying the areas being photographed. This was not a controlled flight, but was guided to try and cover the entire province. Elevation above the surface varied from about 200 feet to about 1500 feet but usually ranged closely around 500 feet above the land surface.

Interpretation of aerial photographs to define land use is a subjective process based on visual interpretation of color and texture of the vegetative cover and identifiable linear forms such as terrace, field or paddy boundaries. The accuracy of the interpretation is dependent on the ability of the interpreter to distinguish these textures and forms and the detail of such information in the photographs. Given that the author was the one who interpreted the slides, an assessment of the accuracy of the interpretation is also subjective.

Generally, with the level of detail in the categories chosen for interpretation and the detail distinguishable from the aerial photographs, the author feels that the interpretation was fairly accurate. The interpretation was in part based on an informal field verification of land use conducted in association with other activities. Specific uses or vegetative covers were easily identifiable in some cases such as with paddy rice, bunded rice in the uplands, coconut plantations, sugar, swamps, fishponds, large settlement areas, river flood plains, and canopied forest. However, there was a problem in identifying grazing land from unproductive grass land, and scattered economically significant trees from general shrub, brush, and scattered trees. These difficulties are discussed further below in relation to the categories of interpretation.

Another possible limit to accuracy was the angle of the photographs which allowed objects of higher elevation, such as trees and hills, to obscure land uses behind them. This was not a major problem since most of the landscape, with the notable exception of the high mountains, was covered from at least two angles of sufficient difference to allow a view of all areas. This did not apply to areas of more densely spaced but scattered trees where small areas of use under the trees may still have been obscured.

The quality of the slides and the coverage were not even. There were two areas in the province which did not get good coverage. One was around Mount Nangtud in Barbaza which could not be photographed close due to high winds at the time of overflight. The other was the far eastern curve of Pandan which was under clouds during the time of overflight. The only area not covered which also might have some significant upland agricultural activity was that in Pandan, but the area of cultivation was probably small. All lowlands were well covered with high detail slides. Most areas below about 600 feet were also of high detail. Many of the mountain shots, especially in the north and central portions of the province, were of less detail and were taken at a greater angle from perpendicular.

The detail of the interpretation of land use is dependent on the number of categories used and the base for locating the use in map form. The categories for interpretation were kept simple and consisted of the following:

1) Flatland field cultivation (formerly termed flatland rice)--cultivation in identifiable fields or paddys. Mainly paddy rice but also including some second cropping of dry field crops such as mongo. No accurate distinction between rainfed and irrigated land was possible. This land use category was very easy to identify.

2) Upland bunded cultivation (formerly termed

bunded rice)--a range of upland field crop cultivation from terraced land, to simple water-break bunds on slopes, to a very few plots of non-bunded cultivation on slopes. Mainly upland or rainfed rice but with a much more complex mix of crops than flatland field cultivation. In the uplands, crops such as corn were often intercropped with rice, and other field crops such as mongo and peanut were important. This land use category was more difficult to identify in some cases where distinct bunds were not present. However, the texture of the land even in the few cases of non-bunded cultivation was fairly easy to distinguish by the difference in color between disturbed or plowed earth and surrounding undisturbed earth. No consistent distinction could be made between active and fallow plots in areas where farmers might have practiced rotation. If plots were at a later stage of bush fallow, they may have been counted in the category of shrub and brush with scattered trees.

3) Sugar--fields of sugar cane. Sugar was easily distinguishable from other uses, particularly rice, by its distinct darker green color and different photographic texture. This crop was partially field checked.

4) Coconut--coconut planted as groves or distinguishable linear plantings along the coastline or river courses. There was some difficulty in identifying this land use category since many farms have only a few

scattered coconut trees planted in no discernible pattern. In the cases in which no clear pattern of planting could be distinguished, the coconut trees were probably included in the category of shrub and brush with scattered trees.

5) Grassland--areas covered predominantly by grasses. Since pastureland could not be consistently distinguished from nonproductive grassland, this economic use was classed along with the generally nonproductive cover. Most pastureland should be contiguous to land classed as upland bunded cultivation, and thus a general pattern of pasture use may be discernible from the pattern of upland bunded cultivation.

6) Shrub and brush with scattered trees--a range of vegetative cover from broken canopy forest to scattered small bushes in association with grass and a few trees. This category relied very much on judgement and probably included some productive scattered fruit trees which had economic significance in areas contiguous to upland cultivation, some areas which might better be classified as disturbed forest or secondary forest, and bamboo which usually grows wild and is technically a grass but has economic uses similar to trees. This category was often a residual category after other categories had been judged not applicable.

7) Forest--areas of forest canopy or slightly

disturbed canopy. Mainly primary forest on higher mountain elevations.

Only the above seven categories are of direct interest in this study and cover almost all of the provincial land area. In addition to these seven, six other categories were also used to account for the entire land area.

8) Settlements--mainly poblacions and large barangay centros with substantial or noticeable land area extent. This was sometimes difficult to interpret if the barangay was small and/or associated with a distinct tree cover, which was often the case.

9) River channels--exposed gravel flood plains and active river channels at the time of the overflights. These were easy to identify but have a tendency to change over time in the lowland plains as river courses change.

10) Swamp--easily identifiable coastal areas of short nipa palms. These areas were often associated with fishponds.

11) Fishponds--swamps which have been converted to controlled aquaculture by construction of defined banks or dikes. This use was easily identifiable in the coastal areas associated with swamps.

12) Barren--usually bare rock face. This land category was only applicable to a small portion of Sebaste in the steep mountains. Most other rock outcroppings had

at least some trees growing out of the crevices and were thus classed in shrub and brush with scattered trees.

13) Undifferentiated--a completely residual category within all areas of the province. This category accounts for the limited ability of the interpreter to make detailed subjective measurement of the land area in each category and is explained further below.

The main division of land use was thus into seven main categories of use or vegetative cover. The detail of analysis was thus limited to the relatively general categories defined. Specific crops, with the exceptions of coconut in defined plantings and sugarcane, were not identified, and neither was the general vegetative cover divided by species.

The other factor in the detail of analysis is the detail of geographical divisions in which the categories are interpreted, or the base map form on which the interpretations are plotted. As was mentioned in Section 5 of Chapter III, various means of dividing the province for land use interpretation were considered. First was a direct division of the province based on defining land use boundaries. This proved to be unsatisfactory due to the mixed nature of land use and cover, especially in the uplands. Second was a broad division of the landscape in which land use would be measured as percent of land area. This was not chosen due to the difficulty in defining landscape divisions (the land systems map was not available at the time) and the opinion that land use should be defined more specifically than broad landscape divisions would allow.

The method finally developed and chosen utilized an arbitrary division of the province by means of a 25 hectare grid overlay which gave a resolution of the province into approximately 11,200 grid cells. Detail in this regard is relative, but the division was as small as could be accommodated in the method used to record data--the cells were 1 by 1 centimeter--and the division was much more detailed than any other division considered.[23]

Interpretation of the slides and data recording were done as follows:

1) a grid of 25 hectare cell size was made on tracing paper for the sixteen 1:50,000 scale BCGS topographic map sheets covering the entire province,

2) the tracing paper grids were overlaid on the topographic maps,

3) the slides were projected on a wall or screen,

4) identifiable landmarks were established between the projected slides and the topographic features, such as

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[23]The 1 centimeter by 1 centimeter grid cell was just large enough to record the land use information directly onto the tracing paper grid.

hills, valleys, streams, or other landmark features of the maps,

5) the land uses or covers were identified on the slide for particular areas or locations,

6) the area covered by each identified land use or cover was estimated to the nearest 5 percent, and

7) the interpretation was noted on the tracing paper grid in the grid cell corresponding to the particular area or location.

Besides the limits to resolution due to category division and geographical division, the procedure for estimating land area also gave rise to some limitation to the detail available for mapping. First, since the photographs were taken at an oblique angle from the earth's surface, actual area of uses could not be measured directly. This necessitated a flat base map which could be related to the areas depicted in the photographs. The BCGS topographic maps provided a good base for identifying even small landscape details which corresponded with the areas shown on particular slides.

In measuring the area for each category, the information in the slides had to be transferred to the appropriate grid cell corresponding to the location of the area on the topographic map. To do this, some means of estimating and recording area had to be devised in order to transfer the information in useable form. This was accomplished by estimating the percent of grid cell area in each category corresponding to the location of the grid cell in the slide. This required a certain amount of subjective estimation of land area between two different perspectives at the same time--one vertical (map) and the other oblique (slide).

In order to simplify the process, only increments of 5 percent of land area were used to estimate the area in a particular category for a particular cell. Thus the resolution of interpretation was limited to discrete quantums of estimated land area. In addition, if a land use was not discernible at least to 5 percent of the land area, it was not counted in a cell. Based on this and the fact that other minor uses, such as roads and trails, could not be discerned using 5 percent increments, each cell was arbitrarily accounted an undifferentiated 5 percent land area. Thus the resolution of estimation and interpretation was not only discrete but also limited to a range of between 5 and 95 percent for any one category in any one grid cell. This would have substantial effects only on uses having areas below 5 percent of cell land area and on uses having areas greater than 95 percent of cell land area. Overall, the categories were probably slightly undercounted using this procedure, but the undercounting should be small and not affect the definition of overall patterns.

Five maps in this study either portray land use and vegetative cover or use such information in comparative analysis with other variables. The five maps are general land use and vegetative cover, upland agricultural density, two maps comparing upland agricultural density with slope and elevation characteristics, and a map of agricultural density by land systems.

In order to simplify both the maps and tabular analysis, some of the land use and cover categories were combined and arbitrary cut-off points were identified to define predominant or characteristic use. For the lowlands, the categories of lowland field cultivation, sugar and coconut were combined as lowland aggregate agricultural cultivation.[24] For the uplands, the categories of upland bunded cultivation, sugar and coconut were combined as upland aggregate cultivation.

In mapping land use or cover, all lowland areas of less than 8% slope were left undifferentiated. The criterion for classifying a grid cell as upland cultivation was a density of aggregate cultivation of 30 percent or greater. This cultivation was mainly bunded cultivation but also included small areas of sugar cane and some coconut areas. Cells with less than 30 percent of their

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[24] This excludes approximately 200 hectares of productive fishponds in the province.

area in upland cultivation were assumed to be more characteristic of one of the other upland classifications.

Grasslands were defined as any noncultivation grid cell which had a proportion of grassland cover more than 50 percent. Mixed grass, shrub and brush was defined as any noncultivation cell which had less than 50 percent grassland and less than 65 percent shrub and brush with scattered trees. Disturbed forest or shrub and brush with some trees predominant was defined as any cell having either 65 percent or more of its area in shrub and brush with scattered trees or which had more than 50 percent of its area in forest and/or shrub and brush with scattered trees but with less than 70 percent of its area in trees. Undisturbed forest was defined as any cell having 70 percent or more of its area in forest. The few upland grid cells which did not falling within any of the categories were classified into the use or cover which predominated.

For the general land use and vegetative cover map, after all grid cells were classified, boundaries were drawn around clusters of cells with the same classification. In the case of embedded single cells of different classification, the single cells were incorporated into the predominant category boundary for map simplification.

The map of upland agricultural density was constructed by deleting all categories except upland cultivation and adding areas with upland cultivation density between 15 to 30 percent. Areas with cultivation density less than 15 percent were not included since they were much more characteristic of their surrounding land and were not of much relative significance being very few and scattered. This map and the associated tabular and textual analysis form the basis of analyzing population distribution and density using cultivated agricultural land as an indirect measure.

The maps relating upland agricultural density with slope and elevation were constructed by overlaying the maps of slope and elevation onto the map of upland agricultural density to identify patterns of covariance. This is an accepted method of relating two or more mapped variables to either produce a composite map or identify areas of overlap, or spatial covariation, of variables.[25]

The map of upland cultivation on slopes of 30 % or greater was constructed using the overlay method to identify areas which met the combined criteria of being equal to or greater than 30 % slope and having an upland cultivation density of 15 percent or greater. The choice of the 30 % slope criterion was based on the use of that

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[25]Carl Steinitz, Paul Parker, and Lawrie Jordan, "Hand-Drawn Overlays: Their History and Prospective Uses," Landscape Architecture 66 (September 1976): 444-455.

slope criterion in identifying land unsuitable for agricultural use under most circumstances.

The map of upland cultivation on elevations greater than 300 meters was constructed using the overlay method to identify areas which met the combined criteria of being greater than 300 meters in elevation and having an upland cultivation density of 15 percent or greater. The choice of the elevation criterion was based on the use of that criterion in the Rainfed Resources Development Project (see Section 5 of Chapter IV).

Agricultural cultivation areas were measured as percent of grid cell cultivated times the grid cell area factor of 25 hectares. The cultivation areas thus calculated were aggregated by land system and divided by land system area to get cultivation density. A map of cultivation density by land system was constructed using the tabulated information.

5. Methods of Analyzing Population

The analysis of population distribution and density is central to this study. Unfortunately, the data available for analysis at the provincial level did not lend itself to direct detailed analysis at any level below arbitrary municipal divisions. This problem was due to the manner in which population data were ordered by the census operations of the Philippines.

The lowest level at which population figures were presented was the barangay which was also the lowest level of political division in the country. Unfortunately, no consistent political boundaries had been mapped for the barangay level in the Province of Antique. Some few maps used in real property tax administration indicated barangay boundaries, but these covered mainly lowland municipalities. The National Census and Statistics Office (NCSO) had attempted to develop barangay base maps for census operations, but during the time that the author was in the province, the maps were neither complete nor accurate nor consistent. Most NCSO barangay maps were sketched to different scales and did not form an interlocking coverage of the provincial land surface.

Thus, the location of population was limited to point locations on a map. This posed problems in relating a point location to area in order to analyze population distribution and density. To put the point location data into useable area form required some arbitrary manipulation of the data.

The analysis of population distribution and density was approached in three ways. First, the point locations of population were used directly to construct a map of relative distribution without regard to the associated land area. Second, an arbitrary grid was used to calculate a rough approximation of density and to depict the pattern of density in the province as a whole. Third, an arbitrary allocation scheme was used to relate point population locations to land system areas in order to analyze the pattern of population distribution and density in particular areas of the uplands.

The base for analyzing population in map form was the barangay location map developed in the province and described in Section 1 of Chapter III. The development of the barangay location map was hindered by the lack of accurate maps of barangay locations in the province. Existing NCSO maps of barangay locations were used as a first approximation but were found to be substantially inaccurate in depicting exact locations. Most of the lowland barangays were subsequently field checked and corrected where necessary as a part of a road survey of the province. Many upland barangays were also field checked and corrected in this operation. Other upland barangays were checked and corrected by use of the aerial slides described in Section 4 of this chapter.

Overall, the final barangay location map should accurately depict barangay centro locations, or the point of most densely aggregated households in the barangay. However, the relative location of barangays in the uplands may not be totally accurate. There is a possibility that barangay names were transposed, thus allowing for one barangay name to be located in an incorrect position relative to other barangays.

This possible inaccuracy was partially checked by asking knowledgeable persons where barangays were located in relation to other barangays. This method of checking may not have been entirely successful since it was noted that some individuals had difficulties relating their knowledge of specific barangays to existing mapped information which would provide a basis for locating the barangays.

The population figures used in the analysis came from the Philippines, 1980 Census of Population by Municipality and Barangay: Antique published by the NCSO. This was the most current census available at the time of writing.

The map of relative distribution using the point location of barangays directly was constructed by drawing circles of relative proportionate size for each barangay in the province. This is an established cartographic method of depicting both size and distribution of either discrete points or areas in which internal distribution is lacking or unimportant. In order to allow for the psychological limitations in discerning circles whose area is strictly proportional to the size of the population, a "psychological scaling method" was used to give greater emphasis to larger population points.[26]

The map of population density using a grid base is similar to the map developed in the province and described briefly in Section 1 of Chapter III. The grid overprint of the topographical map was used as a base for making a larger grid of four square kilometer grid cells. The grid was overlaid onto the barangay location map and the population associated with each barangay in each grid cell was summed and divided by the land area in the cell.

Corrections were made for coastal cells and cells falling on the provincial boundary. If a grid cell covered a land area of 50 percent or more of the cell area, the land area was used directly as a base for calculating density. If the land area within a grid cell was less than 50 percent of the cell size, the area and population were incorporated into the most immediate adjacent grid cell and the combined population and land area were used as the basis for calculating density.

Both of the above methods provided only limited basis for analyzing upland population patterns. First, the map of relative distribution using point locations could not be related to land area. Second, the map of population

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[26]See Robinson, Elements of Cartography, pp. 208-210.

density using grid squares was too course and arbitrary a division of the province to provide a basis for distinguishing upland patterns.

To overcome the above limitations, a method for allocating point population data to land systems areas was devised. No justification for this method was found in the literature, but a conceptually similar method was found in Elements of Cartography by Robinson, Sale and Morrison in a description of a method for "Estimating Densities of Parts."

The problem of estimating densities of parts was defined as follows:

> When preparing density maps, it is not uncommon for the raw data to have been gathered for enumeration districts within which there is considerable unevenness of distribution. This is not apparent from the raw data, of course. If supplementary data exist that allow us to estimate with reasonable accuracy the density of one part, the value assigned to the other part can easily be calculated. . . .
>
> The method is merely an aid to consistency in apportioning established values within the limits of territorial units for whose subdivisions no statistical data are available.[27]

Note that the problem described above was one of allocating within a defined boundary. The problem in this study was one of allocating from a point location to defined boundaries not directly related to the implied boundaries

[27] Robinson, Elements of Cartography, p. 133.

of the point locations. Still, the concept of using supplementary information to make an allocation of a whole to parts provides a basis for dividing point location data to areas.

The supplementary information used in devising the allocation scheme for this study was based on four informal observations by the author concerning the distribution of population within barangays and in relation to the uplands. First, it was noted that most barangays had a central aggregation of population, the barangay centro, which was more dense than peripheral population distribution. Thus within a barangay, relatively more weight should be given to the point location of the barangay than to the periphery in allocating population to area.

Second, barangays with centros located in lowland areas but which were located near to upland areas usually had some of their population living in the upland areas. Thus, these barangays should be singled out for allocation of population between upland and lowland areas. Third and related to the second observation, barangays with centros located in lowlands of restricted area generally had a greater proportion of the population living in upland areas than those located in broad lowland plains or river valleys. In this regard, barangays with centros located in river valleys of restricted width generally had a greater proportion of the population living in upland areas than those in non-riverine lowland areas of restricted area. Most lowland areas of the later type were coastal and provided a greater opportunity for alternative marine activities.

Fourth, barangays with centros located in an upland area were predominantly upland oriented even though the barangay centro may be located near to a lowland area. The exception to this was barangays with centros located in upland areas near to small river valleys, in which case the barangay centro may be located on slopes with a substantial proportion of the population directing their activities to the river valley.

Based on these observations, an allocation scheme was devised by classifying each barangay in the province and allocating population in each classification based on the following criteria.

1) For barangays with centros located within an upland area but greater than 100 meters distance from a lowland river valley or river system--100 percent allocation to the upland land system.

2) For barangays with centros located within an upland area but 100 meters or less distance from a lowland river valley or river system--50 percent allocation to the upland land system and to the associated lowland respectively.

3) For barangays with centros located within a

lowland river valley or river system of 250 meters or less width and bounded on both sides by upland area--50 percent allocation to the upland land system and to the associated lowland respectively.

4) For barangays with centros located within a lowland area of 500 meters or less in width and with the centro located 250 meters or less distance from an upland area--25 percent allocation to the upland land system and 75 percent allocation to the associated lowland. (Note: criteria and allocation proportions under number 3 above take priority with river based barangays on lowland areas of 250 or less meters width.)

5) For barangays with centros located within a lowland area of 500 meters or less in width and with the centro located more than 250 meters distance from an upland area--10 percent allocation to the upland land system and 90 percent allocation to the associated lowland.

6) For barangays with centros located within a lowland area of greater than 500 meters in width and with the centro located 250 meters or less distance from an upland area--10 percent allocation to the upland land system and 90 percent allocation to the associated lowland.

7) For barangays with centros located within a lowland area of greater than 500 meters in width and with

the centro located greater than 250 meters distance from an upland area--100 percent allocation to the lowland area.

This was an admittedly arbitrary scheme of distances and proportions, but one based on general field observations. The exact distances and proportions may vary from reality and may vary from one barangay in a similar situation to another. However, at least some cognizance was made of actual intra-barangay population patterns in relation to upland areas.

The population allocations resulting from the above scheme were first tabulated by municipality and land system, and from the relation of population to land system areas within municipalities, a population density map was constructed. Due to the arbitrary manner in which the barangay populations were manipulated to get distribution and density by land system, the preferred measure and benchmark for judging the accuracy of the allocation was the distribution and density of agricultural cultivation.

It was assumed that any gross deviation from the general trend of population density and cultivation density would indicate either a gross over or under allocation of population, or a substantial under measurement of agricultural cultivation, or a combination of both. Only relatively large deviations were considered in revising the analysis since both the population and agricultural data have their own limitations which could combine to result in moderate deviations irregardless of underlying patterns in reality.

CHAPTER VI

UPLAND GEOGRAPHICAL PATTERNS IN THE PROVINCE OF ANTIQUE, PHILIPPINES

This chapter presents an analysis of the upland geographical patterns in the Province of Antique. Based on the patterns identified in this chapter, implications for the planning of the Antique Upland Development program will be identified in the next chapter of this study.

This chapter is divided into four sections. In Section 1 the patterns of the physical landscape are discussed as a context for later discussions about the distribution and density of population. Section 2 utilizes the distribution of agricultural cultivation in the uplands as a proxy or indirect measure of population distribution and density. Section 3 utilizes census figures on population to present direct measures of population distribution and density. Section 4 provides a summary of important points in preparation for discussions of planning implications.

1. The Physical Landscape

The Province of Antique is located on the Island of Panay in the Western Visayas Region (NEDA Region VI) of the Philippines (see Figure 1 on p. 14). The province is bounded by Aklan Province in the north, Capiz Province in a small portion of the north central boundary, and Iloilo Province in the central portion and south.

There are eighteen municipalities in the province. Figure 5 shows the distribution and boundaries of these municipalities. The Municipality of Caluya (shown offset) is composed of three major islands with the poblacion located approximately 37.3 linear kilometers WNW from the western coastal tip of Libertad. All but three municipalities are coastal. The three largest municipalities of Valderrama, San Remigio, and Sibalom are inland.

Figure 5 also shows the administrative zones of the province used by the Antique Upland Development Program. This reflects a division of the province into three zones with five major upland municipalities per zone. The municipalities of Caluya, San Jose and Belison were generally not considered as upland for AUDP programming purposes.

Most definitions of uplands usually incorporate slope as a criterion. Some have defined uplands to be any land having greater than 3 % slope. In Antique, the definition has been modified to any land having 8 % slope or greater, including small areas of less than 8 % slope which are embedded in areas so defined. The 8 % slope criterion was chosen for three reasons: 1) most land between 3 % and 8 % slope in the province is adjacent to lowland plains or major river systems, 2) most of this land is terraced and is more characteristic of rainfed

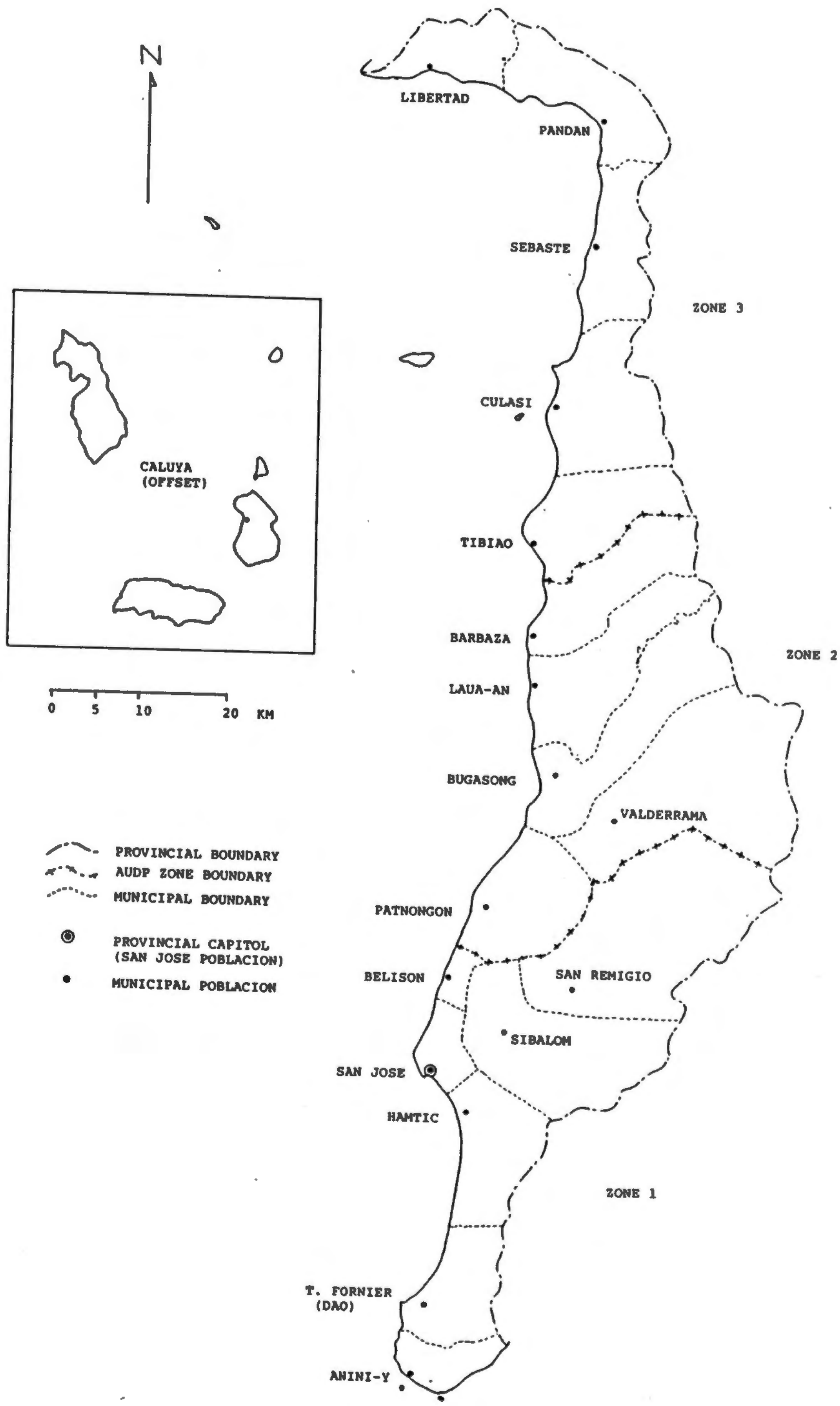

Figure 5. Map of municipal boundaries with AUDP administrative zone boundaries.

lowland than of upland cultivated areas, and 3) the amount of land involved is relatively insignificant being less than 5 percent of total land area.

Figure 6 presents the pattern of slope variation in the province. As can be seen from the map, most of the province may be defined as upland of 8 % or greater slope. Only a small portion of the province along the coast may be classified as lowland. Tables 1 and 2 present areas in each slope category by municipality.

Of the approximately 279,000 hectare or 2790 square kilometer land area of the province, only about 17 percent may be classified as lowland with a slope of less than 8 %. About 83 percent of the land area may be classified as upland of 8 % slope or greater.

Within the uplands, slopes of 30 % are deemed by some as the upper limit for environmentally compatible upland cultivation or use. Thus only about 30 percent of the total land area of the province may be considered as suitable to varying degrees for upland cultivation or use based on a slope criterion.

Most of the suitable upland area of between 8 % to 30 % slope is located in the south of the province with the southern zone having 55 percent of the provincial land area in that category. The Municipalities of San Remigio, Sibalom, and T. Fornier, all in the southern zone, stand out as having the greatest proportion of provincial land

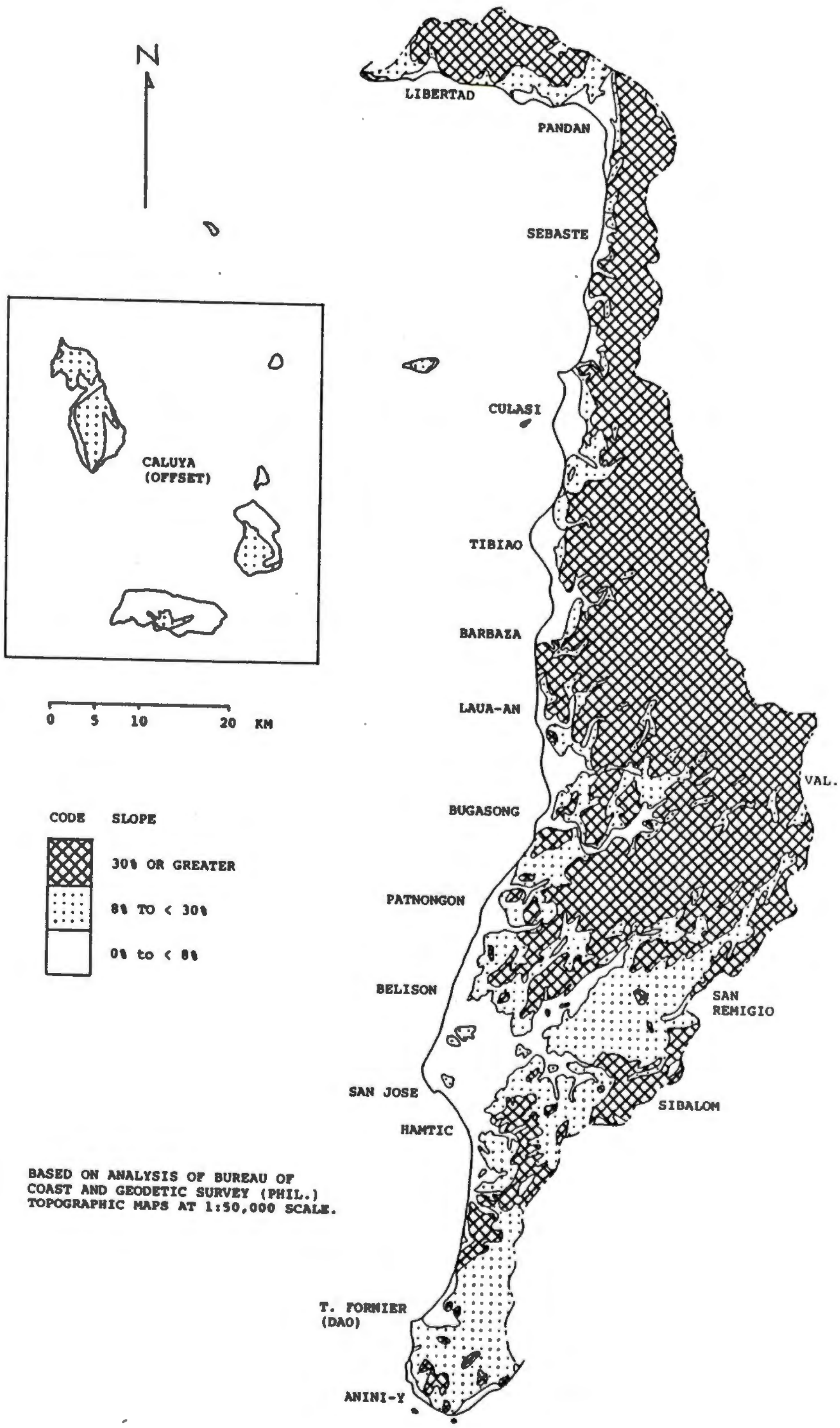

Figure 6. Slope category map.

Table 1. Slope category areas (in hectares) and percent of municipal area by municipality and zone.

Municipality and Zone	Slope Category 0-<8 % area	pct.	8-<30 % area	pct.	30 % -up area	pct.	Upland area	pct.	Total area	pct.
Anini-y	800	15	3425	66	975	19	4400	85	5200	100
T. Fornier	1250	11	8775	79	1050	9	9825	88	11075	100
Hamtic	3125	24	5175	39	5000	38	10175	77	13300	100
San Jose	4175	90	425	9	25	1	450	10	4625	100
Sibalom	6400	26	12850	52	5350	22	18200	74	26400	100
San Remigio	2300	6	14675	39	20425	55	35100	94	37400	100
Belison	1600	79	350	17	75	4	425	21	2025	100
Zone 1 South	19650	20	45675	47	32900	33	78575	80	98225	100
Patnongon	2775	19	6150	41	5900	40	12050	81	14825	100
Bugasong	2975	14	2800	14	14950	72	17750	86	20725	100
Valderrama	1725	5	6050	18	26150	77	32200	95	33925	100
Laua-an	1725	10	2350	13	13850	77	16200	90	17925	100
Barbaza	1775	12	1225	8	11600	79	12825	88	14600	100
Zone 2 Central	10975	11	18575	18	72450	71	91025	89	102000	100
Tibiao	1850	13	1725	12	10400	74	12125	87	13975	100
Culasi	3125	17	3525	20	11300	63	14825	83	17950	100
Sebaste	1325	12	1000	9	8950	79	9950	88	11275	100
Pandan	2150	16	4550	33	7175	52	11725	84	13875	100
Libertad	600	7	1550	19	6150	74	7700	93	8300	100
Zone 3 North	9050	14	12350	19	43975	67	56325	86	65375	100
Caluya	7500	56	5900	44	0	0	5900	44	13400	100
Province	47175	17	82500	30	149325	53	231825	83	279000	100

Note: all percent figures rounded to whole numbers. Thus rows may not total to 100 percent.

Table 2. Slope category areas (in hectares) and percent of provincial area by municipality and zone.

Municipality and Zone	Slope Category 0-<8 % area	pct.	8-<30 % area	pct.	30 % -up area	pct.	Upland area	pct.	Total area	pct.
Anini-y	800	2	3425	4	975	1	4400	2	5200	2
T. Fornier	1250	3	8775	11	1050	1	9825	4	11075	4
Hamtic	3125	7	5175	6	5000	3	10175	4	13300	5
San Jose	4175	9	425	1	25	*	450	*	4625	2
Sibalom	6400	14	12850	16	5350	4	18200	8	24600	9
San Remigio	2300	5	14675	18	20425	14	35100	15	37400	13
Belison	1600	3	350	*	75	*	425	*	2025	1
Zone 1 South	19650	42	45675	55	32900	22	78575	34	98225	35
Patnongon	2775	6	6150	7	5900	4	12050	5	14825	5
Bugasong	2975	6	2800	3	14950	10	17750	8	20725	7
Valderrama	1725	4	6050	7	26150	18	32200	14	33925	12
Laua-an	1725	4	2350	3	13850	9	16200	7	17925	6
Barbaza	1775	4	1225	1	11600	8	12825	6	14600	5
Zone 2 Central	10975	23	18575	23	72450	49	91025	39	102000	37
Tibiao	1850	4	1725	2	10400	7	12125	5	13975	5
Culasi	3125	7	3525	4	11300	8	14825	6	17950	6
Sebaste	1325	3	1000	1	8950	6	9950	4	11275	4
Pandan	2150	5	4550	6	7175	5	11725	5	13875	5
Libertad	600	1	1550	2	6150	4	7700	3	8300	3
Zone 3 North	9050	19	12350	15	43975	29	56325	24	65375	23
Caluya	7500	16	5900	7	0	0	5900	3	13400	5
Province	47175	100	82500	100	149325	100	231825	100	279000	100

* Less than .50 percent.

Note: all percent figures rounded to whole numbers. Thus, columns may not total to 100 percent.

area in that category, followed by Patnongon and Valderrama in the central zone, and Pandan in the north tying with Hamtic in the south.

Both Sibalom and T. Fornier along with the smaller municipality of Anini-y have a majority of their land area in land of between 8 % and 30 % slope. All three municipalities are in the southern zone. These are followed by Patnongon in in the central zone, Hamtic and San Remigio in the south again, and Pandan in the north.

The very steep and mountainous areas are concentrated in the central and northern zones of the province, especially from Valderrama and interior Bugasong north to the boundary of Culasi and Sebaste. Only San Remigio within the southern zone has a majority of its area in slopes of 30 % or greater. All municipalities except Patnongon in the central zone, and all municipalities in the north have a majority of their land in this category. Valderrama in the central zone and San Remigio in the southern zone have the highest percentage of provincial land area in the category of 30 % or greater slope, followed by Bugasong, Laua-an and Barbaza in the central zone, and Culasi and Tibiao in the north.

Figure 7 presents the pattern of elevation in the province. The highest points in the province are along the mountain crests following the provincial boundary from Valderrama to Culasi. The highest mountain is Madja-as in

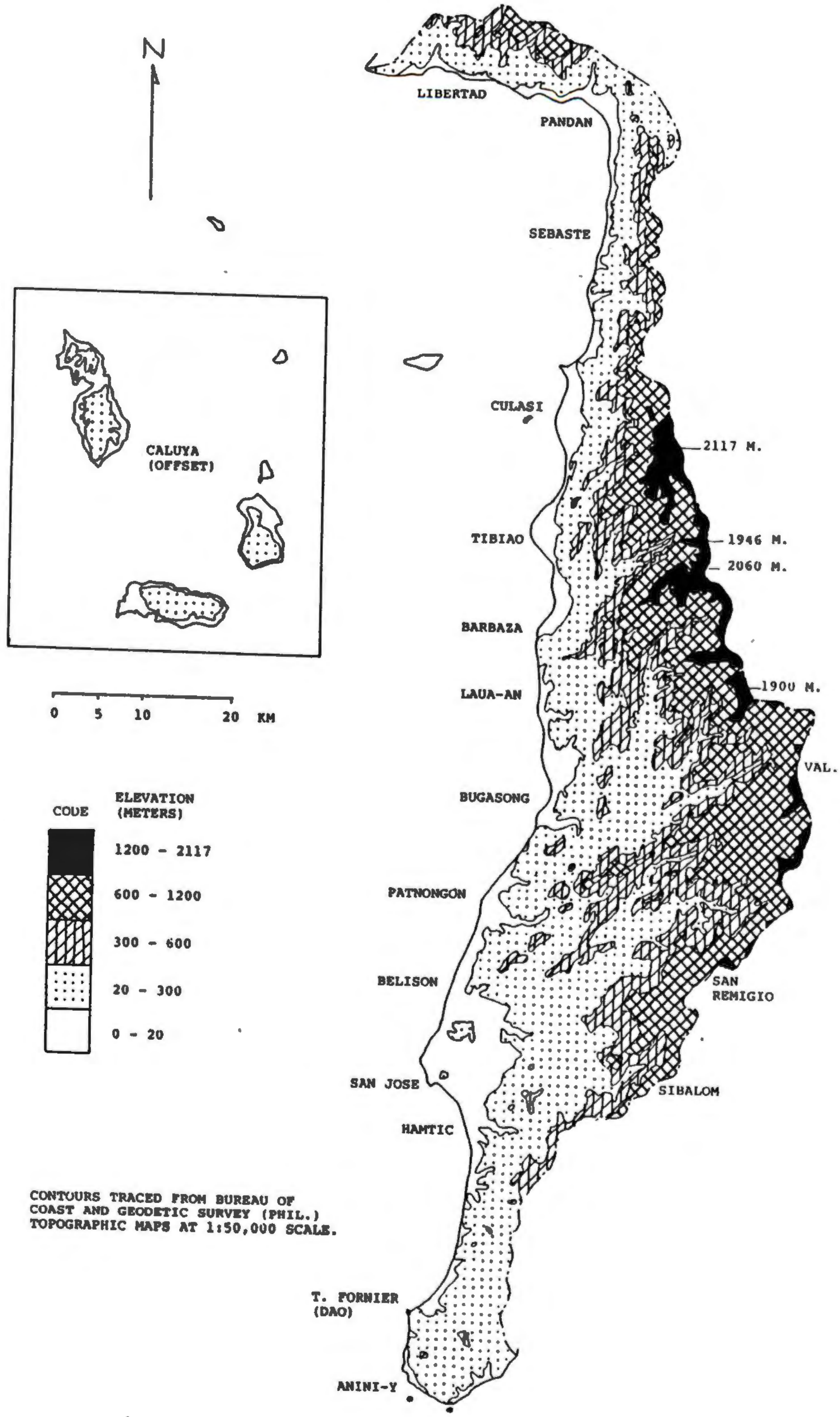

Figure 7. Elevation map.

Culasi (2117 meters) followed by Nangtud in Barbaza (2060 meters with an associated unnamed peak at 1964 meters) and Baloy on the Valderrama and Bugasong boundary (1900 meters). The elevation of the mountains decreases rapidly from Mount Madja-as to the north with the mountains in Sebaste generally ranging from 700 to 1000 meters and the mountains between Pandan and Libertad ranging up to 800 meters. To the south from Mount Baloy, the mountains again decrease rapidly in elevation to around 1000 to 1300 meters from Valderrama to the boundary of San Remigio and Sibalom, and again decrease to the range of 500 to 800 meters along the southern provincial boundary of Sibalom.

From the map it can be seen that most of the area of the province above 300 meters, and also above 600 meters, is concentrated in the central and northern zones of the province. Most of the area of the province below 300 meters is concentrated in the central and southern zones of the province.

A qualitative comparison of Figure 7 with Figure 6 shows that there is a distinct covariation between elevation and slope with higher elevations being associated with greater slopes, and lower elevations being associated with lesser slopes on the average. Also, the land of between 8 % and 30 % slopes which was identified above as being considered least restrictive for upland cultivation is associated more with land below 300 meters elevation in the southern and central zones of the province.

The land systems map presented in Figure 8 synthesizes information on both slope and elevation along with other important information on the physical landscape to define areas of similar land characteristics. There were 30 land systems identified by the Bureau of Soils and United Nations Development Program (BS/UNDP) land suitability mapping project for the Island of Panay, of which 18 were applicable to the Province of Antique. These land systems are listed in the legend to the map in Figure 7. Note that some of the land systems were combined and some were divided for this analysis.

Land systems 1, 2, 3, 4 and 5 were combined as undifferentiated lowland of generally less than 8 % slope. Land systems 17 and 22 were divided to account for substantial variation within these land systems found in analysis of other variables in this study. Land system 17 was divided based on the criterion of slope, with 17-A having most of its land area on slopes of less than 30 %, and 17-B having a substantial portion of its land area on slopes greater than 30 %. Land system 22 was divided into three parts to account for variation in elevation and substantial variation in both cultivation density and population density which are analyzed below in Sections 2 and 3 of this chapter. Land system 22-A was found to

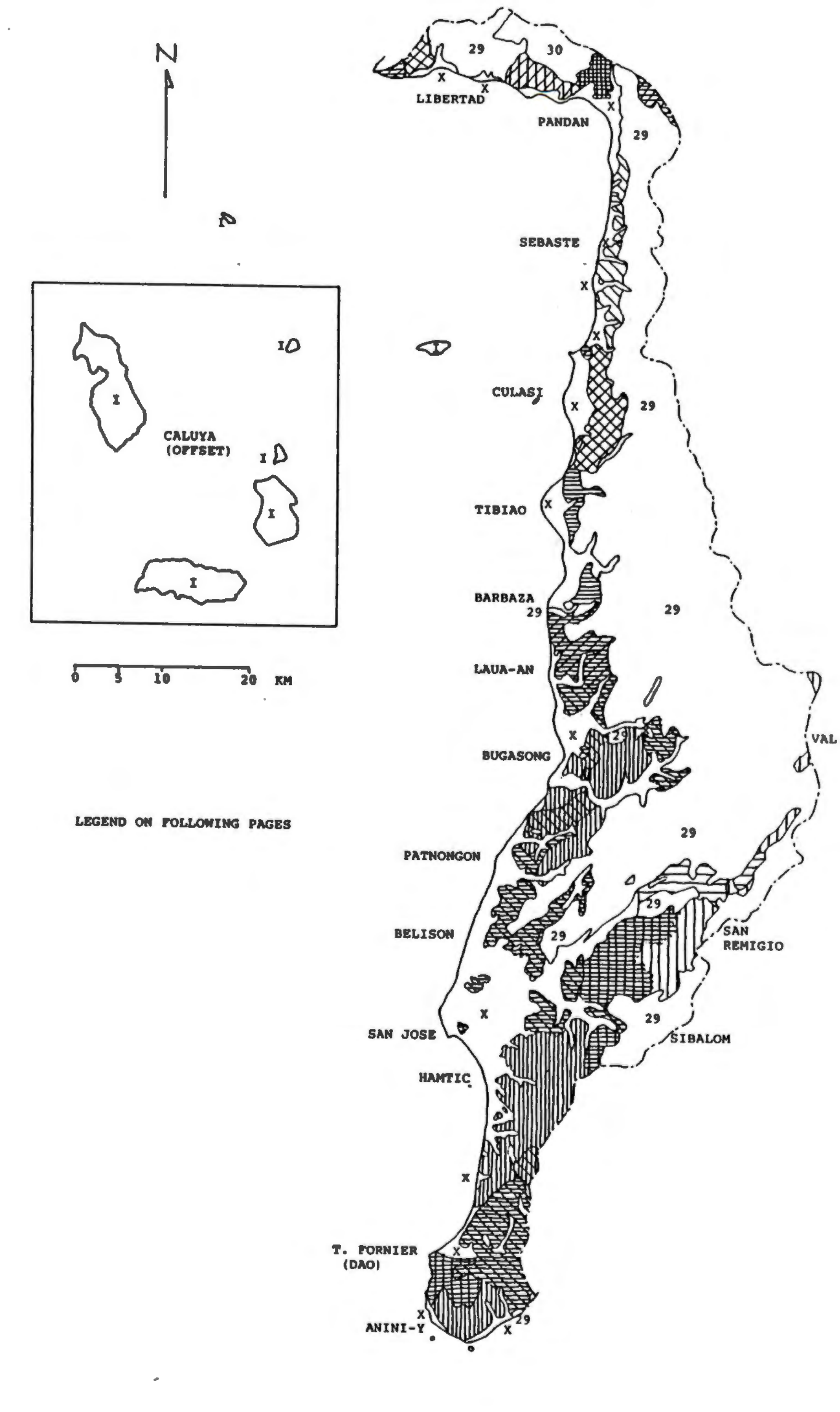

Figure 8. Land systems map.

LAND SYSTEMS LEGEND

CODE	BS/ UNDP CODE	SUB-CLASS	LANDSCAPE/PHYSIOGRAPHY	ELEVATION (METERS)	SLOPE MAJOR/ MINOR AREA	GEOLOGY/ PARENT MATERIAL	SOIL. DOMINANT TEXTURES	SOIL. DOMINANT pH RANGE	SOIL. FERTILITY LEVEL	CULTIVATION DENSITY MAJOR/MINOR AREA	SPECIAL CHARACTERISTICS OR CONSTRAINTS
X	1,2, 3,4, 5		UNDIFFERENTIATED LOWLAND MAINLY ALLUVIAL FANS AND PLAINS WITH RIVER TERRACES AND FLOOD PLAINS	-	-	-	-	-	-	-	-
	7		SMOOTH-SIDED SEDIMENTARY LOW HILLS WITH ASSOCIATED NARROW ALLUVIAL VALLEYS	20-<100	18-30%/ -	CONGLOMERATE	CLAY, CLAY LOAM	5.4-6.9	HIGH	HIGH/ MEDIUM	VERY HEAVY CULTIVATION OF COCONUT OVER MUCH OF THE AREA
	15		HIGHLY DISSECTED STEEP MEDIAN HILLS WITH OCCASIONAL NARROW VALLEYS	20-<300	18-30%/ 30-50%	MAINLY IGNEOUS DIORITE ROCKS WITH ASSOCIATED AGGLOMERATES	LOAM, CLAY LOAM SANDY LOAM	AROUND 5.2	MEDIUM TO LOW	NONE/ LOW	MINOR CULTIVATION IN NARROW INFILLED VALLEYS
	16		KARST LANDSCAPE MEDIAN HILLS WITH MINOR ALLUVIAL VALLEYS AND SOLUTION DEPRESSIONS	20-500	18-30%/ 30-50%	CORALLINE/ REEFS/BIOCLASTIC LIMESTONES	CLAY, CLAY LOAM	AROUND 7.3	HIGH	NONE/ LOW	VERY STONY AND ROCKY,
	17	A	HIGHLY DISSECTED SEDIMENTARY MEDIAN FOOTHILLS WITH OCCASIONAL MINOR ALLUVIAL VALLEYS	20-<300	18-30%/ 8-18%	INTERBEDDED SANDSTONE, CONGLOMERATE WITH SILTSTONE AND SHALE	CLAY, CLAY LOAM SILTY CLAY	6.0-7.3	HIGH	HIGH/ MEDIUM	ONE OF THE MAIN, UPLAND AGRICULTURAL RESOURCE BASES
	17	B	(SAME AS ABOVE 17 A)	20-<300	30-50%/ 18-30%	(SAME AS ABOVE 17 A)	CLAY, CLAY LOAM SILTY CLAY	6.0-7.3	HIGH	HIGH/ MEDIUM	HIGH DENSITY OF BUNDED LAND ON STEEP SLOPES
	18		MODERATELY DISSECTED SEDIMENTARY MEDIAN HILLS WITH LONG SIDE SLOPES AND ROUNDED RIDGES	20-300	18-30%/ 8-18%	SANDSTONE AND SHALE WITH INTERBEDDED CONGLOMERATE AND SILTSTONE	CLAY, CLAY LOAM SANDY CLAY	AROUND 5.8	HIGH	HIGH/ MEDIUM	LONG SIDE SLOPES CONDUCIVE TO BUNDED CULTIVATION
	19		MODERATELY STEEP TO STEEP MEDIAN HILLS: ASSOCIATION OF VOLCANIC HILLS WITH SHARP RIDGES, AND SCATTERED LIMESTONE HILLS	20-300	18-30%/ 30-50%	CORALLINE LIMESTONE, BASALT/ ANDESITE COMPLEX	CLAY, LOAM	5.2-7.8	MEDIUM TO LOW	LOW/ MEDIUM	CULTIVATION MAINLY ON FOOT SLOPES

Figure 8. (continued)

LAND SYSTEMS LEGEND (CONTINUED)

CODE	BS/ UNDP CODE	SUB-CLASS	LANDSCAPE/PHYSIOGRAPHY	ELEVATION (METERS)	SLOPE MAJOR/ MINOR	GEOLOGY/ PARENT MATERIAL	SOIL			CULTIVATION DENSITY MAJOR/MINOR AREA	SPECIAL CHARACTERISTICS OR CONSTRAINTS
							DOMINANT TEXTURES	DOMINANT pH RANGE	FERTILITY LEVEL		
	21		MODERATELY TO HIGHLY DISSECTED STEEP SEDIMENTARY HIGH HILLS	20-<600	30-50%/ 18-30%	SANDSTONE, CONGLOMERATE INTERBEDDED WITH SILTSTONE AND SHALE	CLAY, CLAY LOAM SILTY OR SANDY CLAY LOAM	4.3-5.7	LOW	LOW/ MEDIUM	CULTIVATION MAINLY ON FOOT SLOPES
	22	A	SLIGHTLY DISSECTED METAMORPHIC HIGH HILLS WITH LONG SIDESLOPES	20-600	8-18%/ 18-30%	BASEMENT COMPLEX, MAINLY SCHIST, SLATE WITH QUARTZITE AND CHERT	CLAY, CLAY LOAM	5.9-7.3	HIGH	HIGH/ MEDIUM	LONG SIDE SLOPES CONDUCIVE TO BUNDED CULTIVATION, ONE OF THE MAJOR UPLAND RESOURCE BASES
	22	B	(SAME AS ABOVE 22 A)	100-600	18-30%/ 30-50%	(SAME AS ABOVE 22 A)	CLAY, CLAY LOAM	5.9-7.3	HIGH	NONE/ MEDIUM	GREATER SLOPE AND REMOTENESS MAY BE FACTORS LIMITING CULTIVATION TO MORE ACCESSIBLE FOOT SLOPES, MAINLY BARREN LAND IN GRASS
	22	C	(SAME AS ABOVE 22 A)	600-1200	18-30%/ 8-18%	(SAME AS ABOVE 22 A)	CLAY, CLAY LOAM	5.9-7.7	HIGH	NONE/ LOW	REMOTENESS AND ELEVATION MAY BE FACTORS LIMITING CULTIVATION, SOME FOREST ON UPPER SLOPES, MAINLY BARREN LAND IN GRASS
	23		MODERATELY TO HIGHLY DISSECTED VOLCANIC HIGH HILLS WITH SHARP AND ROUNDED RIDGES	20-100	30-50%/ 18-30%	BASALT FLOWS, AGGLOMERATES WITH ANDECITE AND DACITE, GREENSTONE	CLAY, SANDY CLAY OR CLAY LOAM	4.2-6.2	LOW	NONE/ MEDIUM	STONY AND ROCKY, CULTIVATION LIMITED TO FOOT SLOPES
29	29		MODERATELY TO HIGHLY DISSECTED VOLCANIC MOUNTAINS	100-2117	50%-UP/ 30-50%	MAINLY VOLCANICS, SLIGHTLY METAMORPHOSED SANDSTONE, ARGILLITES	CLAY, SANDY OR SILTY CLAY	5.4-6.3	MEDIUM	NONE	MAINLY BARREN LAND IN GRASS OR GRASS WITH SHRUB AND BRUSH WITH SCATTERED TREES, BUT FORESTED ON REMOTE UPPER SLOPES
30	30		MODERATELY TO HIGHLY DISSECTED METAMORPHIC MOUNTAINS	100-800	50%-UP/ 30-50%	PRE-JURASSIC MARBLE	CLAY	-	-	NONE	MAINLY FORESTED, SOME SPORADIC MINING OF MARBLE
I	-		UNDIFFERENTIATED ISLANDS	-	-	-	-	-	-	-	THE MUNICIPALITY OF CALUYA AND SMALL ISLANDS OFF THE COAST OF CULASI AND ANINI-Y HAVING MINOR UPLAND CULTIVATION

SOURCE: ADAPTED FROM PHILIPPINES, MINISTRY OF AGRICULTURE, BUREAU OF SOILS, LAND RESOURCES EVALUATION OF PANAY FOR AGRICULTURE (MANILA, 1981). (ACCOMPANIED BY LAND SYSTEMS MAP AND OTHER MAPS.)

Figure 8. (continued)

contain a much higher agricultural cultivation density than the remainder of the land system, 22-B contained much less density of cultivation, and 22-C contained even less density of cultivation and was located on land above 600 meters.

The island classification (I) is a mainly residual category to account for areas not covered in the "Land Systems Map of Panay" from which the land systems map used in this study was adapted. The islands of the province were left in a separate undifferentiated category for two reasons: 1) they have a distinct island character more marine oriented and not necessarily comparable to upland characteristics on the mainland, and 2) although the islands do have upland areas as defined by the slope criterion, the productive activity on the sloping land is relatively minor.

Tables 3, 4 and 5 present information on the area and relative area within each land system by municipality. Lowlands account for about 14 percent of the total provincial land area. This is less than the 17 percent of land area defined above as lowland based on a simple slope criterion, mainly because the undifferentiated island category contains substantial lowlands.

Mountainous land under land systems 29 and 30 accounts for approximately 49 percent of the total provincial land area. The mountains of the province are

Table 3. Land system areas (in hectares) by land system and municipality.

Municipality and Zone	Lowland area	Land Systems and Upland Hill Height (Low, Median, High) Low LS 7 area	Median LS 15 area	Median LS 16 area	Median LS 17A area	Median LS 17B area	Median LS 18 area	Median LS 19 area	High LS 21 area	High LS 22A area	High LS 22B area	High LS 22C area	High LS 23 area	Hills Subtotal area	Mountains area	Islands area	Total area
Anini-y	875	-	-	-	675	-	-	-	2925	625	-	-	-	4225	50	50	5200
T. Fornier	1125	-	-	-	7175	-	75	-	850	1850	-	-	-	9950	-	-	11075
Hamtic	3150	-	-	-	25	-	775	-	9350	-	-	-	-	10150	-	-	13300
San Jose	4075	-	-	-	550	-	-	-	-	-	-	-	-	550	-	-	4625
Sibalom	6500	-	-	-	4875	-	-	-	2750	3550	-	550	-	11725	6375	-	24600
San Remigio	2125	-	-	-	500	-	-	-	-	5050	3375	4750	-	13675	21600	-	37400
Belison	1625	-	-	-	400	-	-	-	-	-	-	-	-	400	-	-	2025
Zone 1 South	19475	-	-	-	14200	-	850	-	15875	11075	3375	5300	-	50675	28025	50	98225
Patnongon	3150	-	-	-	3500	-	1575	-	2700	-	-	-	-	7775	3900	-	14825
Bugasong	3075	-	-	-	375	-	1100	-	3200	-	-	-	-	4675	12975	-	20725
Valderrama	2000	-	-	-	1525	-	200	-	1575	-	-	975	-	4275	27650	-	33925
Laua-an	1375	-	-	-	2325	2450	-	-	-	-	-	-	-	4775	11775	-	17925
Barbaza	1825	-	-	-	-	675	-	1075	-	-	-	-	-	1750	11025	-	14600
Zone 2 Central	11425	-	-	-	7725	3125	2875	1075	7475	-	-	975	-	23250	67325	-	102000
Tibiao.	1800	-	-	650	-	-	-	1525	-	-	-	-	-	2175	10000	-	13975
Culasi	2700	-	-	4350	-	175	-	-	-	-	-	-	475	5000	9625	625	17950
Sebaste	1250	-	-	-	-	-	-	-	-	-	-	-	2750	2750	7275	-	11275
Pandan	2125	1425	1975	-	-	675	-	-	-	-	-	-	50	4125	7625	-	13875
Libertad	675	-	100	775	325	-	-	-	-	-	-	-	-	1200	6425	-	8300
Zone 3 North	8550	1425	2075	5775	325	850	-	1525	-	-	-	-	3275	15250	40950	625	65375
Caluya	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13400	13400
Province	39450	1425	2075	5775	22250	3975	3725	2600	23350	11075	3375	6275	3275	89175	136300	14075	279000

Table 4. Land system areas as percent of municipal area by land system and municipality.

Municipality and Zone	Lowland pct.	Land Systems and Upland Hill Height (Low, Median, High): Low LS 7 pct.	Median LS 15 pct.	Median LS 16 pct.	Median LS 17A pct.	Median LS 17B pct.	Median LS 18 pct.	Median LS 19 pct.	High LS 21 pct.	High LS 22A pct.	High LS 22B pct.	High LS 22C pct.	High LS 23 pct.	Hills Subtotal pct.	Mountains pct.	Islands pct.	Total pct.
Anini-y	17	-	-	-	13	-	-	-	56	12	-	-	-	81	1	1	100
T. Fornier	10	-	-	-	65	-	1	-	8	17	-	-	-	90	-	-	100
Hamtic	24	-	-	-	*	-	6	-	70	-	-	-	-	76	-	-	100
San Jose	88	-	-	-	12	-	-	-	-	-	-	-	-	12	-	-	100
Sibalom	26	-	-	-	20	-	-	-	11	14	-	2	-	48	26	-	100
San Remigio	6	-	-	-	1	-	-	-	-	14	9	13	-	37	58	-	100
Belison	80	-	-	-	20	-	-	-	-	-	-	-	-	20	-	-	100
Zone 1 South	20	-	-	-	14	-	1	-	16	11	3	5	-	52	29	*	100
Patnongon	21	-	-	-	24	-	11	-	18	-	-	-	-	52	26	-	100
Bugasong	15	-	-	-	2	-	5	-	15	-	-	-	-	22	63	-	100
Valderrama	6	-	-	-	4	-	1	-	5	-	-	3	-	13	82	-	100
Laua-an	8	-	-	-	13	14	-	-	-	-	-	-	-	27	66	-	100
Barbaza	12	-	-	-	-	5	-	7	-	-	-	-	-	12	76	-	100
Zone 2 Central	11	-	-	-	8	3	3	1	7	-	-	1	-	23	66	-	100
Tibiao	13	-	-	5	-	-	-	11	-	-	-	-	-	16	72	-	100
Culasi	15	-	-	24	-	1	-	-	-	-	-	-	3	28	54	3	100
Sebaste	11	-	-	-	-	-	-	-	-	-	-	-	24	24	65	-	100
Pandan	15	10	14	-	-	5	-	-	-	-	-	-	*	30	55	-	100
Libertad	8	-	1	9	4	-	-	-	-	-	-	-	-	14	77	-	100
Zone 3 North	13	2	3	9	1	1	-	2	-	-	-	-	5	23	63	1	100
Caluya	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	100
Province	14	1	1	2	8	1	1	1	8	4	1	2	1	32	49	5	100

* Less than .50 percent.

Note: percent figures rounded to whole numbers. Thus, rows may not total to 100 percent.

Table 5. Land system areas as percent of provincial area by land system and municipality.

Municipality and Zone	Lowland pct.	Low LS 7 pct.	Median LS 15 pct.	Median LS 16 pct.	Median LS 17A pct.	Median LS 17B pct.	Median LS 18 pct.	Median LS 19 pct.	High LS 21 pct.	High LS 22A pct.	High LS 22B pct.	High LS 22C pct.	High LS 23 pct.	Hills Subtotal pct.	Mountains pct.	Islands pct.	Total pct.
		Land Systems and Upland Hill Height (Low, Median, High)															
Anini-y	2	-	-	-	3	-	-	-	13	6	-	-	-	5	*	*	2
T. Fornier	3	-	-	-	32	-	2	-	4	17	-	-	-	11	-	-	4
Hamtic	8	-	-	-	*	-	21	-	40	-	-	-	-	11	-	-	5
San Jose	10	-	-	-	2	-	-	-	-	-	-	-	-	1	-	-	2
Sibalom	16	-	-	-	22	-	-	-	12	32	-	9	-	13	5	-	9
San Remigio	5	-	-	-	2	-	-	-	-	46	100	76	-	15	16	-	13
Belison	4	-	-	-	2	-	-	-	-	-	-	-	-	*	-	-	1
Zone 1 South	49	-	-	-	64	-	23	-	68	100	100	84	-	57	21	*	35
Patnongon	8	-	-	-	16	-	43	-	12	-	-	-	-	9	3	-	5
Bugasong	8	-	-	-	2	-	30	-	14	-	-	-	-	5	8	-	7
Valderrama	5	-	-	-	7	-	5	-	7	-	-	16	-	5	20	-	12
Laua-an	3	-	-	-	10	62	-	-	-	-	-	-	-	5	9	-	6
Barbaza	4	-	-	-	-	17	-	41	-	-	-	-	-	2	8	-	5
Zone 2 Central	29	-	-	-	35	79	77	41	32	-	-	16	-	26	49	-	37
Tibiao	5	-	-	11	-	-	-	59	-	-	-	-	-	2	7	-	5
Culasi	7	-	-	75	-	4	-	-	-	-	-	-	14	6	7	4	6
Sebaste	3	-	-	-	-	-	-	-	-	-	-	-	84	3	5	-	4
Pandan	5	100	95	-	-	17	-	-	-	-	-	-	2	5	6	-	5
Libertad	2	-	5	13	1	-	-	-	-	-	-	-	-	1	5	-	3
Zone 3 North	22	100	100	100	1	21	-	59	-	-	-	-	100	17	30	4	23
Caluya	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	95	5
Province	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

* Less than .50 percent.

Note: percent figures rounded to whole numbers. Thus, rows may not total to 100 percent.

generally above 100 meters and of greater than 50 % slope but with some substantial areas of between 30 % to 50 % slope in the central zone of the province. Very little if any agricultural activity occurs on this land.

Excluding the lowlands, the islands, and the essentially unproductive mountains leaves approximately 32 percent of the province on upland hills of various heights. Most of the hills in the province are below 300 meters, although some of the higher hills reach up to 1200 meters. Most of the hills are of less than 30 % slope, although some may reach up to around 50 % slope.

There is less than one percent of the provincial land area which may be characterized as low hills of less than 100 meters elevation, and this land system 7 is located in Pandan. The remainder of the upland hill area may be characterized as median to high hills, with median hills generally being less than 300 meters in elevation and high hills generally reaching at least to 600 meters elevation with a maximum in the province of about 1200 meters.

The median hills have land system numbers less than 20. Most of the hills were formed from sedimentary material (17-A, 17-B, and 18) but with some being formed as a part of a karst landscape (16) or from an igneous or volcanic base (15 and 19).

The non-sedimentary median hills are concentrated in the north and show relatively less agricultural activity indicating relatively greater physical constraints to cultivation. Land system 15 shows low cultivation density mainly in narrow infilled valleys within a highly dissected[1] landscape forming relatively steeper hill slopes. The soil base of land system 15 is acidic and of relatively low fertility. Land system 16 is characterized as a karst formation referring to the process of water dissolving the underlying limestone base to give an uneven landscape with solutional depressions[2] and a stony surface. It is probably the stony surface, and to a lesser degree the relatively steeper slopes, which form the physical constraints to cultivation in land system 16. Land system 19 shows a greater localized cultivation density mainly limited to footslopes. The main limiting factors to cultivation in land system 19 may be the acidic soil base on the foot slopes, the relatively low fertility of the soil, and the relatively steep side slopes.

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[1]Dissected means that the landscape is cut into hills and drainage valleys formed by long term erosional forces. A highly dissected landscape has more hills and valleys per comparable area than a less dissected landscape.

[2]Solutional depressions form when the underlying limestone rock formations dissolve unevenly with a centrally greater dissolution of the rock base than in the surrounding area. This leaves a low point in the landscape surrounded on all sides by higher land.

The non-sedimentary median hills showing substantial physical constraints to upland cultivation account for approximately 4 percent of the provincial land area. Land systems 15 and 16 are concentrated exclusively in the northern zone of the province. Land system 15 is concentrated in Pandan and forms the greatest proportion of upland hills in that municipality. Land system 16 is concentrated in Culasi and forms the greatest proportion of upland hills in that municipality. Land system 19 is concentrated on the boundary of the central and northern zones and forms the greatest proportion of upland hills in both Barbaza and Tibiao.

The median hill land systems 17-A, 17-B and 18 which are sedimentary in formation show much greater agricultural activity indicating relatively fewer physical constraints to cultivation. All three land systems combined account for approximately 11 percent of the provincial land area. The less steep land system 17-A shows greatest concentration in T. Fornier and Sibalom in the southern zone and in Patnongon on the boundary of the central and southern zone. This land system also accounts for the greatest proportion of upland hills in each of the three municipalities with T. Fornier having 65 percent of its total land area in this land system. The more steeply sloping land system 17-B shows greatest concentration in Laua-an, and along with the associated land system 17-A accounts for all of the upland hill land systems in the municipality. Land system 18 is most concentrated in Patnongon and Bugasong in the central zone followed by Hamtic in the southern zone, but accounts for relatively less of the upland hill land systems in each of the municipalities.

Land systems 17-A and 17-B are distinguished only by differences in average slope. Both are highly dissected hill systems with high fertility soils. Land system 17-B shows substantial agricultural activity on slopes greater than 30 % indicating that slope is not a major constraint in this land system. Land system 18 is a moderately dissected hill system leaving long, relatively uninterrupted side slopes having high fertility soils conducive to agricultural activity.

The high hills have land system numbers above 20. These hills generally rise in elevation above 300 meters with 600 meters usually being the extent of elevation, although some hills rise to 1200 meters. Land system 21 accounts for about 8 percent of the provincial land area and was formed from sedimentary material. Land systems 22-A, 22-B, and 22-C account for about 7 percent of the provincial land area and were formed from a metamorphic base. Land system 23 accounts for only about 1 percent of provincial land area and was formed on a volcanic base.

Land systems 21 and 23 show low agricultural activity confined mainly to foot slopes. This would indicate relatively greater physical constraints to cultivation associated with the acidic and low fertility soils and greater slopes in a highly dissected landscape. Land system 21 is exclusive to the southern and central zones of the province and shows greatest provincial concentration in Hamtic where the land system also accounts for 70 percent of the municipal land area. Land system 23 is exclusive to the northern zone of the province and shows greatest provincial concentration in Sebaste where the land system accounts for all of the upland hill area in the municipality.

Land systems 22-A, 22-B, and 22-C were originally one land system in the BS/UNDP study, but the single land system designation showed such great internal variation that it was divided for this study. All three land systems were formed from a metamorphic base, and are for the most part only slightly dissected leaving long uninterrupted side slopes of moderate steepness. Land system 22-A shows the least dissection of the three and the least slope. It also has high agricultural activity on fertile long side slopes conducive to cultivation. Land system 22-B shows greater dissection and steeper slopes which, along with physical remoteness, may account for the lower agricultural activity. Land system 22-C is very similar to 22-A but is located on elevations above 600 meters. Both elevation and physical remoteness may account for the low agricultural activity in land system 22-C.

Land system 22-A shows greatest concentration in San Remigio and Sibalom, exclusive to the southern zone. Land system 22-B is exclusive to San Remigio. Land system 22-C is concentrated in San Remigio. All three land systems combined account for almost all of the upland hill land base of San Remigio but with the less productive 22-B and 22-C taking the larger portion.

All of the above hill land systems which show limitations for agricultural activity--15, 16, 19, 21, 22-B, 22-C, and 23--constitute about 17 percent of the total provincial land area and about 52 percent of the upland hill land systems combined. What is even more important, the land systems 15, 16, 19 and 23 account for almost all of the non-mountainous uplands in the north of the province from Barbaza to Libertad. In addition, land system 21 accounts for a large proportion (about one-third) of the non-mountainous upland area in the south of the province from Laua-an to Anini-y.

The hill land systems showing less physical restrictions to upland cultivation are concentrated on four main land system types constituting about 15 percent of the total provincial land area and about 48 percent of the upland hill base. These land system types are 17-A, 17-B, 18, and 22-A. They are generally characterized by slopes of less than 30 %, elevation of less than 300 meters, high fertility, and high concentration of upland cultivation. They are also largely limited to the central and southern zones of the province from Laua-an to Anini-y. This characterization of the main upland agricultural base of the province does have exceptions. There are large areas of dense cultivation on slopes above 30 % in Laua-an, and dense cultivation extends well above 300 meters and up to about 900 meters on the high hills with long side slopes in San Remigio and Sibalom.

There is a variation in climate in the province which may also affect the pattern of agricultural activity from north to south and from the lowlands to the mountains. The far north of the province from about Sebaste to Libertad is characterized by a relatively long rainy season of about eight months and a relatively short dry season of about four months. The remainder of the province is characterized by a distinct six month rainy season, usually from May to November, in which months about 90 percent of the rainfall occurs, followed by a dry season of about six months usually from December to May again. Generally, the farther north, the less severe is the dry season.

The reason for the variation from north to south is the relationship between seasonal monsoon winds and the mountain chain dividing the province from the rest of

Panay island. The province is influenced by the monsoon coming from the south-west during the months of May to November. This monsoon hits the mountains in the province and forms rainclouds which provide the rain in the rainy season. The main exception to this is in the far south of the province where there are no significant mountains which could form clouds during the early and late part of the monsoon. The southwest monsoon period is also the typhoon season in the Philippines, and although the province is not in the typhoon belt, it does get the peripheral effects of typhoons and storms occurring in the north of the Philippines and at times gets hit by a typhoon which travels south of regular paths.

The monsoon coming from the north-east from about December to May is more gentle and hits the mountains on the opposite side of the provincial mountain divide. Thus most of the rain occurs in the other provinces of the island and only a limited amount falls in the high mountains. This monsoon also affects the northern most municipalities of the province since the mountains there are lower and thus do not entirely cut off the rains that the monsoon brings.

Comparative rainfall data for the whole province was not available since there were only a few rain stations and most of these were in the lowlands. However, it has been estimated that the lowlands get around 3000 mm

(118 inches) of rain per year and that the high mountains get around 4000 mm (157 inches) per year.[3] Again, the variation is related to the monsoons and greater cloud formation in the mountains.

Temperature variation from north to south is insignificant with a mean annual temperature of around 27 degrees centigrade (81 degrees fahrenheit). The coldest weather occurs in January with a mean temperature of around 21 degrees centigrade (70 degrees fahrenheit).[4] Temperature does vary substantially from the lowlands to the cooler, higher elevations, and deforested lands to the cooler microclimate of the forests, but there is no formal measure of the difference.

Overall, there probably is not much difference between the lowlands and the agriculturally active uplands in regard to rainfall and temperature. Most of the difference is confined to the mainly unproductive mountains. The one significant exception to this is the agriculturally active land above 300 meters in San Remigio and Sibalom which is usually wetter and cooler than the lower slopes.

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[3]Philippines, Bureau of Soils, Land Resources Survey of Panay, p. 15.

[4]Bouchet, et. al., The Farming System in the Uplands of the South of Antique Province, p. 3.

2. Agricultural Activity

Figure 9 presents the general pattern of land cover or use in the province. The geographic pattern of land cover or use may be characterized as a progression up slope and elevation of: 1) lowland paddy agriculture, 2) upland bunded agriculture or pasture, 3) barren grasslands or grass lands mixed with shrub and brush and some scattered trees, 4) thick shrub, brush and trees or disturbed forest, and 5) undisturbed primary forest.

Most agricultural activity, as well as other economic activity, is concentrated in the lowland plains or wide river valleys and is most concentrated along the coast. Upland agricultural activity is less concentrated and more extensive than in the lowlands. Most upland agricultural areas begin at the boundary of the lowlands and reach well into the interior of the province, but generally do not reach to the boundary of the primary forest.

Between the lowland-upland agriculturally active areas and the primary forest there exist wide stretches of barren land in grass or grass mixed with shrub and brush and scattered trees. These barren lands become noticeable as far north as Pandan and Sebaste but are most prominent from Tibiao south to San Remigio where high and steep mountains predominate.

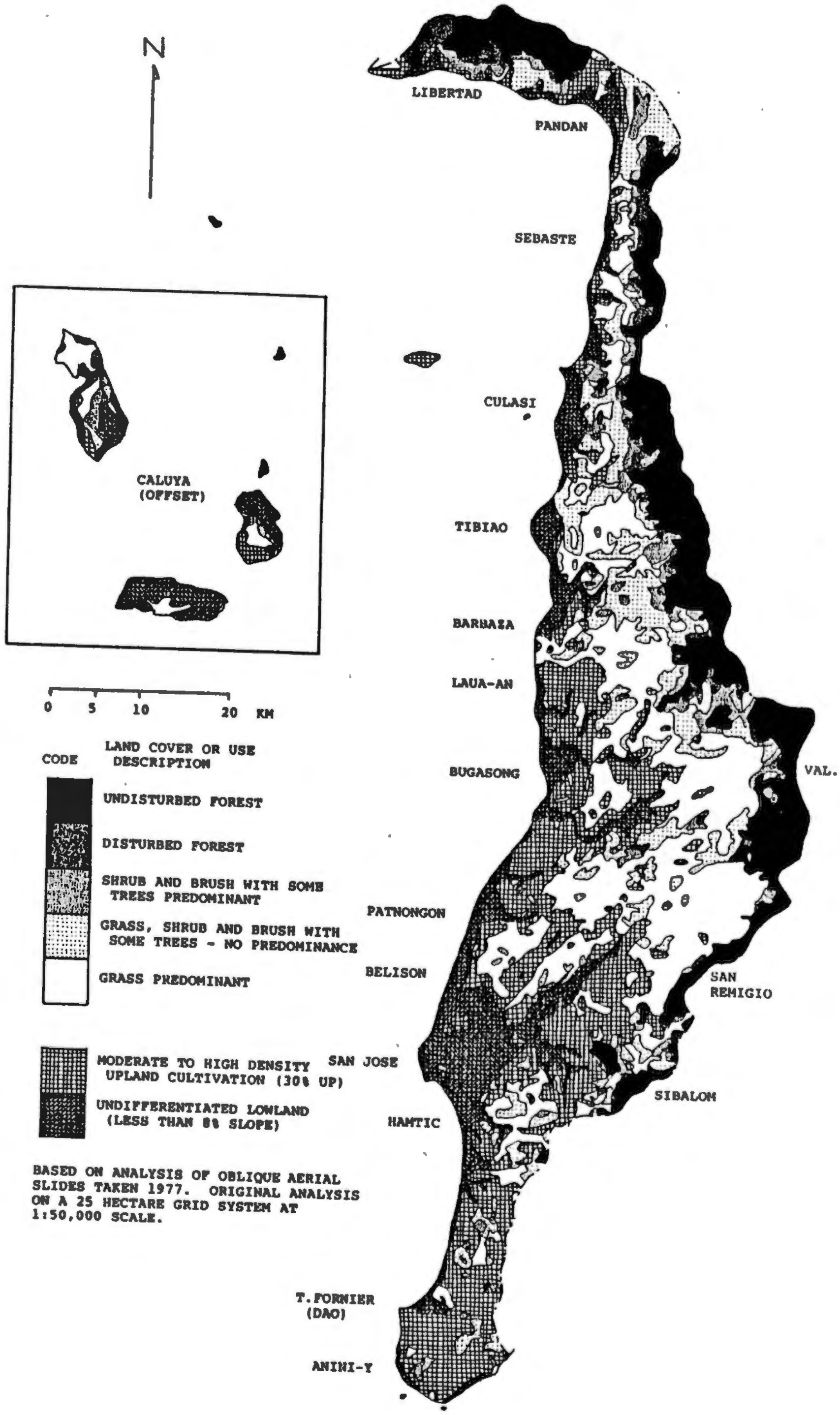

Figure 9. Generalized agricultural land use and vegetative cover map.

Most of the grass lands or mixed grass with shrub and brush areas are located on steep mountain slopes below 600 to 1200 meters elevation. The most noticeable exception to this is in San Remigio where there is substantial barren land on relatively gentle upland hill slopes usually above 600 meters but extending also to lower elevations.

Although the mountains are mainly barren and inhospitable, there does exist some very scattered agricultural activity throughout the area along river channels and on small pockets of less steep land within the steep mountains. Even within the areas designated as moderate to high density upland cultivation in Figure 9, much of the land may also be barren grass or shrub and brush.

The barren gap between the upland agricultural areas and the primary forest has been noted by others, but speculation on why this area exists is mixed. Some say that the barren lands of grass, shrub and brush are old upland slash-and-burn areas which had to be abandoned due to soil depletion, leaving settled agricultural communities on the lesser slopes of the foothills and a frontier of slash-and-burn cultivators at the fringe of the forest in the mountains.

Others have speculated that at least some of the area may be in grass lands or shrub and brush as a consequence of natural phenomena. The natural phenomena may have been lightning caused fires which destroyed the forest cover, or local constraints which favored a non-forest cover. This may be especially true on the very steep slopes where grass is most prevalent.[5]

Whatever the initial cause, there is some evidence that these areas of barren land are perpetuated by human activity, at least at the fringe of active upland agricultural areas. Each year during the dry season, much of these lands are burned by the upland inhabitants. Many of the fires are started to burn off old grass from the previous season to allow new shoots to come up so that cattle may have fresh grazing areas. The fires often, and almost always, burn out of the useful grazing areas onto the steep barren slopes. This is especially noticeable each year in the north at the boundary of Barbaza and Tibiao where there is a relatively unobstructed view of steep mountains up the Dalanas river.

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[5]There seems to be no definitive work on the origins of grasslands in the tropics. However, most authors conclude that the majority of the grasslands in southeast asia were formed by man. Ronald E. Sevoy, "The Origin of Tropical Grasslands in Kalimantan, Indonesia," The Journal of Tropical Geography 40 (June 1975): 48-52, provides a very interesting look into the dynamics involved in one area of southeast asia. J. S. Singh, W. K. Lauenroth, and D. C. Milchunas, "Geography of Grassland Ecosystems," Progress in Physical Geography 7 (March 1983): 46-80, provides a comprehensive world view of grasslands and speculation on their origin.

This is not the burning of formerly idle land as in swidden or slash-and-burn agriculture. This is the repeated burning of unproductive grass lands year after year as a consequence of activities at lower elevations and on lesser slopes.

Another possible factor in perpetuating the barren lands is the seasonal climate variation characterized by distinct wet and dry seasons. It may be that trees cannot establish on the steep slopes if there is a long dry season (often up to six months). In addition, the grass is more resilient and able to come back after a long dry season, thus effectively out-competing the trees on the slopes.

On the fringe of the forested areas, there is evidence of active slash and burn activity. This is most noticeable from northern Culasi to Pandan where slash-and-burn plots can be seen at the forest edge. The author has noticed that slash and burn activity seems to be less frequent the farther south the forest extends in the province, but there is no formal confirmation of this nor is there an explanation. There have been reports that hunters in Valderrama use fire in the forest to drive out game for the kill. There is also forest destruction when grass fires burn to the forest edge. This is usually limited to a few meters of burned trees and seems to be most evident in the south in San Remigio and Sibalom.

The variation from one land use or cover to another is usually gradual with upland cultivation being mixed with grass or shrub and brush to varying degrees, and grass and shrub and brush being mixed in an ever varying proportion from one area to the next. Trees are also scattered in varying degrees of concentration throughout the uplands, ranging from almost none in the predominantly grass covered lands in Tibiao, to very dense in the areas which are predominantly disturbed forest or thick shrub and brush, to a defined canopy in the primary forest.

The one exception to this is the boundary between the barren grasslands and the forest, most notably in San Remigio, where there is a very distinct and abrupt change from one land cover to the next. The change is very dramatic in more ways than one, as the author has experienced. It is so abrupt that if you walk from the barren grass lands toward the forest, you will sense the change in temperature as you move into the forest, similar to walking from outdoors into a cool room on a hot day.

Table 6 presents the area of the four agricultural categories used in this study by broad lowland, upland, mountain, and island groupings of land systems by municipality. What is notable is that bunded field cultivation is most prominent in the uplands with only small amounts of coconut and sugar. Most coconut and sugar areas are located in the lowlands. With the exception of the

Table 6. Areas (in hectares) in crops or types of cultivation by lowland, upland hills, mountains, and islands by municipality.

	Lowland				Upland				Mountain			Island				Municipal/Provincial				
Municipality and Zone	Total	Lowland Field	Coconut	Sugar	Total	Upland Bunded	Coconut	Sugar	Total	Upland Bunded	Coconut	Total	Lowland Field	Upland Bunded	Coconut	Total	Lowland Field	Upland Bunded	Coconut	Sugar
Anini-y	647	438	209	-	1428	1353	75	-	-	-	-	16	-	-	16	2091	438	1352	300	-
T. Fornier	993	892	101	-	3484	3259	225	-	-	-	-	-	-	-	-	4477	892	3259	326	-
Hamtic	2173	1916	242	15	2682	2224	458	-	-	-	-	-	-	-	-	4855	1916	2224	700	-
San Jose	2696	2349	444	176	209	191	-	18	-	-	-	-	-	-	-	3178	2349	191	444	194
Sibalom	5047	4898	38	111	4395	4368	14	13	180	180	-	-	-	-	-	9622	4898	4548	52	124
San Remigio	1436	1362	38	36	2440	2440	-	-	806	806	-	-	-	-	-	4682	1362	3246	38	36
Belison	1189	819	157	213	148	118	1	29	-	-	-	-	-	-	-	1337	819	118	158	242
Zone 1 South	14454	12674	1229	551	14786	13953	773	60	986	986	-	16	-	-	16	30242	12674	14459	2018	611
Patnongon	2541	1786	244	511	2468	2382	12	74	245	245	-	-	-	-	-	5254	1786	2627	256	585
Bugasong	1925	1650	134	141	1620	1588	13	19	225	225	-	-	-	-	-	3770	1650	1813	147	160
Valderrama	956	871	5	80	1299	1270	-	29	378	378	-	-	-	-	-	2633	871	1648	5	109
Laua-an	963	689	20	254	2245	1959	18	268	374	374	-	-	-	-	-	3582	689	2333	38	522
Barbaza	1086	1006	36	44	403	397	1	5	173	173	-	-	-	-	-	1662	1006	570	37	49
Zone 2 Central	7471	6002	439	1030	8035	7596	44	395	1395	1395	-	-	-	-	-	16901	6002	8991	483	1425
Tibiao	1246	973	77	196	375	352	4	19	99	99	-	-	-	-	-	1720	973	451	81	215
Culasi	2416	1419	293	704	469	369	17	83	9	9	-	219	-	176	43	3113	1419	554	353	787
Sebaste	904	778	126	-	341	328	13	-	15	15	-	-	-	-	-	1260	778	343	139	-
Pandan	1894	1057	837	-	746	156	590	-	116	36	80	-	-	-	-	2756	1057	192	1507	-
Libertad	475	244	231	-	370	104	266	-	82	54	28	-	-	-	-	972	244	158	522	-
Zone 3 North	6935	4471	1564	900	2301	1309	890	102	321	213	108	219	-	176	49	9776	4471	1698	2605	1002
Caluya	-	-	-	-	-	-	-	-	-	-	-	3495	1847	67	1581	3495	1847	67	1581	-
Province	28860	23147	3232	2481	25112	22858	1707	557	2702	2594	108	3730	1847	243	1640	60414	24994	25695	6687	3038

Note: upland and mountain cultivation is probably undercounted in Pandan due to cloud cover over the eastern most part of the municipality at time of overflight.

following brief description, most of the remainder of this analysis is concerned with the aggregate or total cultivated area and not with the specific crops or types of cultivation involved.

Figure 10 presents a focussed view of upland agricultural activity. The map gives more detail to the variation of upland cultivation and goes beyond Figure 9 in showing low density cultivation (to a low of 15 percent density only). Only upland cultivation is shown in order to highlight the geographical distribution and variation of upland agricultural activity.

Upland agricultural activity is concentrated in the central and southern portions of the province from Laua-an south to Anini-y. Upland cultivation in the north is generally confined to limited areas adjacent to lowland plains.

There are substantial areas of high density cultivation (70 percent or greater coverage) throughout the central and southern portions of the province. Many of these areas extend far inland away from lowland plains or major river valleys. All municipalities except Caluya, San Jose, and Belison have substantial areas of upland agricultural activity. From Hamtic south to Anini-y, almost all of the upland area has some level of cultivation density.

Most of the cultivation in the uplands occurs on

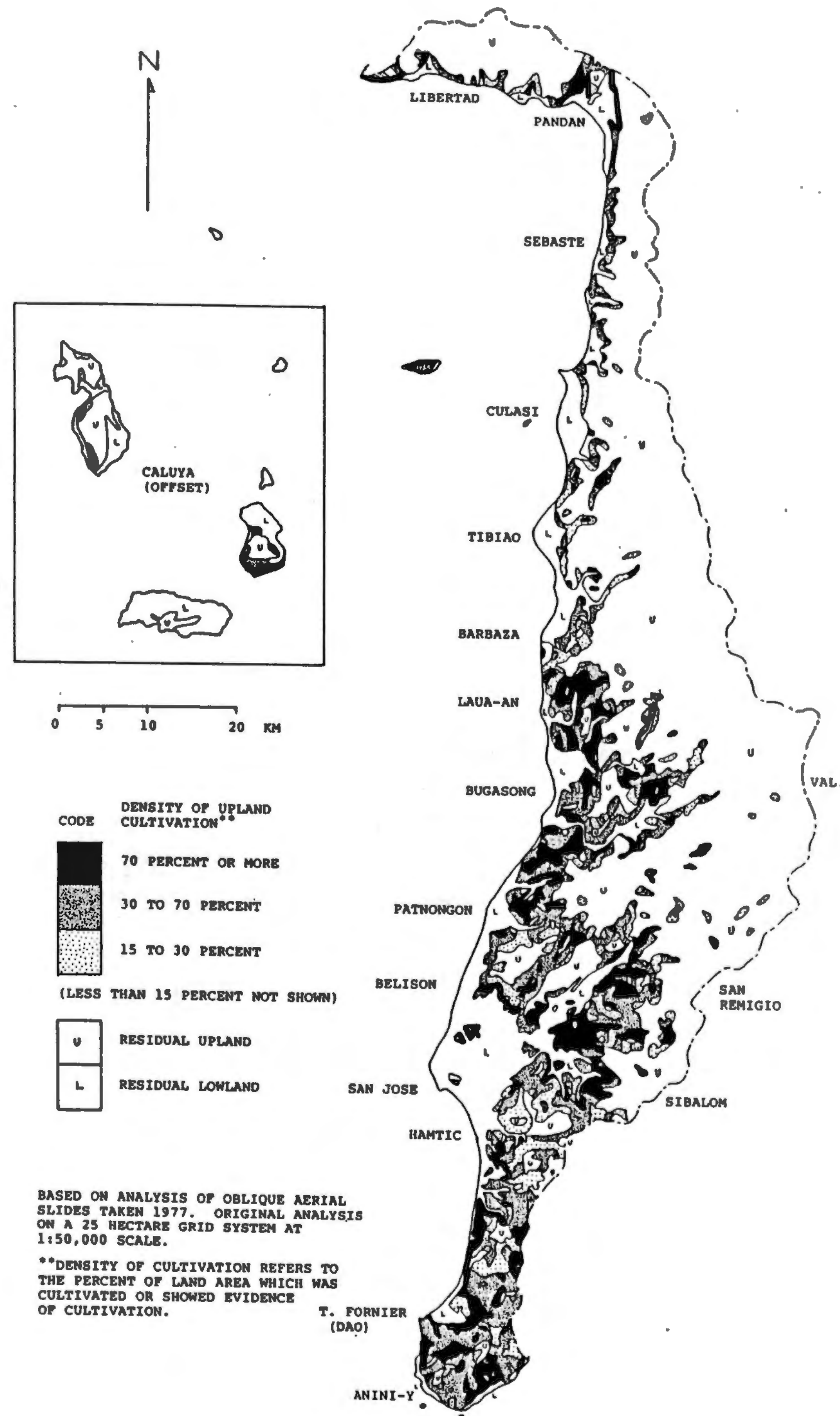

Figure 10. Upland agricultural cultivation density map.

bunded fields. These bunded fields may range from simple strip mounds of earth parallel to the slope contour, to level terraces on the slopes. The main function of the bunds is water control. There are also a few fields which have no bunds and are simply plowed earth on slopes.

The main crop planted is rice (or palay) with older traditional varieties predominating over newer high yielding varieties. Yield is usually in the range of 10 to 20 cavans of field rice per hectare (one cavan equals 44 kilograms). Corn is often intercropped with the rice and is harvested before the rice is mature.

Other crops planted include legumes, tubers and vegetables. The legume, such as mung bean or peanut, may be planted in identifiable fields. Tubers are often planted in less identifiable fields and are not planted as extensively as rice or other field crops. Vegetables are generally cultivated as part of a back yard garden.

There are limited areas of both coconut and sugar cane in the uplands. Coconut is generally a lowland crop concentrated along the coast. Scattered coconut trees may also be found in association with most of the upland cultivated areas. Defined and extensive coconut plantations on upland slopes are limited to three areas in the province. One area is in Pandan on gently rolling hills (in land system 7) and constitutes most of what could be classified as upland agricultural activity in the municipality. The second area is around the coastal boundary of Hamtic and T. Fornier in the south of the province on moderate to steep hillsides (in land system 21) facing the coast. The third is on the island of Caluya and covers most of the agriculturally active uplands of the island and in the municipality as a whole.

Sugar cane is planted mainly on rainfed lowlands and often at the fringe of the uplands. Some of the cane plantings extend from the lowlands up into the gentle slopes of the uplands, but only for a very short distance. There are three areas where this occurs to any significant degree: in Culasi, in Laua-an, and in Patnongon and parts of Belison. Sugar milling in the province is very small scale and is limited to milling raw brown sugar and not refined sugar. The areas for sugar cane generally form around or near an active mill and expand or contract depending on the price of raw sugar on the market.

The main market oriented livestock is cattle. Pastures were not included in the analysis of cultivation density, but the density of pasture and cattle are probably closely related to cultivation density, with the major concentration of cattle being in the southern portion of the province, especially in Sibalom and San Remigio.

The detailed agricultural density map in Figure 10 provides an opportunity to compare definitions of uplands with actual upland agricultural activity. Slope is one of the major criteria for defining uplands. It is also used in defining areas which might not be suitable for upland agricultural activity. Many, including the Bureau of Forest Development, have identified 30 % slope as the upper limit for acceptable upland cultivation.

Most upland agricultural activity in the province occurs on slopes of less than 30 %, but there are also substantial areas of land which are cultivated on slopes of greater than 30 %. Figure 11 shows that most of these lands are located in the central and southern zones of the province.

If low density cultivation is not considered, there are only two areas with substantial concentration of dense cultivation on steep slopes. One area is in Laua-an where there is a high density of bunded cultivation (often to the point of bench terracing) on steep slopes in land system 17-B. The other area is around the boundary of Hamtic and T. Fornier in the south where there is a substantial concentration of coconut on steep slopes in land system 21 facing the coast. There is almost no agricultural activity on slopes greater than 50 %.

Given the limited amount of land of greater than 30 % slope which is cultivated, it would seem that upland farmers naturally conform to the criterion of cultivation on less than 30 % slope. Put another way, steep slopes above 30 % act as a natural barrier to cultivation in most

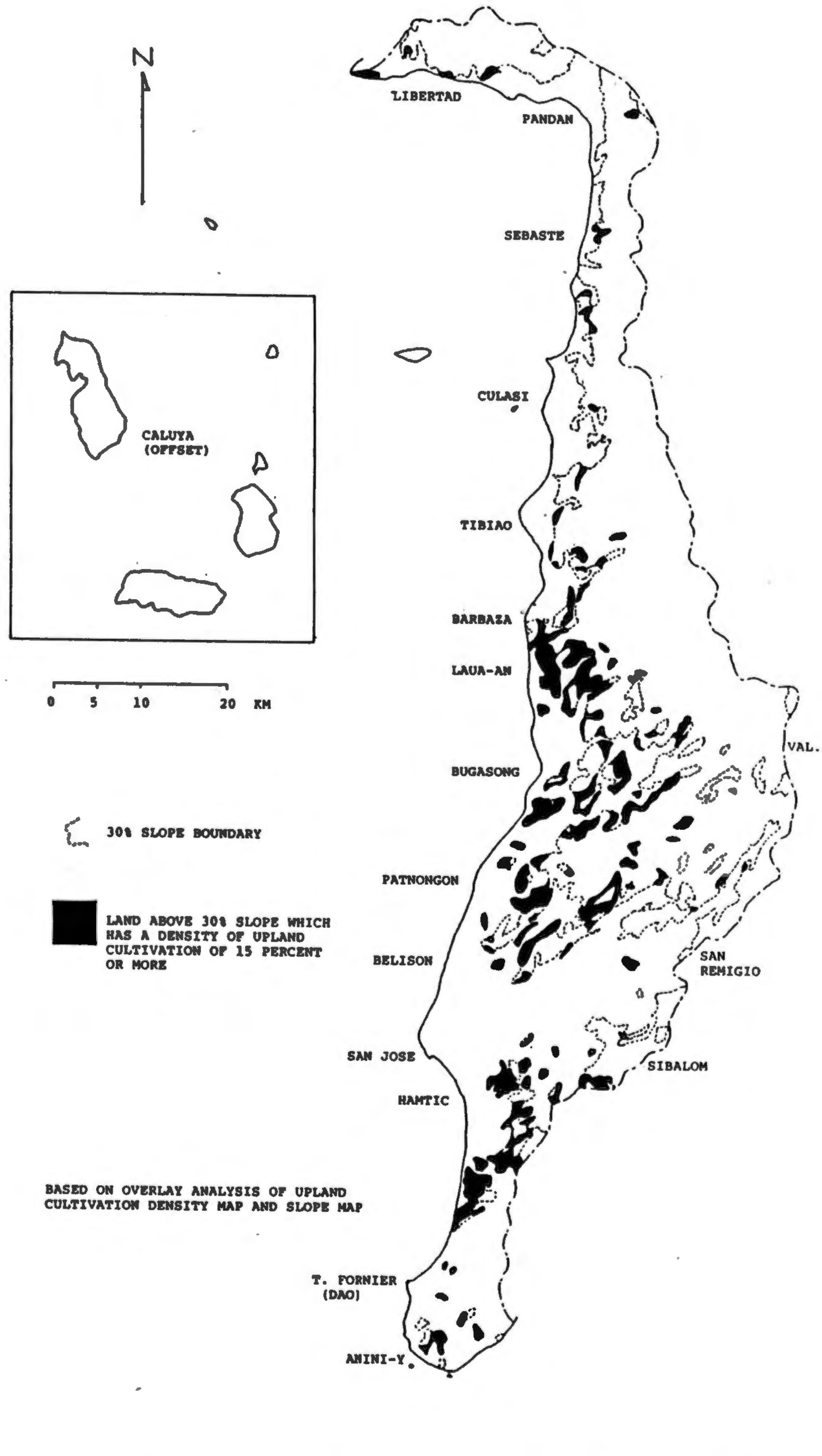

Figure 11. Map of upland agriculture on slopes greater than 30 %.

cases. Even in the two areas mentioned where substantial cultivation occurs on slopes greater than 30 %, the cultivation does not extend beyond 50 % slope to any great degree, and either the land has been modified by terracing or heavy bunding, or the crop is a tree crop and is thus more suited to steep slopes.

Although the criterion of 30 % slope may be a good one, it would seem that it does not have much bearing on upland agricultural activity in the province. With few exceptions, the slope range of 8 % to 30 % effectively defines the limit of most of the agriculturally active land in the province.

Elevation is sometimes also used in defining uplands. Both 300 meters and 600 meters elevation have been used. The definition which uses the 600 meter criterion is as follows:

> . . .uplands can be defined as starting at 600 m. above sea level and/or as having slope of 3% or more. (This) definition of uplands includes, hilly and mountainous agricultural lands along with forest lands. It excludes irrigated, rainfed and coastal lands under 600 m. elevation and with a slope of less than 3%.[6]

This definition is somewhat ambiguous, but is interpreted here to mean that uplands are all lands above 600 meters

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[6] U. S., Agency for International Development, "USAID-Sponsored Upland Hilly Development Workshop," Summary of Proceedings of a conference held at the Manila Garden Hotel, Manila, Philippines, November 18-20, 1980, p. 2.

elevation regardless of slope, and all lands below 600 meters elevation which have greater than 3% slope.

Most of the land in the province which is above 600 meters elevation may be classified as very steep and mountainous and as being either barren (on the lower elevations) or forested (on the higher elevations). There is very little upland agricultural activity above 600 meters, and most of that which does exist is very dispersed and low density. Thus, the 600 meter criterion does not have much bearing on defining uplands in the province.

The 300 meter elevation criterion used by the Bureau of Forest Development to define areas suitable for its Rainfed Resources Development Project Agroforestry Component[7] was much more definitive and restrictive. No land below 300 meters would meet the criterion regardless of slope.

That this criterion was restrictive in the case of the province may be seen from Figure 12. Very little land above 300 meters elevation has any substantial density of upland cultivation. In fact, the only area with any moderate or high density cultivation above 300 meters is in San Remigio and Sibalom in the south of the province. Almost all upland activity occurs below 300 meters elevation.

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[7]The mimeographed guidelines for submitting project proposals was not available at the time of writing. The 300 meter elevation criterion was recalled from memory.

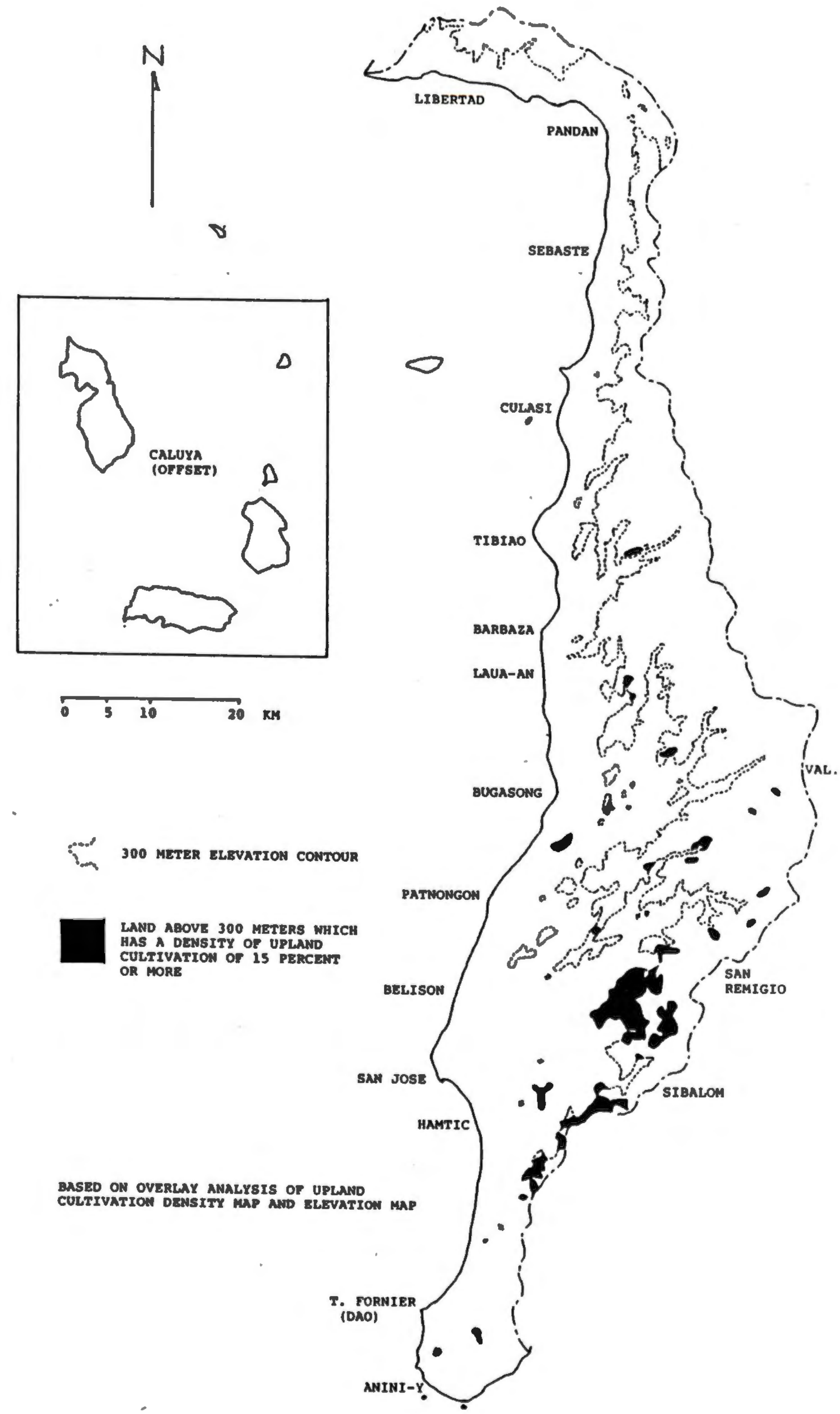

Figure 12. Map of upland agriculture on elevations greater than 300 meters.

Most land above 300 meters is either barren or in forest and is generally very steep and mountainous, with the exception of the agriculturally active areas in San Remigio and Sibalom. Thus the 300 meter criterion used for the Rainfed Resources Development Project was biased against most of the agriculturally active uplands and biased in favor of the unproductive, and generally uninhabited, barren uplands in the steep mountains. Such a restrictive definition of uplands could have very serious implications for planning a program geared to upland farmers.

For the most part, elevation need not be a criterion for defining uplands in the province. Slope acts as a much better single criterion.

For the reminder of this analysis of agricultural activity, the detailed information on upland cultivation is summarized by land system. Although the geographical detail is lost to a certain degree, the summary is necessary in order to provide a geographically comparable base between land system characteristics, agricultural activity, and population distribution. Tables 7, 8, and 9 provide areas and relative areas of agricultural cultivation by land system and municipality.

Two land systems stand out as having the greatest percentage of upland cultivation in the province. The median hill land system 17-A, which was also identified

Table 7. Agricultural cultivation area (in hectares) by land system and municipality.

Municipality and Zone	Lowland area	Land Systems and Upland Hill Height (Low, Median, High) Low LS 7 area	Median LS 15 area	Median LS 16 area	Median LS 17A area	Median LS 17B area	Median LS 18 area	Median LS 19 area	High LS 21 area	High LS 22A area	High LS 22B area	High LS 22C area	High LS 23 area	Hills Subtotal area	Mountains area	Islands area	Total area
Anini-y	647	-	-	-	221	-	-	-	945	262	-	-	-	1428	0	16	2091
T. Fornier	993	-	-	-	2420	-	39	-	218	807	-	-	-	3484	-	-	4477
Hamtic	2173	-	-	-	8	-	314	-	2360	-	-	-	-	2682	-	-	4855
San Jose	2969	-	-	-	209	-	-	-	-	-	-	-	-	209	-	-	3178
Sibalom	5047	-	-	-	1957	-	-	-	670	1627	-	141	-	4395	180	-	9622
San Remigio	1436	-	-	-	196	-	-	-	-	1749	324	171	-	2440	806	-	4682
Belison	1189	-	-	-	148	-	-	-	-	-	-	-	-	148	-	-	1337
Zone 1 South	14454	-	-	-	5159	-	353	-	4193	4445	324	312	-	14786	986	16	30242
Patnongon	2541	-	-	-	1220	-	779	-	469	-	-	-	-	2468	245	-	5254
Bugasong	1925	-	-	-	136	-	661	-	823	-	-	-	-	1620	225	-	3770
Valderrama	956	-	-	-	865	-	83	-	351	-	-	0	-	1299	378	-	2633
Laua-an	963	-	-	-	1227	1018	-	-	-	-	-	-	-	2245	374	-	3582
Barbaza	1086	-	-	-	-	154	-	249	-	-	-	-	-	403	173	-	1662
Zone 2 Central	7471	-	-	-	3448	1172	1523	249	1643	-	-	0	-	8035	1395	-	16901
Tibiao	1246	-	-	100	-	-	-	275	-	-	-	-	-	375	99	-	1720
Culasi	2416	-	-	384	-	6	-	-	-	-	-	-	79	469	9	219	3113
Sebaste	904	-	-	-	-	-	-	-	-	-	-	-	341	341	15	-	1260
Pandan	1894	533	210	-	-	**	-	-	-	-	-	-	3	**746	**116	-	**2756
Libertad	475	-	33	138	199	-	-	-	-	-	-	-	-	370	82	-	927
Zone 3 North	6935	533	243	622	199	**6	-	275	-	-	-	-	423	**2301	**321	219	**9776
Caluya	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3495	3495
Province	28860	533	243	622	8806	1178	1876	524	5836	4445	324	312	423	25122	2702	3730	60414

** Undercounted due to limited photographic coverage in the eastern most part of Pandan. Provincial totals assumed to not be substantially affected.

Table 8. Agricultural cultivation area as percent of municipal cultivation area by land system and municipality.

		Land Systems and Upland Hill Height (Low, Median, High)															
Municipality and Zone	Lowland pct.	Low LS 7 pct.	Median LS 15 pct.	Median LS 16 pct.	Median LS 17A pct.	Median LS 17B pct.	Median LS 18 pct.	Median LS 19 pct.	High LS 21 pct.	High LS 22A pct.	High LS 22B pct.	High LS 22C pct.	High LS 23 pct.	Hills Subtotal pct.	Mountains pct.	Islands pct.	Total pct.
Anini-y	31	-	-	-	11	-	-	-	45	13	-	-	-	68	0	1	100
T. Fornier	22	-	-	-	54	-	1	-	5	18	-	-	-	78	-	-	100
Hamtic	45	-	-	-	*	-	6	-	49	-	-	-	-	55	-	-	100
San Jose	93	-	-	-	7	-	-	-	-	-	-	-	-	7	-	-	100
Sibalom	52	-	-	-	20	-	-	-	7	17	-	1	-	46	2	-	100
San Remigio	31	-	-	-	4	-	-	-	-	37	7	4	-	52	17	-	100
Belison	89	-	-	-	11	-	-	-	-	-	-	-	-	11	-	-	100
Zone 1 South	48	-	-	-	17	-	1	-	14	15	1	1	-	49	3	*	100
Patnongon	48	-	-	-	23	-	15	-	9	-	-	-	-	47	5	-	100
Bugasong	51	-	-	-	4	-	18	-	22	-	-	-	-	43	6	-	100
Valderrama	36	-	-	-	33	-	3	-	13	-	-	0	-	49	14	-	100
Laua-an	27	-	-	-	34	28	-	-	-	-	-	-	-	63	10	-	100
Barbaza	65	-	-	-	-	9	-	15	-	-	-	-	-	24	10	-	100
Zone 2 Central	44	-	-	-	20	7	9	1	10	-	-	0	-	48	8	-	100
Tibiao	72	-	-	6	-	-	-	16	-	-	-	-	-	22	6	-	100
Culasi	78	-	-	12	-	*	-	-	-	-	-	-	3	15	*	7	100
Sebaste	72	-	-	-	-	-	-	-	-	-	-	-	27	27	1	-	100
Pandan	69	19	8	-	-	**	-	-	-	-	-	-	*	**27	**4	-	100
Libertad	51	-	4	15	21	-	-	-	-	-	-	-	-	40	9	-	100
Zone 3 North	71	5	2	6	2	**	-	3	-	-	-	-	4	**24	**4	2	100
Caluya	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	100
Province	48	1	*	1	15	2	3	1	10	7	1	1	1	42	4	6	100

* Less than .50 percent.

** Undercounted due to limited photographic coverage in the eastern most part of Pandan. Provincial totals assumed to not be substantially affected.

Note: percent figures rounded to whole numbers. Thus, rows may not total to 100 percent.

Table 9. Agricultural cultivation area as percent of provincial cultivation area by land system and municipality.

Municipality and Zone	Lowland pct.	Low LS 7 pct.	Median LS 15 pct.	Median LS 16 pct.	Median LS 17A pct.	Median LS 17B pct.	Median LS 18 pct.	Median LS 19 pct.	High LS 21 pct.	High LS 22A pct.	High LS 22B pct.	High LS 22C pct.	High LS 23 pct.	Hills Subtotal pct.	Mountains pct.	Islands pct.	Total pct.
		Land Systems and Upland Hill Height (Low, Median, High)															
Anini-y	2	-	-	-	3	-	-	-	16	6	-	-	-	7	0	*	3
T. Fornier	3	-	-	-	27	-	2	-	4	18	-	-	-	14	-	-	7
Hamtic	8	-	-	-	*	-	17	-	40	-	-	-	-	11	-	-	8
San Jose	10	-	-	-	2	-	-	-	-	-	-	-	-	1	-	-	5
Sibalom	17	-	-	-	22	-	-	-	11	37	-	45	-	17	7	-	16
San Remigio	5	-	-	-	2	-	-	-	-	39	100	55	-	10	30	-	8
Belison	4	-	-	-	2	-	-	-	-	-	-	-	-	1	-	-	2
Zone 1 South	50	-	-	-	60	-	19	-	72	100	100	100	-	59	36	*	50
Patnongon	9	-	-	-	14	-	42	-	8	-	-	-	-	10	9	-	9
Bugasong	7	-	-	-	2	-	35	-	14	-	-	-	-	6	8	-	6
Valderrama	3	-	-	-	10	-	4	-	6	-	-	0	-	5	14	-	4
Laua-an	3	-	-	-	14	86	-	-	-	-	-	-	-	9	14	-	6
Barbaza	4	-	-	-	-	13	-	48	-	-	-	-	-	2	6	-	3
Zone 2 Central	26	-	-	-	39	99	81	48	28	-	-	0	-	32	52	-	28
Tibiao	4	-	-	16	-	-	-	52	-	-	-	-	-	1	4	-	3
Culasi	8	-	-	62	-	1	-	-	-	-	-	-	19	2	*	6	5
Sebaste	3	-	-	-	-	-	-	-	-	-	-	-	81	1	1	-	2
Pandan	7	100	86	-	-	**	-	-	-	-	-	-	1	**3	**4	-	**5
Libertad	2	-	14	22	2	-	-	-	-	-	-	-	-	1	3	-	2
Zone 3 North	24	100	100	100	2	**1	-	52	-	-	-	-	100	**9	**12	6	16
Caluya	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	94	6
Province	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

* Less than .50 percent.

** Undercounted due to limited photographic coverage in the eastern most part of Pandan. Provincial totals assumed to not be substantially affected.

Note: percent figures rounded to whole numbers. Thus, columns may not total to 100 percent.

previously as accounting for the largest proportion of median hill land systems in the province, accounts for 15 percent of provincial cultivated area. The cultivation on this land system is concentrated in the same municipalities as identified in the analysis of land system area, that is, T. Fornier, Sibalom, and Patnongon, with the notable addition of Laua-an which ties Patnongon with 14 percent of the provincial cultivated area in this land system. A similar pattern also holds with relative importance of this land system at the municipal level, but with the substantial increase in percentage of municipal cultivation area in both Laua-an and Valderrama. Overall, the cultivation on this relatively fertile, sedimentary based land system is concentrated in the southern zone with 60 percent of the total cultivation area in land system 17-A, and almost exclusively in the southern and central zones combined.

Land system 21 accounts for 10 percent of provincial cultivation area and, as with total area in this land system, shows greatest concentration in Hamtic and the southern zone in general. This land system also accounts for almost half of the cultivation area within Hamtic and accounts for a substantial 45 percent of the cultivation area in Anini-y, both in the southern zone. This land system shows greater physical constraints to cultivation and most of the cultivation is concentrated on foot slopes, often adjacent to either lowland plains or lowland rivers.

The fertile land system 22-A situated on a metamorphic base of long side slopes follows next accounting for 7 percent of provincial cultivation area. Cultivation on this land system is exclusive to the southern zone and shows greatest concentration in San Remigio where it accounts for 37 percent of cultivated land in the municipality and the majority of all upland cultivation in the municipality.

Within the upland hill land base, the fertile land system 18 on a sedimentary base of relatively long side slopes follows next accounting for 3 percent of provincial cultivation area, and showing greatest concentration again in Patnongon and Bugasong in the central zone. This is followed by the last relatively fertile land system 17-B on a relatively steeper sedimentary base. Land system 17-B accounts for 2 percent of provincial cultivation area and is most concentrated in Laua-an where it again combines with the associated land system 17-A to account for all of the upland hill cultivation in the municipality.

With the exception of land system 21, all of the land systems identified as having physical constraints to cultivation--15, 16, 19, 22-B, 22-C, and 23--accounted for only 1 percent or less, respectively, of the provincial cultivation area. All of the land systems combined accounted for only 4 percent of total provincial cultivation area which matched the percent accounted for by the inhospitable mountains.

The distribution of cultivation in the mountains is interesting. While accounting for only 4 percent of provincial cultivated area, cultivation in the mountains accounts for a relatively more substantial percentage of municipal cultivation in San Remigio in the southern zone, Valderrama, Laua-an, and Barbaza in the central zone, and Pandan in the north. This pattern follows closely the pattern of 30 % to 50 % mountain slopes in the province, thus indicating again that 50 % slope may be the upper limiting slope factor to upland cultivation.

Overall, the pattern of concentration of agricultural cultivation follows closely the pattern of the relatively more fertile land systems 17-A, 17-B, 18, and 22-A. The exception to this is land system 21 which probably accounts for so much cultivation in the province by its relatively greater land area. All of these land systems show greatest concentration in the southern and central zones of the province.

For all hill systems combined, the municipalities showing highest concentration of upland hill cultivation are Sibalom, T. Fornier, Hamtic, and San Remigio in the south, followed by Patnongon and Laua-an in the central zone. From Barbaza on the boundary of the central and northern zones and continuing for all of the northern municipalities, the concentration of upland hill cultivation is relatively low.

If one assumes that population is distributed more-or-less evenly with agricultural land on the average, the above analysis of the distribution of upland agricultural cultivation may be used as an indirect measure for population distribution. Figure 10 (p. 274) may then be viewed as an approximation of a detailed upland population density map. The data on cultivation area by land system may also be transformed into an indirect measure of population density by dividing cultivation area by land system area to give a measure of cultivation hectares per land system hectares. Table 10 presents the results of such a calculation with the numbers referring to percent of land system area covered by cultivation, or hectares of cultivation per 100 hectares of land system area. Figure 13 presents a mapping of the tabular information.

The table may be used to locate areas in the province with highest cultivation density and, by assumption, highest upland population density. Land system 18 stands out as having the highest density of cultivation within the province and within the southern and central zones in which it is located. The highest municipal density occurs in Bugasong with 60 percent cultivation density.

Both land systems 17-A and 22-A follow with a

Table 10. Agricultural cultivation density by land system and municipality.

Municipality and Zone	Lowland dens.	Low LS 7 dens.	Median LS 15 dens.	Median LS 16 dens.	Median LS 17A dens.	Median LS 17B dens.	Median LS 18 dens.	Median LS 19 dens.	High LS 21 dens.	High LS 22A dens.	High LS 22B dens.	High LS 22C dens.	High LS 23 dens.	Hills Subtotal dens.	Mountains dens.	Islands dens.	Total dens.
		Land Systems and Upland Hill Height (Low, Median, High)															
Anini-y	74	-	-	-	33	-	-	-	32	42	-	-	-	34	0	32	40
T. Fornier	88	-	-	-	34	-	52	-	26	44	-	-	-	35	-	-	40
Hamtic	69	-	-	-	32	-	41	-	25	-	-	-	-	26	-	-	37
San Jose	73	-	-	-	38	-	-	-	-	-	-	-	-	38	-	-	69
Sibalom	78	-	-	-	40	-	-	-	24	46	-	26	-	37	3	-	39
San Remigio	68	-	-	-	39	-	-	-	-	35	10	4	-	18	4	-	13
Belison	73	-	-	-	37	-	-	-	-	-	-	-	-	37	-	-	66
Zone 1 South	74	-	-	-	36	-	42	-	26	40	10	6	-	29	4	32	31
Patnongon	81	-	-	-	35	-	49	-	17	-	-	-	-	32	6	-	35
Bugasong	63	-	-	-	36	-	60	-	26	-	-	-	-	35	2	-	18
Valderrama	48	-	-	-	57	-	42	-	22	-	-	0	-	30	1	-	8
Laua-an	70	-	-	-	53	42	-	-	-	-	-	-	-	47	3	-	20
Barbaza	60	-	-	-	-	23	-	23	-	-	-	-	-	23	2	-	11
Zone 2 Central	65	-	-	-	45	38	53	23	22	-	-	0	-	35	2	-	17
Tibiao	69	-	-	15	-	-	-	18	-	-	-	-	-	17	1	-	12
Culasi	89	-	-	9	-	3	-	-	-	-	-	-	17	9	*	35	17
Sebaste	72	-	-	-	-	-	-	-	-	-	-	-	12	12	*	-	11
Pandan	89	37	11	-	-	**0	-	-	-	-	-	-	6	**18	**2	-	**20
Libertad	70	-	33	18	61	-	-	-	-	-	-	-	-	31	1	-	11
Zone 3 North	81	37	12	11	61	**1	-	18	-	-	-	-	13	**15	**1	35	**15
Caluya	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	26
Province	73	37	12	11	40	30	50	20	25	40	10	5	13	28	2	27	22

* Less than .50 percent cultivation density.

** Upland cultivation not counted or under counted in LS 17B and Mountains of east Pandan due to cloud cover at time of overflight.

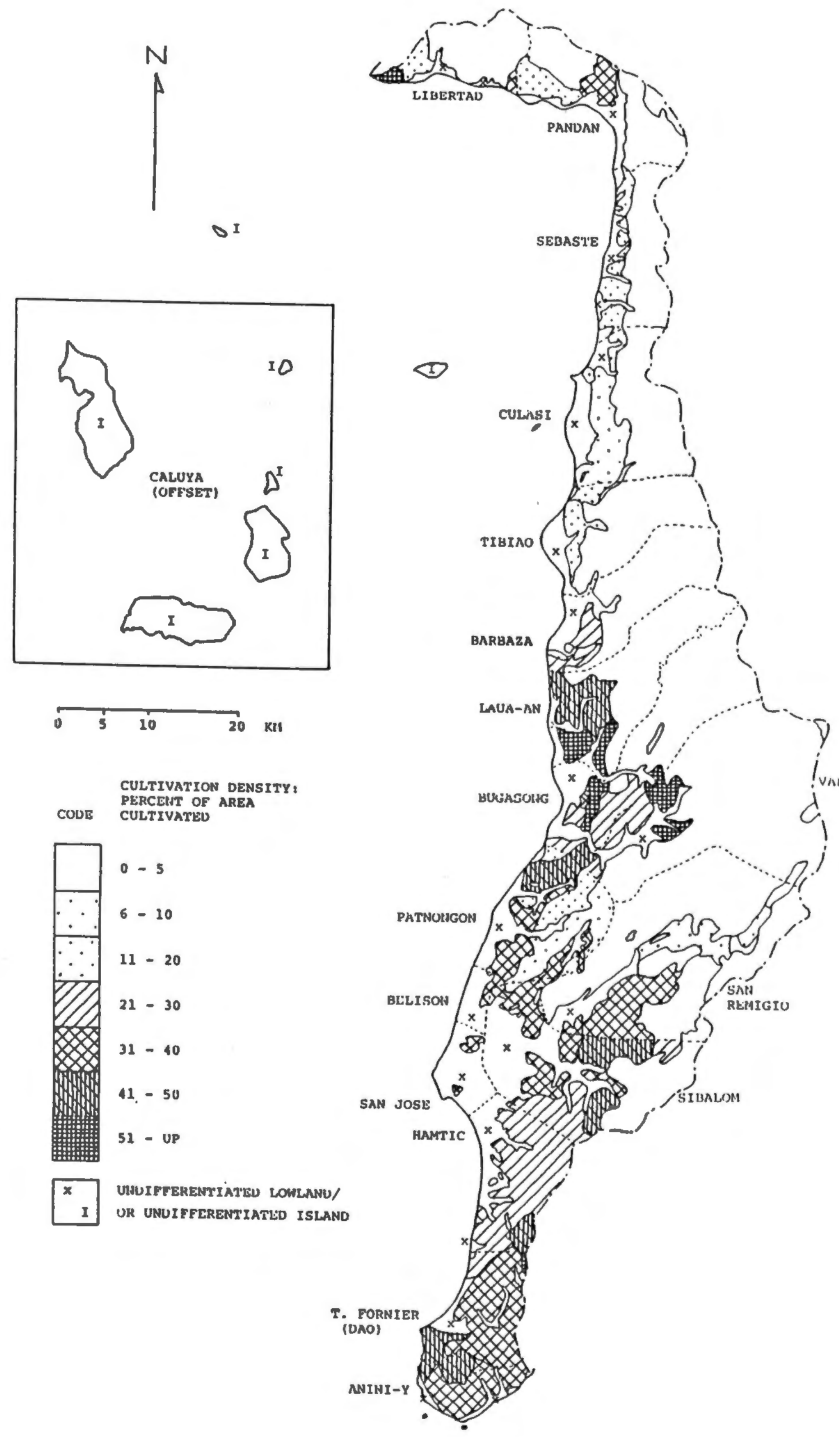

Figure 13. Map of agricultural cultivation density by land system.

provincial level density of 40 percent each. Land system 22-A is exclusive to the south of the province and shows greatest density of cultivation in Sibalom and the municipalities of T. Fornier and Anini-y.

Land system 17-A is located in most of the southern and central municipalities and shows an interesting trend from south to north. The density of cultivation generally increases from the relatively drier southern municipality of Anini-y to the relatively wetter municipalities in the central zone and interior of the province. This may be related to the variation in climate discussed at the end of Section 1 of this chapter and may indicate a substantial variation of rainfall even within the central and southern zones. Note, however, that the trend is not evident in land system 21 which shows just the reverse trend.

Land system 17-A shows greatest density in Valderrama and Laua-an in the central zone. Sibalom in the south also shows substantial density of cultivation in this land system.

Land system 7 in Pandan follows in sequence with a cultivation density of 37 percent. This land system is uncharacteristic of most of the upland hill systems by being the only low hill system and also being predominately cultivated for coconut.

The next major upland hill system is 17-B showing

30 percent density of cultivation. This system shows highest density in Laua-an in the central zone.

All of the other hill land systems show cultivation densities less than the provincial density within all hill systems combined. These other land systems were previously identified as having greater physical restrictions to cultivation, and this may account for the relatively lower cultivation densities. However, land system 21 in the southern and central zones with a cultivation density of 25 percent may be considered as the least restrictive of the group, followed by land system 19 in the central and northern zones with 20 percent cultivation density. Note that these two land systems show only about half the density of the three major fertile land systems identified previously.

The geographical correlation of land system characteristics within municipalities and the density of cultivation within municipalities is clear. Almost all of the hill land systems in the northern municipalities may be characterized as having relatively greater physical constraints to cultivation, while most of the municipalities in the central and southern zones have substantial areas of fertile hill land with relatively fewer constraints to cultivation.

Laua-an in the central zone stands out as having the highest municipal cultivation density on the combined fertile land systems 17-A and 17-B. This is followed by Sibalom, T. Fornier and Anini-y in the south, all having substantial areas in the fertile land systems 17-A and 22-A. This is again followed by Bugasong and Patnongon in the central zone each having substantial areas in the fertile land systems 17-A and 18. In all of the above municipalities except Laua-an, land system 21, which was identified previously as being the least restrictive of those land systems having physical limitations to cultivation, also accounts for substantial municipal land system and cultivation area.

Only Libertad in the northern zone shows a density greater than the provincial hill average and this is associated mainly with an uncharacteristically high density in land system 17-A and the highest localized land system density in the province. All of the remaining municipalities in the north, including Barbaza on the northern boundary in the central zone, have upland hills predominantly in the land systems having greater physical limitations to cultivation.

Those municipalities in the south and central zone which show relatively less cultivation density have a higher proportion of hill land area in the more restrictive land system 21 or the uncharacteristically less dense land systems 22-B and 22-C. Hamtic in the south and Valderrama in the central zone both have a majority of their hill land in system 21 with land system 21 accounting for almost all of the upland area in Hamtic. San Remigio in the southern zone has a majority of its upland hills in land systems 22-B and 22-C, both of which are related to the fertile land system 22-A but which may present localized limitations which cannot be definitively identified with the information available.

Overall, the southern and central zones account for most of the cultivation in the uplands of the province and show the highest density of cultivation on the most fertile upland hill land systems. Assuming that population distribution and density follow closely cultivation distribution and density, the same pattern of upland variation should hold for an analysis of population.

3. Population

The direct analysis of population distribution in this study was limited by the ordering of available population census figures to point locations associated with barangays. The direct relation of point locations with associated barangay areas was not possible since consistent and defined barangay boundaries were not available. To overcome this limitation, this study utilized three alternative methods of analyzing population census data for distribution and density.

The first method relied solely on the location and size of barangays and was limited to analyzing the distribution of population in the entire province while necessarily excluding a quantitative analysis of population density. Figure 14 presents the point locations of barangays with a representation of relative size. Comparing this map with the map of slope in Figure 6 or the map of land systems in Figure 8 shows that most upland barangays have populations of less than 500 people, or about 90 households, while most lowland barangays have populations of greater than 500 people. The mean barangay size in the uplands is about 340 persons in 63 households, with a mean of about 5.4 persons per household.

The distribution of upland barangays is generally more dispersed than lowland barangays. This fact along with the smaller size of upland barangays indicates a distinct difference in density of population between the more dense lowlands and the less dense uplands. Within the uplands, the distribution of barangays is uneven with most barangays being located on land of lesser slope while very few are located on mountainous land of greater slope. This would indicate that most of the upland population is concentrated on the hill land systems leaving the mountains either sparsely settled or uninhabited. The map also shows that the upland areas in the south of the province, and to a lesser degree the central portion of the province, account for more of the upland barangays than the north.

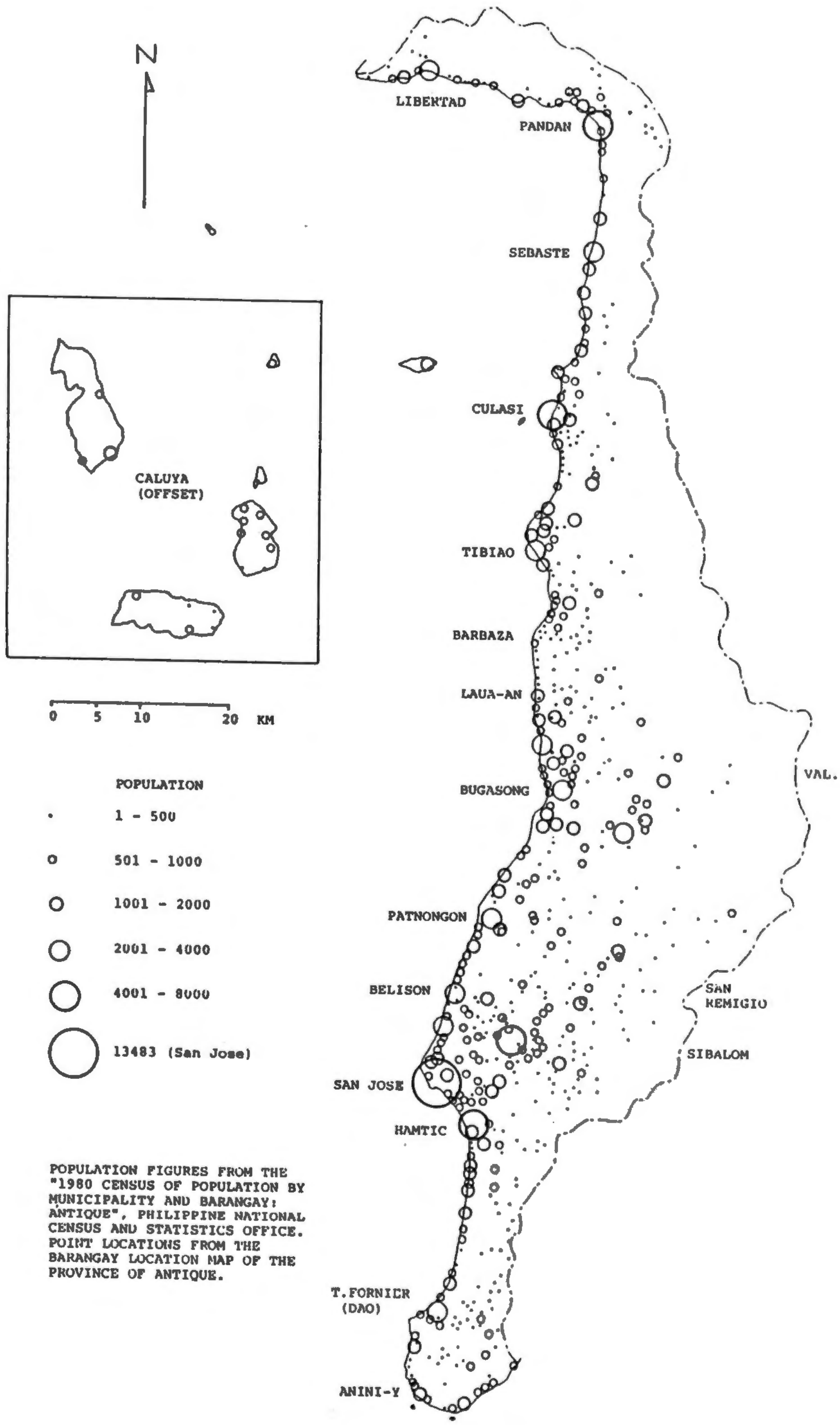

Figure 14. Map of barangay locations with relative size of barangays.

The largest barangays or groups of urban barangays are located in the lowlands and especially along the coast. The highest concentration of very large urban populations[8] occurs in the southern poblacions of San Jose with a population of 13483, Sibalom with 4691, and Hamtic with 4289. This triad of urban centers combine to account for 37 percent of provincial urban population.

The poblacions of Bugasong with a population of 3985 and Patnongon with 3711 are the largest urban concentrations in the central portion of the province. In the north, the poblacions of Pandan with a population of 4183 and Culasi with 4117 are the largest urban concentrations. Poblacions with less than 3000 population are, in rank order, Tibiao with a population of 2741, Valderrama with 2686, T. Fornier with 2531, Sebaste with 2221, Libertad with 2088, San Remigio with 1583, Anini-y with 1518, Laua-an with 1063, and Barbaza with 967. Belison poblacion has a population of 3481 and Caluya has a poblacion population of 907, but neither of these urban centers are of much importance to the uplands.[9]

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[8]Urban population here means all poblacion barangays combined in a municipality plus other barangays not designated as poblacion barangays but which are contiguous to and a distinct continuation of poblacion barangays. This definition does not necessarily conform to the NCSO definition of urban.

[9]All population figures are from the 1980 Census.

The urban center of San Jose is the obvious urban center of the province with a population almost three times larger than the next largest municipal urban centers. San Jose also serves as the commercial and trading hub of the province and the provincial administrative center and contains the only developed commercial sea port and airport[10] in the province. It is important to the uplands of the province by being the largest center for selling or trading goods and services, functions necessary for the commercial aspects of upland activities, even though most upland economic activities are subsistence oriented.

Most upland farmers do not trade directly in or through San Jose. The smaller municipal centers, usually with more periodic or weekly market activities, serve as either final or intermediate market centers for the municipal upland population and provide more immediate access to urban goods and services.

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[10]The airport was not serviced by regular commercial flights. Another private corporation airport was located on Semirara Island in Caluya in association with a large coal mining operation on the island. The sea port could accommodate only small cargo ships with shallow draft. Most sea port traffic was between Antique and Palawan to the west. There was also an undeveloped landing at Lipata Point in Culasi. Most traffic at this landing was between the main portion of the province and Caluya but extended also to Mindoro to the north.

The very small poblacion centers of less than 3000 population do not provide many urban goods and services but often act as intermediate nodes along the way to the larger centers where more goods and services may be obtained. Some of the small poblacion centers have even less commercial activities than larger rural barangays and the label "urban" may be a misnomer when applied to them.[11] However, the location of municipal administrative functions along with such private and public supported urban functions as banks, schools and churches focuses most municipal-wide activity in the poblacions.

While giving some indication of relative population distribution and qualitative density, the point locations of Figure 14 are not directly useful for calculating density. Figure 15 presents a map of density constructed by means of an arbitrary grid of four square kilometer grid cell size. Within each grid cell, the point locations falling within the cell may now be related to known, but arbitrary, land area.

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[11]The definition of "urban" as an economic and social function is elusive. Rondinelli in Urbanization and Rural Development notes that a common population definition is 5000 persons or more for an economically viable community (p. 63), but notes that this may be too arbitrary and large. In Antique, this author noted that urban centers of greater than 3000 population showed distinctly greater visible activity, such as market, banks, schools and churches, than those less than 3000 population. The smaller "urban" centers were often more characteristic of large rural barangays.

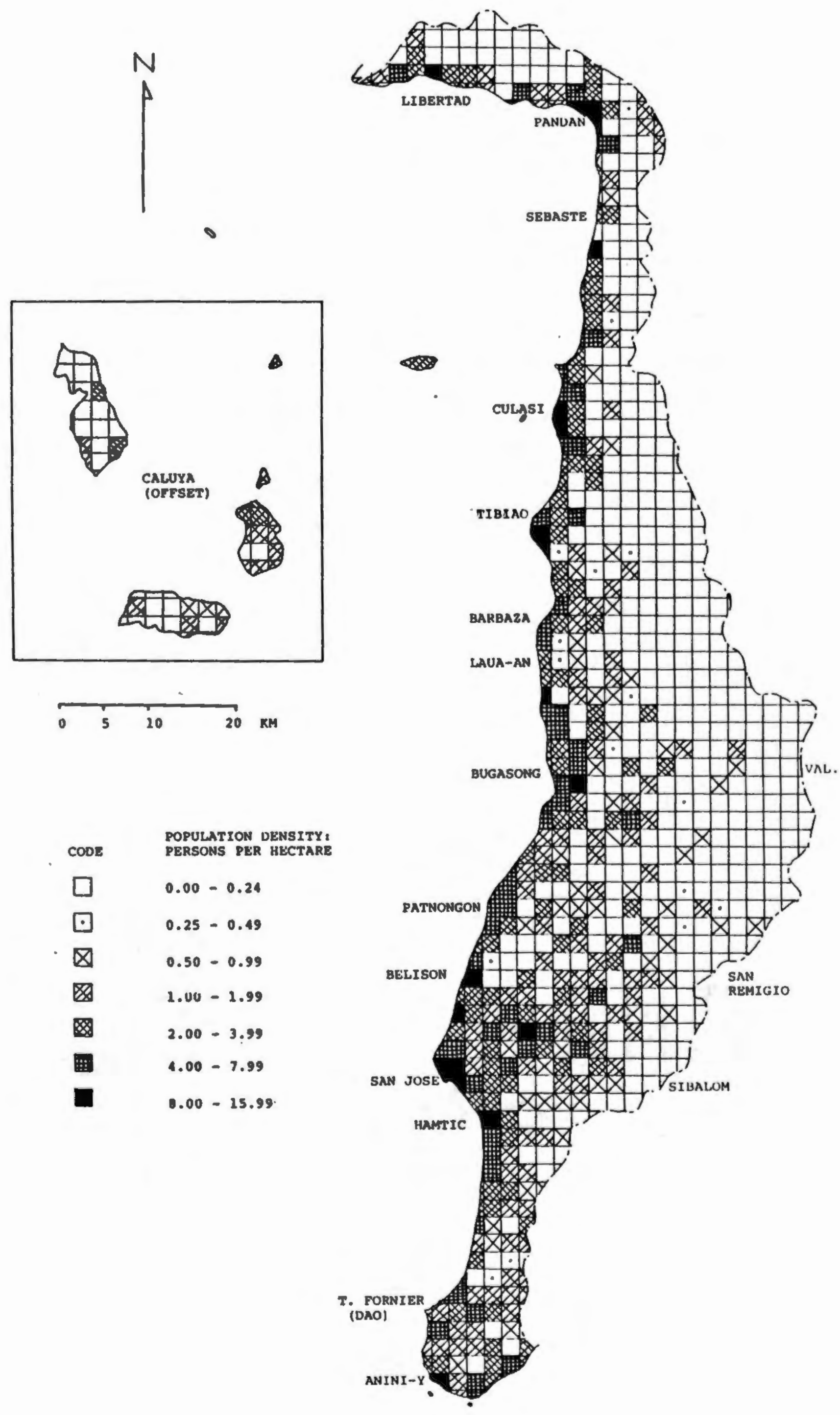

Figure 15. Map of population density in an arbitrary grid of four square kilometer cells.

Figure 15 is limited by presenting density in small discrete spatial increments which are not necessarily related to natural patterns. However, the map does indicate again that the lowlands are more dense than the uplands, with the coastal areas and the urban centers standing out as being the most densely populated areas in the province. On the other hand, the remote, steep and generally barren mountains show very low population density. The map again shows that more of the upland population is distributed in the south and, to a lesser degree, in the central portion of the province than in the north.

Most of the inhabited upland areas show a density of between one to two persons per hectare (100 to 200 persons per square kilometer), and some areas reach up to four persons per hectare (400 persons per square kilometer). In contrast, most of the coastal and lowland plains have densities above four persons per hectare and most urban centers reach into the category of eight to 16 persons per hectare (800 to 1600 persons per square kilometer). San Jose poblacion area has the largest and most dense population with 14.42 persons per hectare (1442 persons per square kilometer) calculated.

Figure 15 is some improvement over Figure 14 when quantifying population density and visualizing population distribution, but the arbitrary manner in which the density figures were calculated limits the analysis to broad generalizations about distribution and density within the province. The specific differences within the uplands and the relation of distribution and density with other upland information is hindered by the arbitrary and discrete grid cell calculations.

An improvement on both maps would be a relation of population with land systems of known characteristics. This again is limited by the point locations of population information by barangay but may be overcome by a simple, but again somewhat arbitrary, allocation of point population figures to land systems areas. This method was discussed in the methodology chapter (Section 5 of Chapter 5) and consists generally of allocating all of a barangay's population to a land system if it is located far from another land system, and allocating a defined proportion of the population between land systems if the barangay is located near to another land system. This at least recognizes that there is a spatial distribution of intra-barangay population which may relate to more than one land system depending on the relation of the barangay centro to the land systems.

The results of such an allocation are presented in Tables 11, 12 and 13 showing population and relative population by land system and municipality. With this information, an analysis similar to those presented in

Table 11. Population by land system and municipality.

Municipality and Zone	Lowland pop.	Land Systems and Upland Hill Height (Low, Median, High) Low LS 7 pop.	Median LS 15 pop.	Median LS 16 pop.	Median LS 17A pop.	Median LS 17B pop.	Median LS 18 pop.	Median LS 19 pop.	High LS 21 pop.	High LS 22A pop.	High LS 22B pop.	High LS 22C pop.	High LS 23 pop.	Hills Subtotal pop.	Mountains pop.	Islands pop.	Total pop.
Anini-y	9506	-	-	-	365	-	-	-	2880	726	-	-	-	3971	•0	•0	13477
T. Fornier	9725	-	-	-	7659	-	212	-	672	4238	-	-	-	12781	-	-	22506
Hamtic	21788	-	-	-	•0	-	924	-	5806	-	-	-	-	6730	-	-	28518
San Jose	29202	-	-	-	926	-	-	-	-	-	-	-	-	926	-	-	30128
Sibalom	24311	-	-	-	5832	-	-	-	1459	3901	-	•0	-	11192	•0	-	35503
San Remigio	8326	-	-	-	908	-	-	-	-	4596	2213	498	-	8215	2660	-	19201
Belison	8392	-	-	-	233	-	-	-	-	-	-	-	-	233	-	-	8625
Zone 1 South	111250	-	-	-	15923	-	1136	-	10817	13461	2213	498	-	44048	2660	•0	157958
Patnongon	10751	-	-	-	3077	-	2084	-	995	-	-	-	-	6156	1053	-	24260
Bugasong	16980	-	-	-	288	-	2257	-	1313	-	-	-	-	3858	766	-	21604
Valderrama	7498	-	-	-	2071	-	•0	-	1195	-	-	•0	-	3266	2201	-	12965
Laua-an	10902	-	-	-	2258	3601	-	-	-	-	-	-	-	5859	2017	-	18778
Barbaza	9775	-	-	-	-	1215	-	1313	-	-	-	-	-	2528	2390	-	14693
Zone 2 Central	62206	-	-	-	7694	4816	4341	1313	3503	-	-	•0	-	21667	8427	-	92300
Tibiao	13243	-	-	677	-	-	-	2194	-	-	-	-	-	2871	1081	-	17195
Culasi	18307	-	-	4049	-	158	-	-	-	-	-	-	235	4442	719	2195	25663
Sebaste	8298	-	-	-	-	-	-	-	-	-	-	-	1955	1955	115	-	10368
Pandan	16872	840	643	-	-	429	-	-	-	-	-	-	•0	1912	1606	-	20390
Libertad	6051	-	303	1020	486	-	-	-	-	-	-	-	-	1809	1993	-	9853
Zone 3 North	62771	840	946	5746	486	587	-	2194	-	-	-	-	2190	12989	5514	2195	83469
Caluya	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10878	10878
Province	236227	840	946	5746	24103	5403	5477	3507	14320	13461	2213	498	2190	78704	16601	13073	344605

• Zero population allocated due to limits of allocation algorithm.

Table 12. Population as percent of municipal population by land system and municipality.

Municipality and Zone	Lowland pct.	Low LS 7 pct.	Median LS 15 pct.	Median LS 16 pct.	Median LS 17A pct.	Median LS 17B pct.	Median LS 18 pct.	Median LS 19 pct.	High LS 21 pct.	High LS 22A pct.	High LS 22B pct.	High LS 22C pct.	High LS 23 pct.	Hills Subtotal pct.	Mountains pct.	Islands pct.	Total pct.
		Land Systems and Upland Hill Height (Low, Median, High)															
Anini-y	71	-	-	-	3	-	-	-	21	5	-	-	-	29	**0	**0	100
T. Fornier	43	-	-	-	34	-	1	-	3	19	-	-	-	57	-	-	100
Hamtic	76	-	-	-	**0	-	3	-	20	-	-	-	-	24	-	-	100
San Jose	97	-	-	-	3	-	-	-	-	-	-	-	-	3	-	-	100
Sibalom	68	-	-	-	16	-	-	-	4	11	-	**0	-	32	**0	-	100
San Remigio	43	-	-	-	5	-	-	-	-	24	12	3	-	43	14	-	100
Belison	97	-	-	-	3	-	-	-	-	-	-	-	-	3	-	-	100
Zone 1 South	70	-	-	-	10	-	1	-	7	9	1	*	-	28	2	**0	100
Patnongon	70	-	-	-	13	-	9	-	4	-	-	-	-	25	4	-	100
Bugasong	79	-	-	-	1	-	10	-	6	-	-	-	-	18	4	-	100
Valderrama	58	-	-	-	16	-	**0	-	9	-	-	**0	-	25	17	-	100
Laua-an	58	-	-	-	12	19	-	-	-	-	-	-	-	31	11	-	100
Barbaza	67	-	-	-	-	8	-	9	-	-	-	-	-	17	16	-	100
Zone 2 Central	64	-	-	-	8	5	5	1	4	-	-	**0	-	23	9	-	100
Tibiao	77	-	-	4	-	-	-	13	-	-	-	-	-	17	6	-	100
Culasi	71	-	-	16	-	1	-	-	-	-	-	-	1	17	3	9	100
Sebaste	80	-	-	-	-	-	-	-	-	-	-	-	19	19	1	-	100
Pandan	83	4	3	-	-	2	-	-	-	-	-	-	**0	9	8	-	100
Libertad	61	-	3	10	5	-	-	-	-	-	-	-	-	18	20	-	100
Zone 3 North	75	1	1	7	1	1	-	3	-	-	-	-	3	16	7	3	100
Caluya	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	100
Province	69	*	*	2	7	2	2	1	4	4	1	*	1	23	5	4	100

* Less than .50 percent.

** Zero population allocated due to limitations of allocation agorithm.

Note: percent figures rounded to whole numbers. Thus, rows may not total to 100 percent.

Table 13. Population as percent of provincial population by land system and municipality.

		Land Systems and Upland Hill Height (Low, Median, High)															
Municipality and Zone	Lowland pct.	Low LS 7 pct.	Median LS 15 pct.	Median LS 16 pct.	Median LS 17A pct.	Median LS 17B pct.	Median LS 18 pct.	Median LS 19 pct.	High LS 21 pct.	High LS 22A pct.	High LS 22B pct.	High LS 22C pct.	High LS 23 pct.	Hills Subtotal pct.	Mountains pct.	Islands pct.	Total pct.
Anini-y	4	-	-	-	2	-	-	-	20	5	-	-	-	5	**0	**0	4
T. Fornier	4	-	-	-	31	-	4	-	5	31	-	-	-	16	-	-	7
Hamtic	9	-	-	-	**0	-	17	-	41	-	-	-	-	9	-	-	8
San Jose	12	-	-	-	4	-	-	-	-	-	-	-	-	1	-	-	9
Sibalom	10	-	-	-	24	-	-	-	10	29	-	**0	-	14	**0	-	10
San Remigio	4	-	-	-	4	-	-	-	-	34	100	100	-	10	16	-	6
Belison	4	-	-	-	1	-	-	-	-	-	-	-	-	*	-	-	3
Zone 1 South	47	-	-	-	66	-	21	-	76	100	100	100	-	56	16	**0	46
Patnongon	7	-	-	-	13	-	38	-	7	-	-	-	-	8	6	-	7
Bugasong	7	-	-	-	1	-	41	-	9	-	-	-	-	5	5	-	6
Valderrama	3	-	-	-	9	-	**0	-	8	-	-	**0	-	4	13	-	4
Laua-an	5	-	-	-	9	67	-	-	-	-	-	-	-	7	12	-	5
Barbaza	4	-	-	-	-	22	-	37	-	-	-	-	-	3	14	-	4
Zone 2 Central	26	-	-	-	32	89	79	37	24	-	-	**0	-	28	51	-	27
Tibiao	6	-	-	12	-	-	-	63	-	-	-	-	-	4	7	-	5
Culasi	8	-	-	70	-	3	-	-	-	-	-	-	11	6	4	17	7
Sebaste	4	-	-	-	-	-	-	-	-	-	-	-	89	3	1	-	3
Pandan	7	100	68	-	-	8	-	-	-	-	-	-	**0	2	10	-	6
Libertad	3	-	32	18	2	-	-	-	-	-	-	-	-	2	12	-	3
Zone 3 North	27	100	100	100	2	11	-	63	-	-	-	-	100	17	33	17	24
Caluya	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	83	3
Province	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

* Less than .50 percent.

** Zero allocation due to limitations of allocatio algorithm.

Note: percent figures rounded to whole numbers. Thus, columns may not total to 100 percent.

Sections 1 and 2 of this chapter may be undertaken and population figures may be used directly in comparison.

Of the household population of the province, 28 percent are upland with 23 percent being located on hill land systems and only 5 percent being located in the mountains. The pattern of population distribution by land system follows closely the pattern of agricultural activity by land system, but a distinct trend may be seen in comparing lowlands with uplands.

The lowlands account for 14 percent of the provincial land area, 48 percent of the agricultural cultivation area, and 69 percent of the population. On the other hand, upland hill land systems account for 32 percent of provincial area, 42 percent of agricultural cultivation area, and 23 percent of population, while mountains account for 49 percent of land area, 4 percent of agricultural cultivation area, and 5 percent of population. The trends show a distinctly greater concentration of agricultural activity and even greater population in the lowlands while showing a lesser concentration of both agricultural activity and population in the uplands, with the mountains showing the least concentration of all.

The relatively greater concentration of population with respect to lowland cultivation area may be explained in part by the capacity of lowland agricultural land to support more population per hectare than upland agricultural land. However, the urban centers of the province are also located in the lowlands (with the exception of poblacion San Remigio), and these urban centers contain substantial population not engaged in agriculture but engaged in more urban oriented activities. Thus it is not surprising that the relationship of population to land area and agricultural activity is relatively greater in the lowlands than in the uplands.

Within the uplands, the fertile and sedimentary based land system 17-A again stands out as accounting for the greatest percentage (7 percent) of provincial population in the uplands. As with agricultural activity, the population within this land system is concentrated in Hamtic and Sibalom in the south, with lesser concentrations in Patnongon, Valderrama and Laua-an in the central zone. Almost all of the population on this land system is located in the southern and central zones combined.

Next are the high hill land systems 21 and 22-A accounting for 4 percent each of provincial population. Land system 21 was identified previously as the least restrictive of the land systems showing physical constraints to cultivation. The effects of the constraints may be seen by comparing agricultural area and population between land systems 21 and 22-A. While both land systems account for about the same percentage of population, land system 21 accounts for a greater percentage of cultivated area (10 percent) than does land system 22-A (7 percent). This would tend to indicate that more of the poorer land in land system 21 must be cultivated in order to sustain about the same number of population. Conversely, the more fertile and less constrained land in land system 22-A has the capacity to support a proportionately greater population.

Population within the relatively more constrained sedimentary based land system 21 is concentrated in Hamtic and Anini-y in the southern zone and is exclusive to the southern and central zones combined. Population within the more fertile metamorphic based land system 22-A on long side slopes is concentrated entirely in the south of the province with about equal distribution between T. Fornier, Sibalom, and San Remigio.

Land systems 16, 17-B, and 18 account for about the same percentage of provincial population with 2 percent each. The population within the fertile land system 17-B on a sedimentary base again shows greatest concentration in Laua-an, in the central zone, where all the municipal upland hill population is located on this land system combined with the associated and less steep land system 17-A. The population within the fertile sedimentary based land system 18 on long side slopes is concentrated again in Patnongon and Bugasong in the central zone, with the population within this land system being exclusive to the southern and central zones combined. The more physically constrained land system 16 again shows greatest concentration in Culasi in the northern zone.

Land system 16 shows an uncharacteristically greater percentage of population relative to the percentage of agricultural cultivation area. The position of land system 16 improved in relation to both land systems 17-B and 18. Whereas land systems 17-B and 18 combine to account for 5 percent of cultivation area in the province, while land system 16 accounts for only 1 percent, land systems 17-B and 18 combine to account for 4 percent of provincial population, while land system 16 accounts for a proportionately increased 2 percent. This may indicate one of two things. Either the population allocation scheme gave too much population to land system 16 or the area cultivated in the land system was undercounted. This problem is taken up again later in this section.

All of the remaining land systems identified as having physical constraints to cultivation again account for a lesser percentage of provincial population and are located mainly in the northern municipalities.

In relating population to land systems, an opportunity presents itself to calculate population density by using the less arbitrary land areas of the land systems. Given the underlying land characteristics, one could expect that population density would vary with the variation of characteristics such as fertility of the land and physical constraints to cultivation. One could also expect that the pattern of population density would show a similar pattern to that of cultivation density.

Table 14 presents the results of calculating population density by land system and municipality and Figure 16 presents a mapping of the information contained in the table. Comparing Figure 16 with Figure 13 (p. 291) shows that the same general pattern of population distribution and density holds when using population figures as when using cultivation density as an indirect measure of population density.

Due to the nature of the population allocation scheme used to allocate population to the land systems, some small areas of municipal land systems may have been allocated a disproportionate amount of population, thus giving uncharacteristically high population density calculations. Notable examples of this in Table 14 are probably land systems 15 in Libertad, 18 in Hamtic, and possibly 22-A in T. Fornier. Due to the variation caused by the procedure used in relation to smaller areas, the provincial and zonal density figures probably give a better indication of density by land system.

Within the province, the fertile land system 18 again, as with the analysis of cultivation density, stands out as having the highest population density of all land

Table 14. Population density (per hectare) by land system and municipality.

Municipality and Zone	Lowland dens.	Land Systems and Upland Hill Height (Low, Median, High) Low LS 7 dens.	Median LS 15 dens.	Median LS 16 dens.	Median LS 17A dens.	Median LS 17B dens.	Median LS 18 dens.	Median LS 19 dens.	High LS 21 dens.	High LS 22A dens.	High LS 22B dens.	High LS 22C dens.	High LS 23 dens.	Hills Subtotal dens.	Mountains dens.	Islands dens.	Total dens.
Anini-y	10.86	-	-	-	0.54	-	-	-	0.98	1.16	-	-	-	0.94	**0	**0	2.59
T. Fornier	8.64	-	-	-	1.07	-	2.83	-	0.79	2.29	-	-	-	1.28	-	-	2.03
Hamtic	6.92	-	-	-	**0	-	1.19	-	0.62	-	-	-	-	0.66	-	-	2.14
San Jose	7.17	-	-	-	1.68	-	-	-	-	-	-	-	-	1.68	-	-	6.51
Sibalom	3.74	-	-	-	1.20	-	-	-	0.53	1.10	-	**0	-	0.95	**0	-	1.44
San Remigio	3.92	-	-	-	1.82	-	-	-	-	0.91	0.66	0.10	-	0.60	0.12	-	0.51
Belison	5.16	-	-	-	0.58	-	-	-	-	-	-	-	-	0.58	-	-	4.26
Zone 1 South	5.71	-	-	-	1.12	-	1.34	-	0.68	1.22	0.66	0.10	-	0.87	0.09	**0	1.61
Patnongon	3.41	-	-	-	0.88	-	1.32	-	0.37	-	-	-	-	0.79	0.27	-	1.64
Bugasong	5.52	-	-	-	0.77	-	2.05	-	0.41	-	-	-	-	0.83	0.06	-	1.04
Valderrama	3.75	-	-	-	1.36	-	**0	-	0.76	-	-	**0	-	0.76	0.08	-	0.38
Laua-an	7.93	-	-	-	0.97	1.47	-	-	-	-	-	-	-	1.23	0.17	-	1.05
Barbaza	5.47	-	-	-	-	1.80	-	1.22	-	-	-	-	-	1.44	0.22	-	1.01
Zone 2 Central	5.45	-	-	-	1.00	1.54	1.51	1.22	0.47	-	-	**0	-	0.93	0.13	-	0.90
Tibiao	7.36	-	-	1.04	-	-	-	1.44	-	-	-	-	-	1.32	0.11	-	1.23
Culasi	6.78	-	-	0.93	-	0.90	-	-	-	-	-	-	0.49	0.89	0.07	3.51	1.43
Sebaste	6.64	-	-	-	-	-	-	-	-	-	-	-	0.71	0.71	0.02	-	0.92
Pandan	7.94	0.59	0.33	-	-	0.64	-	-	-	-	-	-	**0	0.46	0.21	-	1.47
Libertad	8.96	-	3.03	1.32	1.50	-	-	-	-	-	-	-	-	1.51	0.31	-	1.19
Zone 3 North	7.73	0.59	0.46	0.99	1.50	0.69	-	1.44	-	-	-	-	0.67	0.85	0.13	3.51	1.28
Caluya	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.81	0.81
Province	5.99	0.59	0.46	0.99	1.08	1.36	1.47	1.35	0.61	1.22	0.66	0.08	0.67	0.88	0.12	0.93	1.24

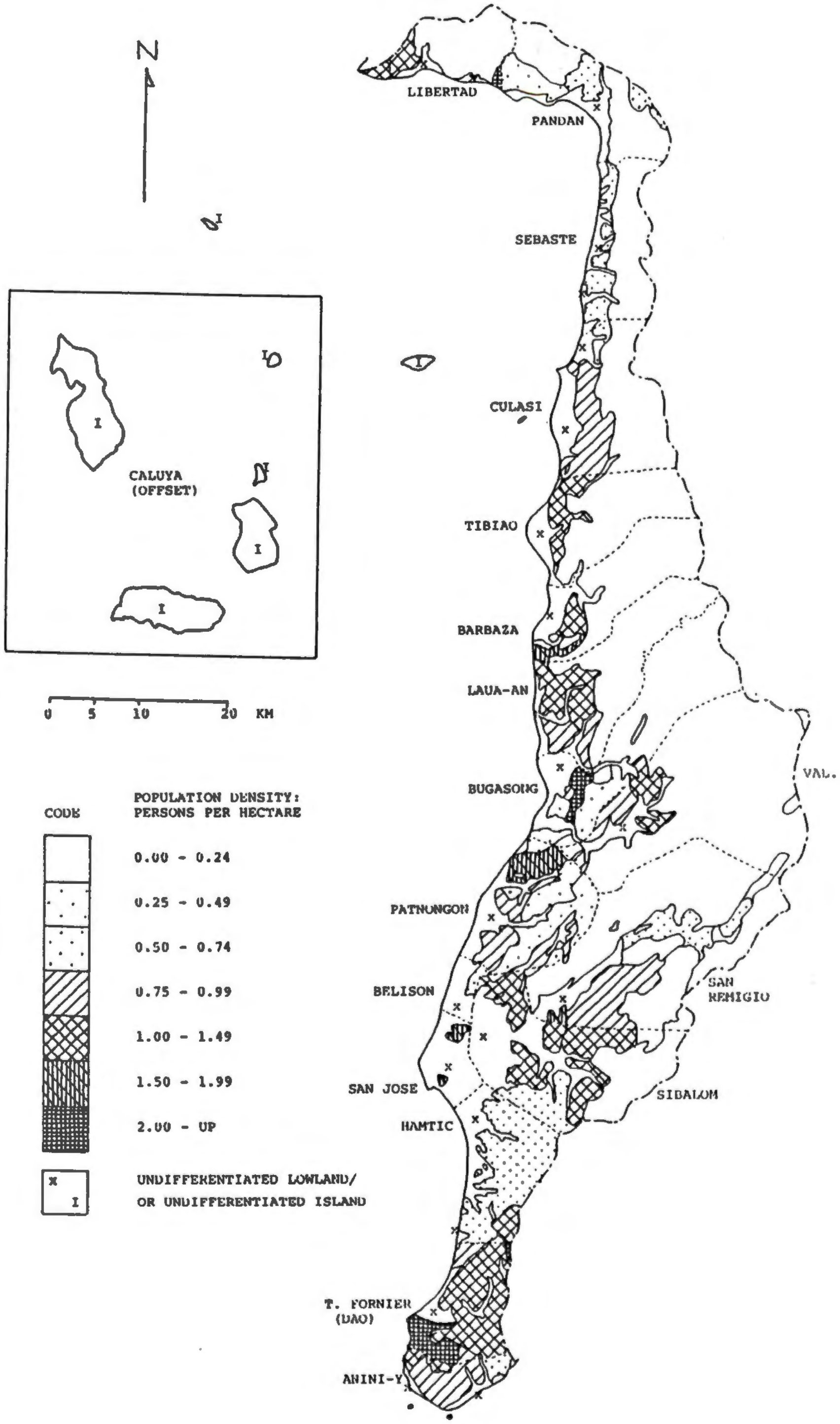

Figure 16. Map of population density by land system.

systems. This also holds in the southern zone but is slightly eclipsed by land system 17-B in the central zone.

The remaining land systems show a pattern somewhat different from the pattern obtained with analysis of cultivation density. The next two highest population density land systems are 17-B and 19. Both of these land systems show a relatively greater density than land systems 17-A and 22-A identified as the next two most densely cultivated land systems.

The discrepancy in relative density between 17-B and 17-A is localized to the central zone and specifically to Laua-an. This discrepancy is most likely a result of the allocation procedure assigning too much population to 17-B from barangays situated close to the land system. The very high population density in Barbaza may also be due to the allocation procedure and the relatively small land area involved.

The discrepancy in land system 19 is less clear. The cultivation density of land system 19 is one-half of land systems 17-A and 22-A and two thirds of land system 17-B, while population density is larger than either land systems 17-A or 22-A and almost equal to land system 17-B. This would indicate either an overallocation of population or an undercounting of cultivation or both in land system 19.

The next three highest population densities are in land systems 17-A, 22-A, and 16. Again a discrepancy is evident between the analysis of cultivation density and population density with land system 16 having a proportionately greater density of population than cultivation density between the land systems.

The cultivation density of land system 16 is only about one-fourth of the cultivation density of either land systems 17-A or 22-A, while the population density of land system 16 is almost equal to that of 17-A and only slightly less than 22-A. This would again indicate either an overallocation of population or an undercounting of cultivation area or both in land system 16.

Given the relative size of both land systems 17-A and 22-A, it is doubtful that there was a substantial effect on population allocation from the allocation procedure used. It may be assumed then that the density figures are fairly accurate. The relatively lower population density in land system 17-A would then indicate that the land in this land system may be of lesser quality than either land system 18 or 22-A and may have constraints to cultivation not apparent in the analysis of land systems.

The remaining hill land systems which were identified previously as having greater physical constraints to cultivation show characteristically lower population densities. Land system 7 shows an uncharacteristically low population density in comparison to its relatively high cultivation density, but this may be explained by the concentration of coconut plantations in this land system. Coconut utilizes more extensive cultivation techniques as compared to the more intensive field cultivation characteristic of most other upland areas. This would be associated with fewer farmers per hectare of crop.

Upland population density variation by municipality shows a similar pattern to that obtained by analysis of cultivation density. Those municipalities having a greater proportion of the more fertile and less restrictive land systems 17-A, 17-B, 18, and 22-A show generally greater population density on the municipal hill systems. Those municipalities which show a lesser upland hill population density generally have substantial areas in the land systems which are more physically constrained for cultivation. The exceptions to this are in Barbaza, Tibiao, and Culasi where the uncharacteristically high population densities on land systems 16 and 19, which account for most of the hill area in the municipalities, give the municipalities a higher upland hill population density relative to cultivation density. Still, overall the southern and central zones account for most of the population in the uplands

4. Summary Highlights

This chapter has presented an analysis of the geographical patterns of the physical landscape, agricultural activity, and population. All three have been related by means of a division of the provincial land surface into land systems, or areas with similar land characteristics. The major focus of the analysis has been the variation of population. Agricultural cultivation distribution and density provided an indirect measure of population patterns, while census figures were analyzed in three ways to gain a more direct analysis of population distribution and density.

The integration of information on agricultural activity and population within land system boundaries provided a basis for comparing both with the characteristics of the physical landscape. It was found that the distribution of population is uneven, with a greater proportion of the population being located on more fertile land systems which are, in turn, more concentrated in the southern and central portions of the province. Not only do the more fertile land systems account for most of the provincial upland population, they also show a greater density of both agricultural activity and population than the land systems showing distinct physical constraints to cultivation. The more physically constrained land systems are concentrated in the north of the province and account for absolutely and proportionately less of the provincial population and agricultural activity in the uplands.

Using the basic information developed in this chapter, the next chapter further analyses the information on upland geographical patterns in the province to identify implications for the geographical allocation of Antique Upland Development Program resources.

CHAPTER VII

SUMMARY AND PLANNING IMPLICATIONS

This final chapter provides a summary of the planning context in which this study was developed and the implications of both the geographical analysis of the uplands and the manner in which it was accomplished in the specific local government planning context. Section 1 summarizes the planning context and also identifies the planning criteria which are used in the succeeding section to draw implications from the geographical analysis of the uplands. Section 2 uses the planning criteria to identify both priority municipalities in the province and priority areas in the municipalities to form a framework for decisions on geographical allocation of Antique Upland Development Program resources. Section 3 provides some suggestions on the place of geographical analysis in provincial planning and appropriate means of undertaking such analyses.

1. Summary

The definition of planning may be reduced to the intelligent use of imagination, reason, and judgement in decision making for future action, with the aid of analytical methods which hopefully provide a better basis of knowledge than intuition or guesswork. This definition does not specify the form of planning nor the specific content. It recognizes that planning is more of a process than a set of procedures resulting in a final document or "blueprint" plan. It also recognizes that the process of planning may be a learning process for those involved and that the form and content, and even the methods of planning, may be created in the process as more information and experience are gained and perceptions are sharpened.

The form and content of planning described in this study was shaped by the context of planning operations in the Province of Antique in general and the Antique Upland Development Program in specific. Much of this study was experience based and the methods reflect this by being formed in an incremental, often experimental manner, in response to the form and content of planning in the province. The specific planning problem which this study addressed was identified from within the context of both the AUDP and the more general provincial planning operations.

The Antique Upland Development Program was planned much in the manner indicated in the above definition. In an incremental fashion and while learning in the process, the program took shape and became a model of rural development directed toward the uplands and the upland population. However, the program evidenced some weakness in planning as activities were expanded from a small pilot area into eight other municipalities in the province. Some of the weakness showed itself in internal administrative operations as resources became spread too thin and program effectiveness suffered.

Another less evident weakness was the manner in which expansion areas were chosen and showed itself in an uneven distribution of resources in relation to, at the time, informally perceived geographical patterns in the uplands. Based on an arbitrary administrative division of the province and a criterion of municipal representation in each administrative zone, the program ended up with a selection of three municipalities in each of three zones.

Since each zone had five upland municipalities, the decisions reflected a proportional representation by number of municipalities in each zone. This did not, however, reflect the proportion of upland population in each municipality or in each zone. The fault, if there was a fault, lay with the criterion of representation by arbitrary zone and a lack of formal knowledge of actual patterns of upland population distribution on which an alternative criterion could be applied.

From about the same time that the AUDP was being initiated, a basis for making knowledgeable decisions about geographical allocation of resources was being developed in parallel provincial planning operations. The provincial planning operations were generally characterized by direction from the national level through structured projects. The structure of the projects did not encourage learning in the process of planning but instead stressed defined procedures resulting in planning documents or "blueprint" plans.

The type of planning procedures incorporated into the early projects at times suggested or required the use of maps in planning operations, but did not provided much indication on how the maps were to be developed and how they were to be used. At the same time, existing data on the province were generally not amenable to map analysis. However, from a small beginning with existing maps of the province, a set of map based information was collected and developed incrementally over a number of years. The maps found some minor use in planning operations in the province and ultimately found their most direct use in this study.

Even though the planning procedures incorporated into the nationally defined projects did not provide direct guidance in the development and use of maps, they did provide some stimulus in the efforts to improve the base of mapped information in the province for planning operations. They also highlighted the difficulties in using existing information in the planning procedures designed at the time.

The greatest initial difficulty was the lack of accurate and useable maps on such basic subjects as political boundaries, population locations, roads, and land use. Subsidiary problems were the general lack of data on the subjects and the specific lack of data which could be mapped in any useful detail. Over many years, and with a certain amount of luck, all of the basic subject data were put into map form including important additional information on the physical landscape from a source outside the province.

The stimuli for map development in the early planning contexts came more from a negative perception or lack of use at the time, but also provided some positive learning experiences. The negative experiences centered in two major planning operations on comprehensive planning and road network planning. Both planning operations were designed at the national level and were highly structured.

The planning and development model inherent in both planning operations reflected more of a national perspective than local priorities. Based probably on a model of sectoral and infrastructural development as an indirect means to the alleviation of poverty, the planning operations were divided into sectoral categories reflective of national sectors and focussed mainly on production and infrastructure.

During the time that the maps were being developed in the early planning context in the province, a change in the development model was occurring at the national level which would have implications on how planning was to be approached at the local level. Based on dissatisfaction with the results of previous sectoral development models which emphasized industrialization and which were intended to alleviate poverty by creating jobs in the modern, mainly urban based sector of the economy, a new model was formulated which focussed on the basic human needs of specific poverty groups and how the needs could be met in a more direct manner to alleviate poverty.

In the Philippines it was noted that the modern industrial sector could not generate sufficient jobs to support the growing number of the labor force being displaced from the traditional rural or agricultural sector. The lack of employment opportunities both within the industrial sector and the rural sector was identified as the major cause of poverty.

The manner of planning development was also identified as a problem. The centralized nature of the older development planning model was not conducive to addressing the wide variation of development problems in the country. Another weakness in the older model was the lack of avenues or incentives to effectively involve the beneficiaries in the planning and development process.

The local government level, specifically the provincial level in the Philippines, was identified as the most appropriate level for decentralized development planning to occur. Bringing the process of development planning to the local level would allow the process to both more effectively address the variation in development problems in the country and more easily involve the beneficiaries of development in planning their own futures.

The new model of development was designed into a project which provided the main planning context for further development and use of the maps in the province. The maps found their greatest use in this project directed to specific poverty groups including the upland population. This project was a departure from previous development planning projects in being flexible in design and explicitly recognizing the need for geographical specificity in resource allocation. By being focussed on poverty groups or population in the province, the project reinforced the content of planning reflected in the AUDP and also gave a clearer set of criteria for the geographical allocation of program resources.

Instead of the arbitrary criterion of administrative zones, the project stressed population distribution and concentration, with the population being defined as the poorer population and specifically any one of several major poverty groups in the Philippines. In the identification and design of the project, analysis was made of the national poverty situation and regions within the country were identified where specific poverty groups were concentrated.

Three of the thirteen regions analyzed were chosen for allocation of project resources based on the criterion of concentration of the poverty groups. Within one region, the Province of Antique stood out as having the greatest concentration of poor based on percent of the total population. The province was also identified as containing the highest concentration of one poverty group (artisanal fishermen) in the region.

The project was designed to give local governments a greater role in the planning of development in their own jurisdictions. Instead of set procedures for planning, the project stressed planning as a learning process involving all participants in development, including the beneficiaries themselves. No formal set of planning procedures were defined for the project but a general outline of the process was given. The province was to formulate a broad strategy of development focussed on specifically identified poverty groups.

In the Province of Antique, two groups were identified--artisanal fishermen and upland farmers. A strategy for development was formulated and projects identified in a hurried manner to meet national budget deadlines. Thus a part of the project design was not accomplished in the first activities undertaken in the province. Only minor direct participation of beneficiaries was allowed in the time frame demanded to meet bureaucratic deadlines.

Another part of the project as designed was also slighted in the rush to meet deadlines. The previous analysis of the geographical distribution of the poverty groups was specific to the level of the province but did not define the distribution of populations within provinces. Part of the task of the province in the planning process was to develop a geographically more disaggregated analysis of poverty group distribution as a basis for allocating resources.

The maps developed over years past found some use in this task, but the resulting analysis was less specific than required for knowledgeable resource allocation decisions. The analysis of both identified poverty groups remained general, with only qualitative geographical considerations being identified for the upland population.

Even this general consideration of upland geographical patterns would not have been undertaken if it had not been for the familiarity of the province gained from almost ten years of working on the maps of the province. Unfortunately, the qualitative analysis provided for the provincial strategy and project identification process did not have much impact in the planning process at the time. The main reasons for this were the previous commitment of the AUDP to specific municipalities in the province and the overriding concern of gaining funding to meet the commitments.

Thus, the full potential of the maps were not realized in the province or in the Antique Upland Development Program. It was only after the author of this study left the province that he was able to reflect on the experiences of the past and synthesize the mapped information into a formal analysis of upland geographical patterns suitable for planning purposes under the new development and planning model.

2. Program Planning Implications

The analysis of upland geographical patterns has no major planning use by itself. To translate the information into a form useful for decision making requires explicit planning criteria to be identified. As the above summary of the planning context indicates, the criterion used in selecting expansion areas in the AUDP was mainly based on an arbitrary division of the province into administrative zones. The result was a division of the province into zones containing five major upland municipalities each. The result of the decisions to expand program activities was an allocation of resources to three municipalities in each zone, thus giving an allocation proportional to the number of municipalities in each zone.

Even without specifying an alternative set of criteria, it was intuitively obvious from the analysis of upland geographical patterns that the upland population and upland agricultural activity were not spread equally between the three zones. Thus, the particular criterion used and the lack of formal knowledge at the time may have allowed an unbalanced allocation of program resources in the province.

The new development and planning model mentioned in the summary above identified a more appropriate set of criteria for geographical resource allocation. The criteria were based on the distribution and concentration of specific poverty groups and were applied to analysis of the national and regional levels of the Philippines which resulted in the selection of specific provinces for inclusion in a project geared to local level development planning.

The analysis contained in the project documents stopped at the identification of provinces with concentrations of poverty groups and it was the explicit task of the local governments eventually selected for project participation to give internal geographical specificity to the analysis of poverty groups identified at the local level. The criteria again would be the geographical distribution and concentration of the poverty groups.

What was not made explicit in the criteria for resource allocation was the level of geographical specificity required for analysis within provinces. However, the form of planning and program operations within the AUDP provides a basis for identifying the level of specificity required. The AUDP operated on the basis of municipal divisions, and selected areas within municipalities to begin operations for immediate upland development and as a base for future expansion within the selected municipalities. Thus, municipalities and areas within municipalities would be an appropriate level of geographical specificity.

To translate the analysis of upland geographical patterns into a specific framework for planning for the allocation of future program resources and to compare past decisions with the new framework, the set of explicit criteria were used as follows:

1) priority of resource allocation should be based on the relative magnitude and density of upland population in the different municipalities as a measure of concentration of the upland poverty group,

2) priority resource allocation should be based on the relative density of population in different land systems as the most geographically specific division practical for measuring concentration within municipalities.

To give these two criteria operational meaning, both the indirect measure of cultivation density and the direct measure of population density were used. Only the measures of the phenomena in the upland hill land systems were used since the hill land systems effectively define most of the upland population in the province. The mountain land systems were excluded since most of the mountainous areas were virtually uninhabited. Also, the distribution of mountain land, being so uneven between municipalities, might have a tendency to mask major variations of concentration in the province.

To overcome the inconsistencies in the measures which might have been due to either undercounting of cultivation area or over allocation of upland population, an index was created for each measure, with the highest ranked municipality or land system being assigned an index of 100 and each lower ranked municipality or land system being given an index as a percent of the value of the highest rank.

The two measures were analyzed separately and then combined and re-ranked on the basis of average index magnitude. This had the effect of averaging the differences between the two ranks which may have been based on the possible discrepancies in the measurement of the phenomena. The combined index rankings were then analyzed separately and further combined using both a simple and weighted average of magnitude and density indices to give a composite index for final ranking of municipalities.

It was assumed that the higher the rank of the municipality based on the simple measures or composite measures, the higher the priority of the municipality for program resource allocation. Given that nine municipalities were selected for AUDP activities in the past, the first nine ranked municipalities were used as a basis for evaluating past decisions.

To give geographical specificity within municipalities, land systems were ranked on the basis of cultivation density and population density, indexed, and then combined and re-ranked based on average index magnitude. It was assumed that the higher the rank of land systems, the greater the priority for intra-municipal resource allocation. From the identification of specific land systems within the nine top priority municipalities, a framework map of priority sites for program resource allocation was constructed.

Turning first to the identification of priority municipalities, Table 15 ranks municipalities on the basis of upland hill cultivation area and upland hill population. The simple index of cultivation area shows that Sibalom has the highest concentration of upland cultivation area in the province. Of the top nine ranked municipalities, all are from the southern and central zones of the province. Of the last ranked six municipalities, all five northern zone municipalities are accounted for along with Barbaza in the central zone.

Table 15. Ranking of municipalities for cultivation area and population.

Rank	Municipality	Cultivation Area	Index	Municipality	Population	Index	Municipality	Avg. Index
1	Sibalom	4395	100	T. Fornier	12781	100	Sibalom	94
2	T. Fornier	3484	79	Sibalom	11192	88	T. Fornier	72
3	Hamtic	2682	61	San Remigio	8215	64	San Remigio	60
4	Patnongon	2468	56	Hamtic	6730	53	Hamtic	57
5	San Remigio	2440	56	Patnongon	6156	48	Patnongon	52
6	Laua-an	2245	51	Laua-an	5859	46	Laua-an	49
7	Bugasong	1620	37	Culasi	4442	35	Bugasong	34
8	Anini-y	1428	32	Anini-y	3971	31	Anini-y	32
9	Valderrama	1299	30	Bugasong	3858	30	Valderrama	28
10	Pandan	746	17	Valderrama	3266	26	Culasi	23
11	Culasi	469	11	Tibiao	2871	22	Pandan	16
12	Barbaza	403	9	Barbaza	2528	20	Tibiao	16
13	Tibiao	375	9	Sebaste	1955	15	Barbaza	15
14	Libertad	370	8	Pandan	1912	15	Sebaste	12
15	Sebaste	341	8	Libertad	1809	14	Libertad	11

Note that the cultivation density index of Pandan, the top ranked of the bottom six, is close to half of the index of Valderrama, the bottom ranked of the top nine, and less than one fifth of the top ranked Sibalom. This indicates that not only are the municipalities in the northern zone relatively less of a priority in the uplands, they also have a substantially lower absolute concentration of upland cultivation indicating a wide gap between the relative rankings.

The ranking of municipalities based on upland population changes the ranks of many municipalities, but the overall pattern still holds, with one important exception. Sibalom moves to number two rank to be replaced by T. Fornier. All but one of the top nine ranked municipalities are from the southern and central zones. The notable exception is Culasi which rises in rank from number 11 to number seven and displaces Valderrama in the top nine rankings. Still, four of the six bottom ranked municipalities are from the northern zone, and Barbaza is joined by Valderrama from the central zone. All municipalities in the southern zone fall within the top nine ranks. The trend in the index indicates that this measure does not show as great a gap between the bottom six ranks and the top nine. The trend is more gradual with Valderrama being close to Bugasong and Anini-y, but with the bottom ranked municipalities having only about one-fourth or less of the population of he highest ranked municipality of T. Fornier.

The combined average ranking of the index of magnitudes by municipality reestablishes the primacy of the southern and central zones with only slight shifting in ranks of municipalities. Culasi again falls into the bottom six ranked municipalities along with all the other municipalities in the northern zone and Barbaza in the central zone.

Table 16 provides a ranking of municipalities based on aggregate upland hill cultivation density and population density. The ranks of the municipalities change dramatically over those considered in ranking of cultivation area and population. On cultivation density, Laua-an is ranked first followed by Sibalom and T. Fornier which were both ranked as either second or third based on the previous rankings. All of the top nine ranked municipalities, except for one, come from the southern and central zones. Libertad from the northern zone is now ranked number seven, a great improvement in ranks from the lowest two in the previous rankings. Barbaza from the central zone is joined by San Remigio from the southern zone in the bottom six rankings along with the remaining four northern zone municipalities.

The ranking of municipalities on upland hill population density changes the relative ranking even more.

Table 16. Ranking of municipalities for cultivation density and population density.

Rank	Municipality	Culti-vation Dens.	Index	Municipality	Popula-tion Dens.	Index	Municipality	Avg. Index
1	Laua-an	47	100	Libertad	1.51	100	Laua-an	91
2	Sibalom	37	80	Barbaza	1.44	95	Libertad	83
3	T. Fornier	35	74	Tibiao	1.32	87	T. Fornier	80
4	Bugasong	35	74	T. Fornier	1.28	85	Barbaza	72
5	Anini-y	34	72	Laua-an	1.23	81	Sibalom	72
6	Patnongon	32	68	Sibalom	0.95	63	Anini-y	67
7	Libertad	31	66	Anini-y	0.94	62	Bugasong	65
8	Valderrama	30	65	Culasi	0.89	59	Tibiao	62
9	Hamtic	26	56	Bugasong	0.83	55	Patnongon	60
10	Barbaza	23	49	Patnongon	0.79	52	Valderrama	58
11	Pandan	18	38	Valderrama	0.76	50	Hamtic	50
12	San Remigio	18	38	Sebaste	0.71	47	San Remigio	43
13	Tibiao	17	37	Hamtic	0.66	44	Culasi	40
14	Sebaste	12	26	San Remigio	0.60	40	Sebaste	37
15	Culasi	9	20	Pandan	0.46	30	Pandan	34

Libertad from the northern zone is ranked first followed by two other municipalities, Barbaza from the central zone and Tibiao from the northern zone, formerly ranked in the bottom six. These municipalities in the top nine ranks are joined by Culasi from the northern zone which was also formerly ranked in the bottom six. A total of three municipalities from the northern zone are ranked in the top nine based on upland hill population density. Two municipalities from the southern zone and two from the northern zone now are ranked in the bottom six.

The relative spread of density indices is less dramatic than that of cultivation area and population numbers. This would indicate that there is less variation in density between municipalities than there is in areas or numbers from which the density figures were calculated. In both measures of density, the first ranked municipality in the bottom six is only about one-half as dense as the overall top ranked municipality.

The relative shifting of municipal rankings is probably due more to the difficulties and inconsistencies involved in the basic measurements of both cultivation area and population numbers. The average index probably gives a more accurate ranking of density by municipality.

The ranking of average indices again shows Laua-an having the greatest density of upland hill activity in the province. The remainder of the top nine ranked municipalities contain three municipalities formerly in the bottom six ranks. These municipalities are Libertad and Tibiao from the northern zone, and Barbaza from the central zone. Three municipalities formerly ranked as in the top nine are now in the bottom six. These municipalities are Valderrama from the central zone and Hamtic and San Remigio from the southern zone.

The two rankings by themselves give some indication of priority municipalities for resource allocation but approach the problem from two different measures of concentration. Given that both measures are of importance in decisions on resource allocation, a more convenient single measure may be devised by making a composite index from the average combined indices. However, assumptions as to the relative importance of the index measures must be made before combining the measures.

One assumption may be that the two measures are of equal importance, and thus a simple average of index numbers by municipality should give an acceptable ranking of priority municipalities. This, however, masks the greater diversity in cultivation area and number of population in the separate municipalities. Allocation of resources is not made to a density of population, but to a group or number of population. It may be argued then that number is of greater importance than density. To portray this, a separate weighted average index was calculated assuming a weight of four to number and a weight of one to density.

Table 17 presents the ranking of both simple and weighted calculations of average index by municipality. In both rankings, three municipalities stand out as having the top ranks in the province. Sibalom and T. Fornier from the southern zone and Laua-an from the central zone occupy the top three ranks respectively. These are followed by a grouping of San Remigio and Hamtic from the southern zone and Patnongon from the central zone but with relative ranks changing between the two calculations. Bugasong from the central zone and Anini-y from the southern zone consistently occupy ranks seven and eight in both calculations.

The last rank of the top nine ranked municipalities shows more dramatic shifts than with the other municipalities. Libertad is ranked number nine with the simple average index calculation while Valderrama is ranked nine with the weighted average. This is due to the relatively larger upland population in Valderrama. There is an associated shifting of ranks in the lower six ranked municipalities but mainly among the northern zone municipalities.

The range and trend in the simple average index is less dramatic than the range and trend in the weighted average index. This is due to the greater effect of

Table 17. Simple and weighted average index ranking of magnitude and density by municipality.

Rank	Municipality	Simple Average Index	Municipality	Weighted Average Index
1	Sibalom	83	Sibalom	90
2	T. Fornier	76	T. Fornier	74
3	Laua-an	70	Laua-an	57
4	Patnongon	56	San Remigio	57
5	Hamtic	54	Hamtic	56
6	San Remigio	52	Patnongon	54
7	Bugasong	50	Bugasong	40
8	Anini-y	50	Anini-y	39
9	Libertad	47	Valderrama	34
10	Barbaza	44	Culasi	26
11	Valderrama	43	Barbaza	26
12	Tibiao	39	Libertad	25
13	Culasi	32	Tibiao	25
14	Pandan	25	Pandan	20
15	Sebaste	25	Sebaste	15

differences in magnitude of population between municipalities, with the northern municipalities having proportionately less upland population than either the central or southern municipalities.

Using the weighted average index as a final base for assigning priority to municipalities shows all municipalities in the southern zone being in the top nine priority municipalities, with Sibalom and T. Fornier showing a distinctly higher index than all other municipalities. All of the northern municipalities, and including Barbaza on the boundary of the northern and central zone, fall within the last six priority municipalities.

This would indicate that the bases for decisions which resulted in actual municipalities chosen for allocation of AUDP resources did not reflect actual geographical patterns in the uplands. None of the northern municipalities chosen--Tibiao, Culasi, and Libertad--fall within the top nine priority ranks. Only Libertad falls within the top nine based on a simple average index and both Tibiao and Culasi fall behind two other municipalities in rank. In the weighted average index, all three are of about the same marginal rank in the bottom six priority municipalities.

Of the top nine ranked municipalities, T. Fornier stands out as being a very high priority municipality which was not chosen in actual decisions for AUDP resource allocation. The other municipalities not chosen were San Remigio and Patnongon, both of which show a substantially higher weighted index than the last three of the top nine which were chosen.

What is less apparent in the priority rankings is the relative importance of the municipalities within the top nine ranks. If weight is given only to upland population size, an argument could be made that both Sibalom and T. Fornier should be assigned two areas each before either Anini-y or Valderrama are chosen. This is due to the fact that both Sibalom and T. Fornier have more than twice the upland population than the other two municipalities.

All that can be concluded from this ranking is that the decisions on allocation of program resources did not reflect actual geographical patterns in the uplands. One cannot say categorically that the decisions were wrong. First, an explicit criterion for selection was representation in each of the zones. After first round expansion, this was accomplished with Tibiao in the north, Laua-an in the central zone, and Hamtic in the southern zone.

Given that the pilot area in Hamtic was chosen based on an accidental occurrence and that the main purpose of choosing the site was the development of program content, the choice proved to be fairly good. The choice of Laua-an in the central zone of the province was a good choice considering that it ranked highest of all central zone municipalities. The choice of Tibiao in the north proved to be a fairly good one given that the difference in rank between Culasi, Libertad, and Tibiao was very small.

In second round expansion, the criterion of representation in each zone would not necessarily hold since representation was already established. However, there were other explicit criteria of choice which may have played a greater role even if an analysis such as the one contained in this study were available. These criteria were not geographic in focus, but stressed the presence of local leadership supportive of the program, or at least the absence of factors which would hinder program operations. These criteria may have been of such importance in the municipalities of the province that geographical considerations would have been only secondary.

There is reason to believe that this would not have been the case. No formal analysis of upland geographical patterns had been made at the time and thus no formal basis for decision making was available. There might have been a different set of municipalities chosen, or even a doubling of areas in some municipalities chosen, had there been an analysis of the uplands to act as a framework to judge the relative importance of the other criteria.

The framework of priorities presented in this study thus cannot give a definitive answer as to where program resources should be allocated in the province. It can only provide a framework for future decisions which are best made by the policy and decision making body--the AUDP Board.

Before turning to the implications of this study for the planning process in the province, it would be useful to give even greater specificity to the areas within municipalities which could be considered as top priority for the allocation of program resources. This supplemental analysis is intended only as indicative and not definitive since actual selection of areas for program activities would best be undertaken by field surveys at a scale of analysis much smaller than used in this study.

To identify possible priority areas within municipalities, the relative ranks of both cultivation density and population density by land system may provide an indication of relative concentration within the province and, assuming similar patterns among municipalities, within specific priority municipalities. Again, the measures were ranked separately and a combined average index calculated to average out inconsistencies.

Table 18 presents the rankings of land systems for cultivation and population density. Land system 18 stands out in all calculations as the most densely settled upland

Table 18. Ranking of land systems for cultivation density and population density.

Rank	Land System	Cultivation Dens.	Index	Land System	Population Dens.	Index	Land System	Avg. Index
1	18	50	100	18	1.47	100	18	100
2	17-A	40	80	17-B	1.36	93	22-A	82
3	22-A	40	80	19	1.35	92	17-A	76
4	7	37	74	22-A	1.22	83	17-B	76
5	17-B	30	60	17-A	1.08	73	19	66
6	21	25	50	16	0.99	67	7	57
7	19	20	40	23	0.67	46	21	46
8	23	13	26	22-B	0.66	45	16	44
9	15	12	24	21	0.61	42	23	36
10	16	11	22	7	0.59	40	22-B	32
11	22-B	10	20	15	0.46	31	15	28
12	22-C	5	10	29+30	0.12	8	22-C	8
13	29+30	2	4	22-C	0.08	5	29+30	6

hill land system. The most appropriate measure of relative density is the combined average index. The ranking of this measure shows that land system 18 is followed by a cluster of land systems with relatively high index numbers. These land systems are 22-A, 17-A, and 17-B. All four land systems combined were identified in the analysis of upland geographical patterns as being the most fertile and least physically restricted upland hill land systems in the province. They are followed by land system 19 which was identified as one of the land systems having distinct physical constraints to cultivation.

The ranking of land systems can end here since the top four land systems also are concentrated in the priority municipalities identified above and the remainder of the land systems do not provide much guidance in the identification of concentrations in municipalities. Land system 19 may be viewed as a marginal priority land system but one which is concentrated exclusively in two municipalities previously identified as low priority.

The priority land systems by municipalities is presented in map form in Figure 17. As can be seen from the map, the priority land systems are concentrated mainly in Sibalom and T. Fornier, thus also providing an explanation of the priority rank of these two municipalities. Both land systems 22-A and 17-A are important in Sibalom,

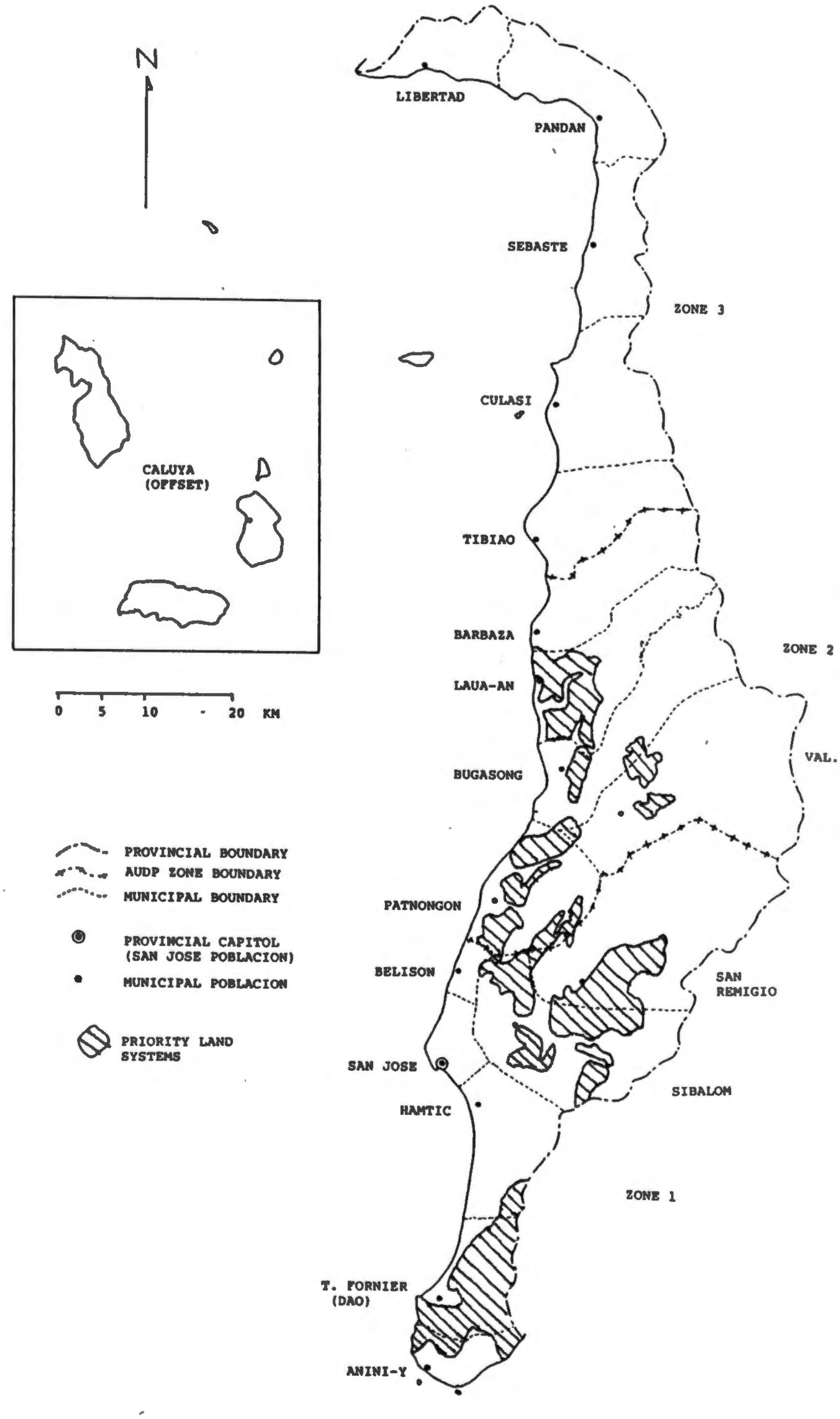

Figure 17. Map of priority land systems areas within priority municipalities.

while 17-A and, to a lesser degree, land system 18 make up the upland hill priority areas in T. Fornier.

The entire upland hill base in Laua-an is made up of a combination of both the lesser sloping land system 17-A and the greater sloping 17-B. The concentration within San Remigio is mainly on land system 22-A with some minor concentration on 17-A. The concentration of population in the upland hills of Hamtic is very localized to a small area of land system 18, but masks some local concentrations of population on the footslopes of land system 21 in most of the remainder of the municipality. Land systems 17-A and 18 combine to identify concentration of upland hill population in Patnongon, with 18 being more important locally. Land system 17-A identifies the greatest concentration of upland hill population in both Bugasong and Valderrama, but this masks some localized concentrations on the footslopes of land system 21. The areas of concentration of population on land systems 17-A and 22-A in the eighth ranked Anini-y seems very small and masks a substantial local concentration of population on the footslopes of land system 21.

The map in Figure 15 emphasizes the concentration of upland hill population in the southern and central zones. It also emphasizes the relative concentration of population in T. Fornier, Patnongon and San Remigio where no AUDP areas were yet established at the time of writing.

3. Implications for the Planning Process.

The above geographical framework for making decisions on resource allocation is important for the content of planning within the AUDP. Of equal importance are the implications which may be drawn from the way in which the analysis was done. Briefly, the analysis was done in a local government planning context in response to stimuli encountered in that context and adapted to the constraints and opportunities in that context.

The Local Resources Management project approach to development which focuses on specific poverty groups has as one of its components the direct and central inclusion of local governments in the development planning process. Local governments are seen as a catalyst in development by being closer to the intended beneficiaries and by providing a more direct access to the planning process in which beneficiaries should be actively involved.

The planning process itself is seen as more of a learning process, with participants defining the form and content of both planning and development as experience is gained. One part of the content of planning is the geographical specification at the local government level of the distribution and concentration of specific poverty groups within jurisdictional boundaries.

The important point to note is that LRM stressed the conduct of geographical analysis at the local government level. This could be accomplished by outside consultants, but this might prove to be expensive to the local governments concerned. This study, by being done from within a local government, provides an appropriate alternative which may be accomplished by the local government personnel themselves. This would have the added benefit of allowing a direct participation in an important part of planning analysis by local government personnel and thus hopefully making the analysis more of an internalized product than just another planning document.

The materials needed for the conduct of the analysis are relatively inexpensive and easily obtainable in the Philippines. The methods are simple, though tedious at times in reliance on manual analysis, and could be simplified to an even greater degree if resources are more limited than in the Province of Antique.

Specifically, a province participating in a project such as the Local Resources Management project could probably obtain a useful analysis by just identifying land forms from a set of large scale topographic maps instead of relying on a more technical, and more expensive, land systems analysis. Even though much information on the quality of the physical landscape would not be available, the analysis of variables specific to land forms could give a fair indirect indication of underlying physical constraints.

Even if a local government could not afford a relatively inexpensive aerial photographic coverage of its jurisdiction, the direct analysis of population from census figures may give a suitable overall picture of the distribution of population within the local government boundaries when related to land forms. However, given the problems inherent in the geographical population patterns using existing census data, the author would suggest the concurrent use of an independent analysis of cultivation as an indirect measure of population distribution.

The magnitude of the effort involved in an analysis of this type may be too much for a small program, such as the AUDP, to undertake on its own. The analysis would probably be more appropriately conducted as a part of general planning operations, with specific topical analysis being undertaken from a general map information base. This would also allow flexibility in meeting future analysis needs not related to initial program concerns.

The maps used as a basis for analysis in this study were developed over a number of years in an incremental manner. The process of map development was at times disjointed and at times lacked overall direction. However, based on the experience of developing a base of mapped information in the province, a general set of guidelines may be formulated to assist others who might want to develop a map base in their own province.

The following set of guidelines is not meant to be definitive. They are only presented as suggestions to focus effort at the local level and to save time in searching for appropriate methods. Since each local government situation may vary to a greater or lesser degree from the situation found in the Province of Antique, imagination and experimentation will probably be required to make the suggested guidelines fit the local planning context.

Central to the following guidelines is the assumption that the personnel involved come from the existing or permanent local planning office. Involving local personnel directly in the process of developing a map base for planning should provide continuity in the use of the final product, make further refinements easier, and provide flexibility in meeting the analysis needs for specific planning problems.

An assumption is also made that the analysis is conducted within a general planning process and not specific to a particular local government project. By placing the development of the maps in the general planning process, the usefulness of the information base may be broadened beyond the specific interests of a particular project.

Since an analysis of land systems probably would be outside of the capabilities of local governments to conduct on their own, this component of analysis is excluded from the following guidelines. In its stead, a simpler identification of land forms is substituted. The identification of land forms is a subjective process, but can be assisted by defining criteria of such factors as slope, elevation, and dissection of the land, or the number of river and stream valleys cutting the land. As far as the author can tell, there are no set and standard criteria available for identifying land forms. Thus, each local planning office could define its own. To allow more standardized criteria, the national level, for example, the Bureau of Soils, could set some general criteria and assist directly in the process.

The overall principle followed in formulating the guidelines was to keep requirements simple, if possible, and thus hopefully less expensive. Simple manual analysis was assumed for most tasks, that is, methods similar to those used in this study and which would usually require no more than simple drafting tools, tracing paper overlays and a pocket calculator (possibly a programmable calculator).

The tasks to be accomplished may be defined as follows:

1) Organize and orient the planning staff

resonsible for developing the map base and analysis. The staff involved could vary but thre to five would facilitate simultaneous work on the different tasks and thus reduce the time needed. The staff should be drawn from the existing planning staff.

2) Collect and collate existing information and maps of political boundaries, barangay locations, roads, topography, etc. and prepare a set of overlays at the largest scale of analysis (assumed to be 1:50,000 scale based on Bureau of Coast and Geodetic Survey topographic maps).

3) Identify and rectify conflicts and inconsistencies in the existing information and map sources and set the boundaries of the areas (political boundaries) to be used for further analysis.

4) Conduct a road location field survey and produce a geographically accurate road location map at largest scale of analysis.

5) Conduct a barangay location field survey to accurately locate barangay centros as point locations and produce a geographically accurate barangay location map at largest scale of analysis. Part of this could be accomplished along with the road location task but those barangays not located along roads should be either located in the field or located by means of the aerial photographs mentioned below.

6) Analyze topographic maps and produce a slope map and a generalized elevation map at largest scale of analysis.

Intermediate analysis of maps at this point could be done to produce measurements of areas within political boundaries and areas within slope category boundaries. These measurements could be used as a check for area measures from other sources.

7) Conduct a detailed photographic overflight of the entire province. This would be done from a light overhead-winged airplane by taking oblique color slide pictures in sequence from the windows of the airplane. Planning of flight paths and luck in weather conditions would be required. If an airplane could not be assigned from the Philippine Air Force, as in the case of Antique, then the province should seriously consider renting an airplane for the task.

8) Analyze oblique aerial slides on a grid based map (suggested grid size of 25 hectares but no less than 100 hectares or one square kilometer to retain detail) for land cover and land use. Spot field check interpretation accuracy and produce a set of grid based maps by land cover and land use at the largest scale of analysis.

9) Identify land forms using the topographic maps, the analyses of slope and elevation, and the aerial

slides. Produce a land form map at the largest scale of analysis.

10) Analyze population distribution by allocating point barangay location population figures (from census figures) in both a grid square matrix and the land form map. (The grid square allocation could be done separately before the land form analysis.)

11) Reduce mapped information from the largest scale of analysis (1:50,000) to scales of 1:100,000 for general provincial level planning analysis and wall display, 1:250,000 for portable display, and a suitable scale (1:815,000 scale in the case of Antique) for report size maps, and produce permanent map overlays of the various data at scales of 1:50,000 and 1:100,000 for future planning use. This would require skill in map data simplification from the detailed large scale maps to the necessarily less detailed smaller scale display and report size maps.

12) Present interim results to small groups of planners and decision makers at the provincial and municipal levels. Small groups would be preferred to allow more interaction between the staff and the planners/decision makers. From this interaction could come an input of planning and development priorities on which to formulate specific planning implications.

13) Re-analyze maps and other information by

planning and development priority areas and draw geographical planning implications. This would ideally include formally set development priorities from a legitimate planning body such as the Provincial Development Council.

14) Write-up analysis of separate maps and planning implications in report form for publication. This could also include the packaging of a slide/map/chart presentation suitable for group orientations.

15) Use the analyses and maps in planning.

The above tasks follow a general time order and also have an underlying order from specific and relatively simple analysis to more comprehensive and complex analysis. Tasks 1 to 3 may be seen as gearing up exercises. Tasks 4 and 5 are included on the basis of observations that road maps and especially barangay location maps are usually inaccurate and outdated. The tasks also allow the planning staff to begin learning by experience of the relationships between what is on the ground and what is on the maps. Task six is a rather simple but tedious desk-top analysis of the topographic base maps which would at the same time provide another level of learning to abstract from physical geographic features.

Task 7 is a key task which would provide much of the raw data for subsequent analyses and would also provide the staff with another perspective (aerial) on the area they are studying. Task 8, and especially interpreting the aerial slides, would be one of the most difficult and complex tasks to be undertaken by the staff and would require much concentration on quality control to produce an accurate result.

Task 9, the identification of land forms, may require some outside specialist assistance if standardized land forms are desired. If something more detailed was desired, such as the land systems map and analysis in this study which was based on a study done by the Bureau of Soils and the UNDP, then much greater and more specialized assistance would be required. Ideally, this kind of analysis should be multi-disciplinary with geographers and soil scientists being key people. Even with the expense involved in acquiring outside specialist expertise, a good geomorphological analysis would be highly desirable in providing a comprehensive framework for relating all other analyses.

Task 10 is a rather mechanical exercise in calculating population patterns and density. The grid square method is a geographically arbitrary method of analyzing patterns and density. In also using the land forms map, the allocation of population to areas would at least have some basis in natural geographical patterns. The biggest problem in either analysis is that population figures for barangays can only be represented as point locations. This means that the allocation method would have to use some more-or-less arbitrary assumptions about population patterns at the barangay level. This study has presented a set of assumptions and criteria for allocation, but others may wish to develop their own to more closely account for local variations.

Task 10 would be the first time that population comes into the analysis process directly as a variable to be mapped. The analysis focuses on the number of people and the relation of the number of people to land area and type. It says nothing about the characteristics of the population as individuals or households. Since planning is not just concerned with the physical patterns of the land but is also concerned, even more so, with the population on the land, it would be desirable to gather information on the population and relate this information to the geographical patterns observed.

It may be desirable to conduct a province-wide household survey stratified by land forms and political boundaries. This would require some outside expert assistance on sample design, survey design and execution, and statistical analysis. The major problem with such a survey, however, is time and financial resources, both of which may be in short supply at the local government level. The Province of Antique proposed such a survey within the LRM project but the survey was not approved.

Task 11 is the process of producing the physical maps in final form for archival, display and working use. These maps will be used in all the remaining tasks.

Tasks 12 to 16 bring the map based analysis more firmly into the planning and decision making process. Task 12 brings the planners and decision makers into the process, first as receptors of the results of previous analysis and then as agents who can add to the analysis by providing feedback on the clarity of the maps and analysis and by identifying specific development concerns and priorities. These will be the end users of the final product and they should be involved in focusing specific analysis to their own concerns.

With specific priorities and concerns identified, task 13 provides an opportunity for more focused analysis on which to base geographical planning implications. This is similar to the process that occurred in defining the problems identified in this study and providing planning implications focused on the uplands.

Task 14 is the usual write up of results for formal report presentation and archival purposes. This could easily be expanded into a group presentation format of slide shows accompanied by maps and charts.

Task 15 is the focus of all the other tasks. For the output of the project to have any real meaning, it must be used. The best way for the analysis to be used in planning is to have the planners and decision makers themselves involved in the process of analysis. For the output to be most useful, there needs to be someone left in the province who knows how the output was developed, what it contains, and how to further refine the output in future planning situations. Points in the project have thus been identified in which planners and decision makers should be directly involved. More importantly, it is recommended that existing staff from the planning office be the ones to develop the maps and conduct the analysis so that there will be some continuity after the report is written and the maps produced.

In conclusion, the experience of the author leads him to believe that local governments themselves can conduct geographical analysis suitable for planning the geographical allocation of development resources. This can be done in a planning context more closely linked to the final beneficiaries of development projects at the local level and can provide a geographical framework for resource allocation to identified beneficiaries.

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VITA

John David Lamb was born in Oak Ridge, Tennessee on April 12, 1950. He attended Norwood Elementary, Sterchi Elementary and Powell Elementary schools in Knox County, Tennessee. He attended Powell High School and graduated in 1968. Beginning the summer of 1968, he attended the University of Tennessee and graduated June 1972 with a Bachelor of Science in Psychology with a minor in Anthropology.

He entered the Graduate School of Planning at the University of Tennessee in the fall of 1972 and graduated in June of 1977 with a Master of Science in Planning degree. Before graduating, he joined the Peace Corps in 1975 and served two years as a planner with the Provincial Development Staff, San Jose, Antique, Philippines. After a short homeleave to finish his thesis, he returned to the Province of Antique on an extension of his Peace Corps assignment.

Upon leaving the Peace Corps in 1979, he entered the Department of Agricultural Economics and Rural Sociology at the University of Tennessee to pursue another master's degree. He interrupted his studies again in 1981 to return to the Philippines as a Research Fellow under a grant from the Ford Foundation through the Panay Island Consortium for Research and Development (PICRAD). Along with his work with the PICRAD, he again worked in the Province of Antique with the Antique Upland Development Program. He returned to the University of Tennessee in 1984 to complete his thesis and graduate in December 1985 with a Master of Science degree in Agricultural Economics.