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COOPERATIVE AGREEMENT ON HUMAN SETTLEMENTS AND NATURAL RESOURCE SYSTEMS ANALYSIS

SPATIAL PLANNING AND RURAL SETTLEMENTS ACCESS TO SERVICES AND FACILITIES: METHODS AND APPLICATION IN THE PHILIPPINES (BICOL RIVER BASIN STUDY)

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FOREWORD

This paper draws freely from materials produced by the author and Junio M. Ragragio during 1977 and 1978 when they were principal investigator and co-investigator, respectively, of the Urban Functions in Rural Development (UFRD) project of the Bicol River Basin Development Program. These materials formed the final report of the project which was later published by the Center of Policy and Development Studies (CPDS) of the University of the Philippines. A long overdue acknowledgement is given to Dr. Dennis A. Rondinelli who edited the final report of UFRD and who wrote the executive summary.

To facilitate reading of this paper, only maps and figures are included in the text. For those interested in statistics and numbers, all tables have been relegated to the annex, in the order that they are mentioned in the paper.

The views and opinions expressed in this paper are the sole responsibility of the author and do not in any way, nor are they intended to, reflect the official policies of the offices he is presently connected with in Indonesia.

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BACKGROUND

Urban Functions in Rural Development, a research project in spatial planning[1] provided a unique opportunity for urban and regional planners in the Bicol River Basin to examine the system of settlements in an integrated area development project[2] and analyze the role it plays in rural development.[3] It concluded that "the settlement system as it exists is extremely poor in terms of providing access to service and facilities for rural people" outside of a narrow strip of urban settlements lying along the regional highway to the national capital, the city of Manila, about 500 kilometers to the west. The study recommended that "much more attention be given to the access implications of locations of projects."[4]

The Bicol Study addressed directly the advocacy for a more balanced spatial development to facilitate rural development.[5] Theorists and regional planners have long noted that in many developing countries, the pattern of urban centers is characterized by the primacy of one or two coastal cities. They function as entrepot for external trade and were not intended to complement more internally-oriented rural development, a colonial heritage that modern Third World governments perpetuate, knowingly or unknowingly.[6] Such a pattern carries an urban-industrial bias which often closes its eyes to the reality that the developing world is still predominantly rural and will remain so for many more generations to come.

This paper proposes to present the methodologies used in spatial analysis in the Bicol Study and a summary of its findings. In the concluding section, several observations will be made regarding a number of implications of the study's methodologies and of its findings to rural area development planning. The latter are based on the writer's experience both in the Philippines and in Indonesia.

PART I. THE BICOL STUDY

A. Introduction

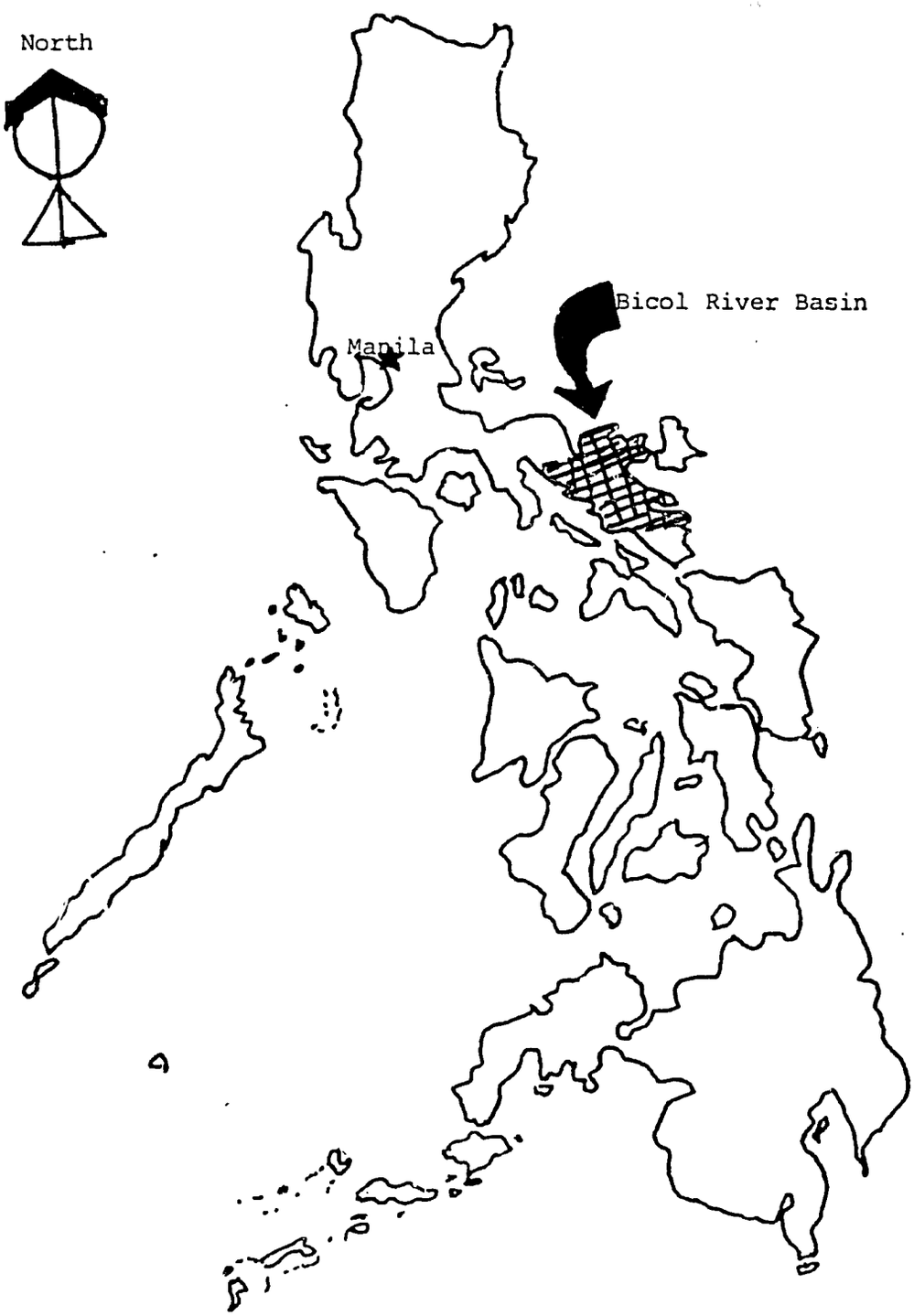
Within the original program framework of the Bicol River Basin Development Program (BRBDP), the urban development component was oriented towards making the secondary cities of the area (the provincial capitals and major towns) more habitable for its urban residents. Preliminary discussions, however, with the project sponsors and the Philippine and U.S. consultants assigned to the project identified a direction that is more relevant to the rural development focus of BRBDP.[7] It was decided that the urban development program should look into the urban functions present in urban centers of the river basin and how they are integrated, spatially and functionally, with the system of rural settlements where the farmers reside. The main questions posed was whether the system of urban centers form a supportive spatial framework to the rest of the rural sub-space.

The backgrounder to the study area, Table 1 provides some vital statistics of the basin in relation to the region and the nation. Bicol ranks second poorest in the national hierarchy of underdeveloped regions. But while its farmers receive very low incomes, it has vast potentials for agriculture and historically had produced rice surpluses for nearby regions, up to Manila (see Map 1). At the time of the study, the basin included two administrative provinces, 54 municipalities or townships, and 1,534 village administrative units called barangays. In terms of population, the basin was 18 percent urban compared to the national urban population of 30 percent.

Approach. A three-pronged approach was used. First, ascertain the spatial system of urban centers and assess their capacity to provide services and facilities. Second, look into the rural sub-space and find out the extent of settlement development, especially as it relates to the need for services and facilities important to rural development. Third, examine the nature and strength of linkages between settlements to determine the geographic reach of urban centers, approximate spatial groupings of settlements and assess physical accessibility of rural settlements to urban centers.

Organization. A dozen researchers and assistants were put together under two urban-regional planners who were principal and co-investigator, respectively. Primary surveys were contracted to schools and participating line agencies in the basin. An inter-agency team from BRBDP was organized as counterpart team to whom methodologies developed during the study will be transferred. A multidisciplinary team of senior academics were available at periodic workshops to assess research output and provide technical guidance. A senior U.S. consultant visited the project to review progress, suggest methodologies, edited the final report, and in general infused the philosophy and direction of the study into the project staff.[8]

Map 1. The Philippines showing the location of the Bicol River Basin



B. Methodology

Since the Bicol Study was the first of three global studies in spatial planning for rural development[9], there were no models to illustrate precise methodologies. The literature on central place theory and related spatial studies were made available and were found to be rich in concepts and theoretical materials but low on field investigations that could apply to the condition of Bicol and the intent of the study.[10]

Some of the few that found practical application were the scalogram of Benjamin Fisher which he used in his village inventory in Indonesia, the computer-based Guttman scale, and a revised version of John Marshall's threshold analysis in his Canadian studies. The rest of the methods were "quick and dirty" methods which were formulated right in the field, have not been formally tested, and can be processed by modest facilities or what is termed "low tech" such as simple desk calculators and black and white mapping.[11]

1. Classification of Settlements

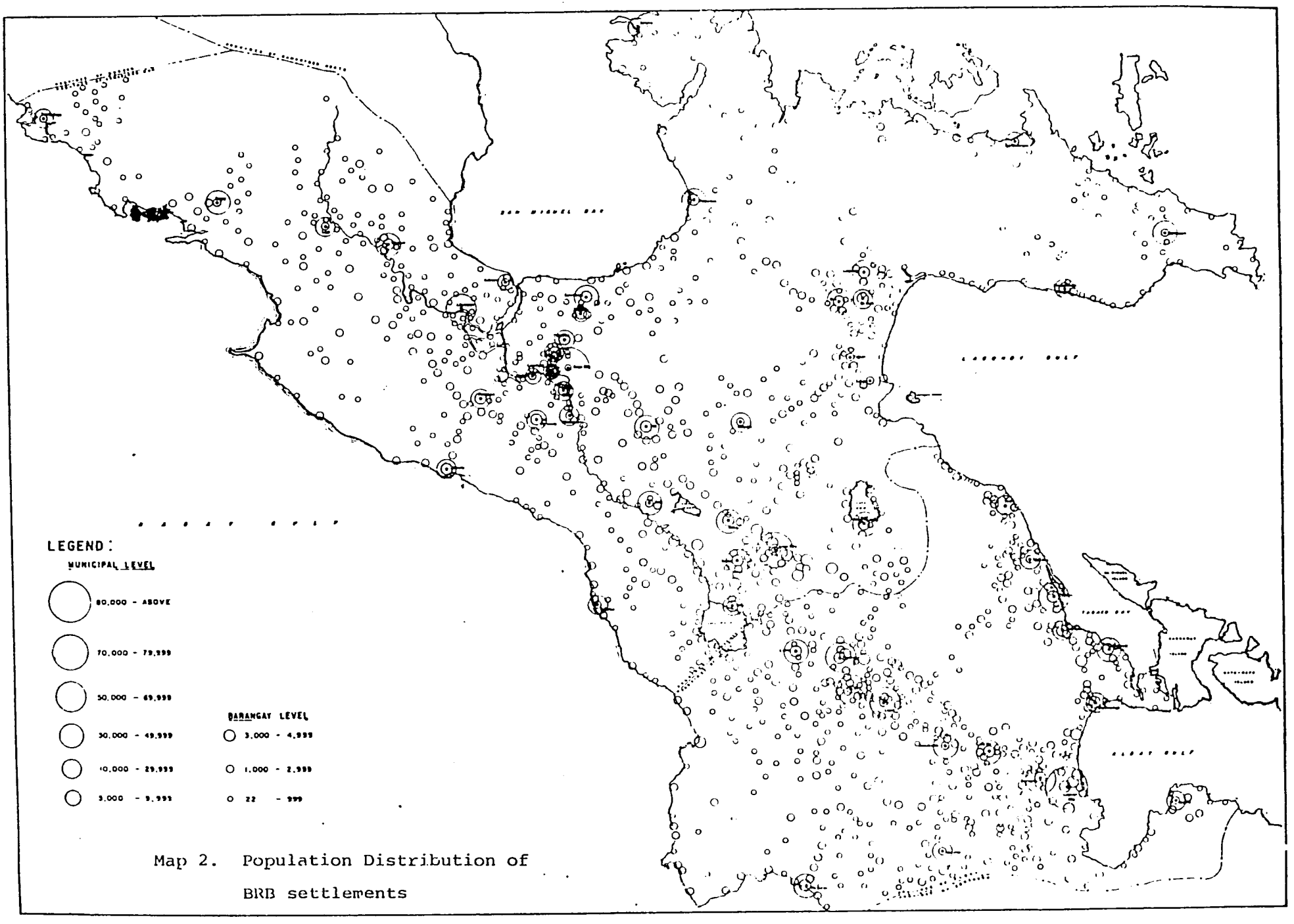
Analysis of secondary social and economic data were done at two levels: municipal and village. Population data from two censal periods, 1970 and 1975 were analyzed to show sizes of settlements, to identify villages/municipalities that are gaining/losing population by comparing absolute numbers and annual average growth rates, and to compare percentage distribution of population in villages/municipalities in relation to total municipal/provincial population.

The analysis at municipal level arrayed population data with selected economic development indicators and indicators of the availability of selected services. Together, they were regarded as indicators of municipal development. This analysis was correlated with the functional analysis of settlements (see below) and was found to be positively related. The resulting classification of municipalities is presented in Table 2 while in Map 2 the pattern of population distribution is illustrated.

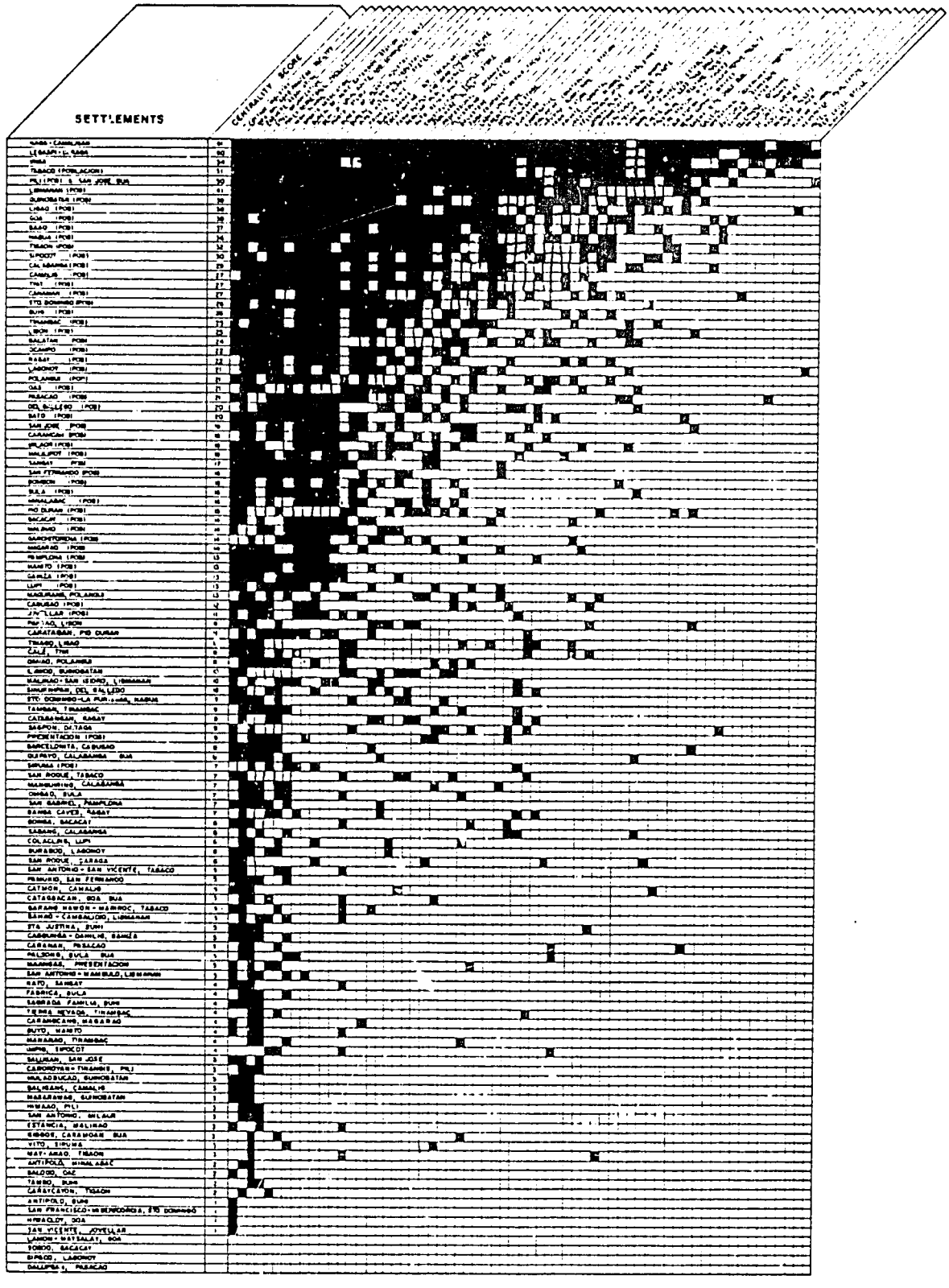
2. Functional Analysis of Settlements

Scalogram analysis, Guttman scaling and analysis of secondary socio-economic, demographic and physical accessibility data were used to construct a hierarchy of settlements and functions in the Bicol River Basin, yielding a four-level settlement structure of provincial centers, local service centers, rural centers and non-central places. Table 3 presents the summary of the functional analysis while Table 4 lists the 64 functions that were inventoried and scaled. While threshold analysis was attempted, the results were not that definitive because population data were based on administrative, not spatial units. Figure 1 shows the manual scalogram.

When the village inventory was being planned, the impossible task of making a total inventory of 1,534 villages to authenticate the resulting hierarchy became a research issue. To reduce the number of cases without sacrificing the accuracy of a complete inventory, a criteria was drawn to exclude non-central places and to define settlements instead of administrative



Map 2. Population Distribution of BRB settlements



• PRESCENCE ■
ABSENCE □

Figure 1. Scalogram showing centrality of settlements

villages. After assessing preliminary information, it was found that villages of 1,000 population and below function as mere residentiary settlements and need not be inventoried. These villages comprise 95 percent of all villages in the basin. By merging continguous built-up areas, it was found that 121 distinct spatially-defined settlements can be scaled for centrality of functions, for the rest of the villages. It was within these 121 built-up areas that urban centers containing significant numbers of urban functions were identified.

3. Spatial Linkage Analysis

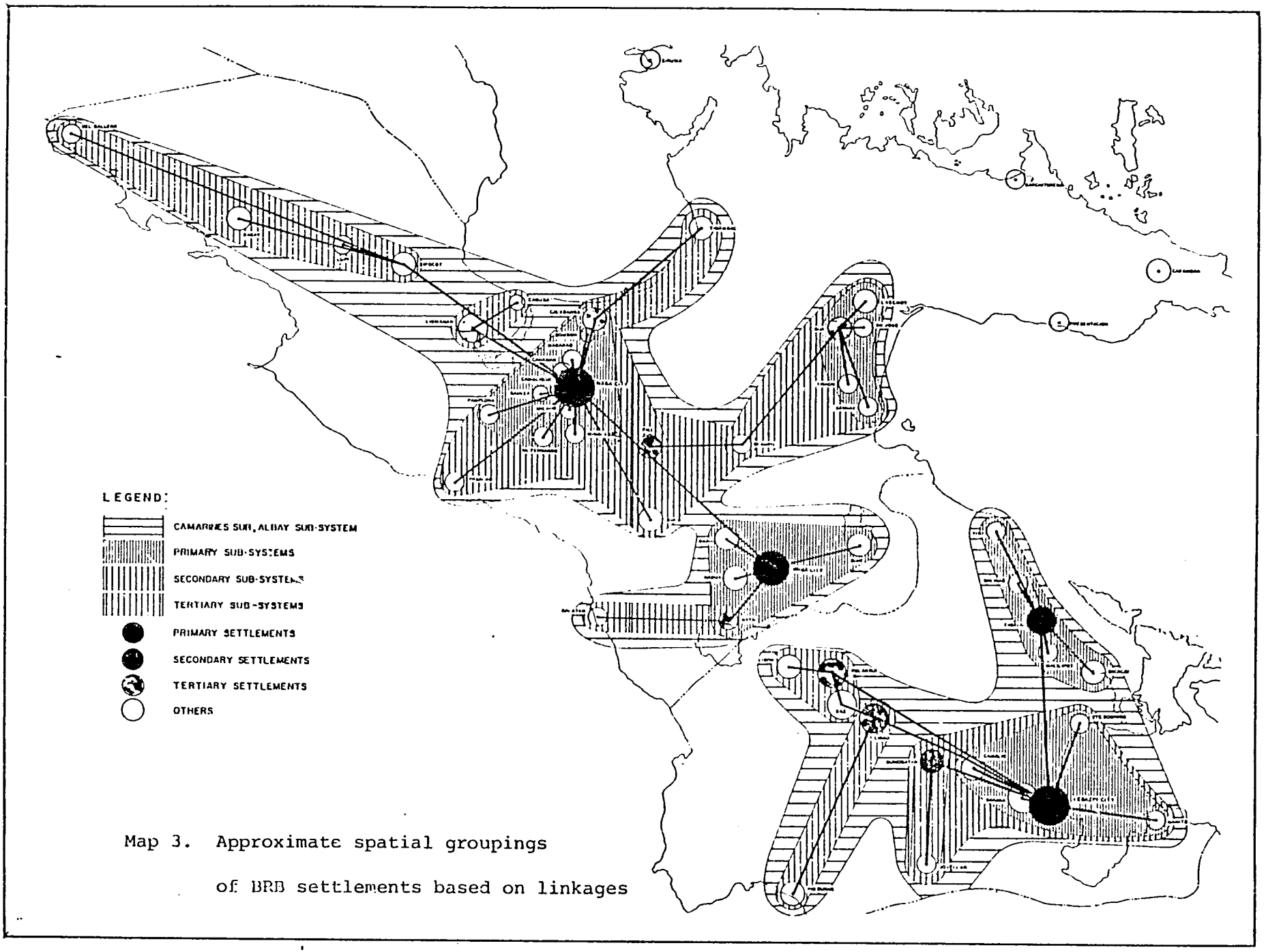
The analysis of physical, economic and social linkages between settlements provides the basis for approximating the spatial grouping or clustering of settlements. It also checks the results of the functional analysis of settlements in structuring the hierarchy of central places. With these two sets of information, the service center and its service area can be identified. Analysis of spatial linkages also estimates, on very rough terms, the "spread effect" of a facility in that urban center. Combining these spread effects of several key facilities can infer the geographic "reach" of an urban center. Lastly, this methodology, through the examination of physical linkages, provides a most important indicator of transport accessibility. Map 3 summarizes the resultant spatial clustering of Bicol River Basin settlements.

For the study of linkages, the following methodologies were used: 1) commodity flow analysis in selected weekly and daily markets; 2) analysis of the system of roads and transport facilities, and of travel patterns of basin residents; 3) origin-destination studies of students in post-secondary schools of patients in major hospitals, and of brides and grooms. Historical and mythological accounts were also analyzed for insights into the founding of settlements. Case studies were made of the government administrative systems as they affect delivery of services and locational decision-making. These methodologies are discussed in summary form below.

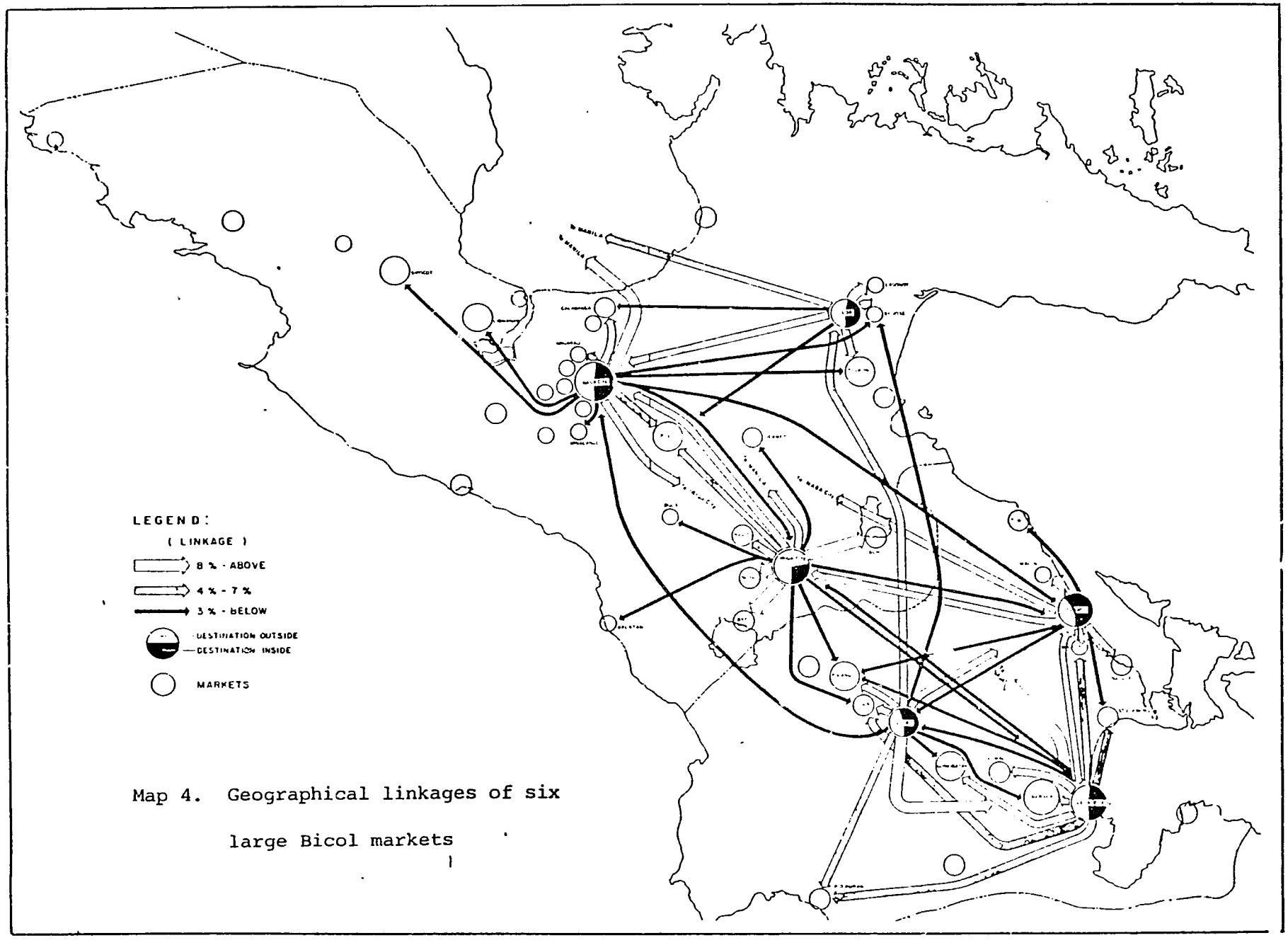
3.1 Study of Market Centers

The six largest daily markets and six weekly (periodic) markets were surveyed. The former are located in town centers while the latter are scattered in isolated villages. In addition, in-depth case studies were made to trace the origin of periodic markets. For both types of markets, 100 retailers and 100 buyers were randomly selected and interviewed for the sourcing and destination of commodities traded in the markets. Frequency of transaction were estimated as well as distances from the market facility. To approximate the size of the public market, three alternative researches presented themselves: 1) count and classify all stalls and stores and measure the market area in hectare; 2) estimate market attendance over a market cycle and average out a daily/weekly attendance level, and 3) determine market receipts (public market income from stalls rental and related taxes) from the municipal treasurer. The third looked the easiest and was used.

The result of the market studies are presented in the following: Map 4 shows the geographical linkages of the six major daily markets, Figure 2 illustrates the structure of the market system in the basin and also indicates the clustering of settlements based on market services areas; Table 5 shows the places of intensive linkages to/from selected market centers; Table 6 shows the "downward" and "upward" linkages of the markets;and Table 7 shows the approximate geographic reach of the markets in kilometer radius.



Map 3. Approximate spatial groupings of BRB settlements based on linkages



Map 4. Geographical linkages of six large Bicol markets

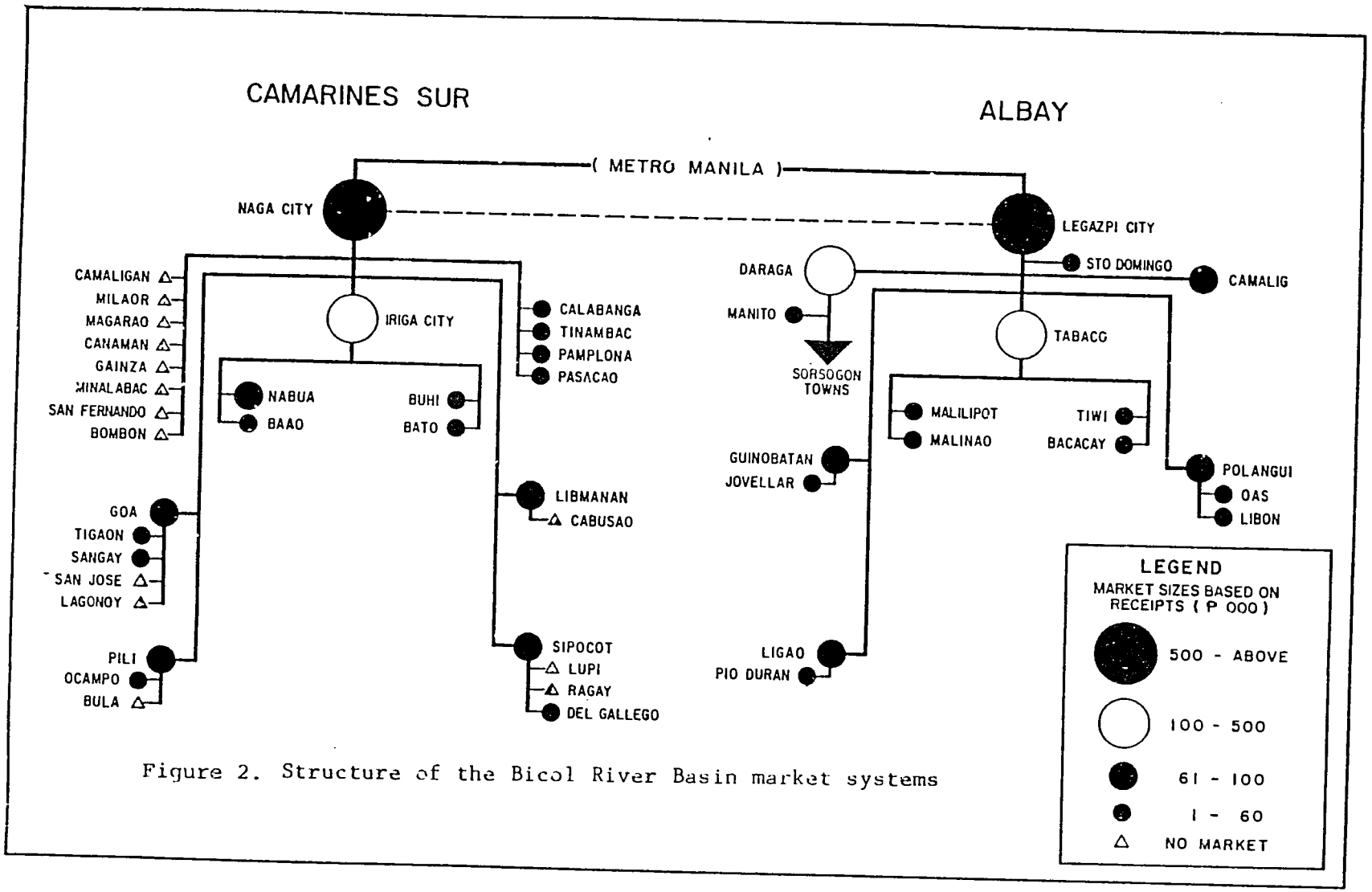


Figure 2. Structure of the Bicol River Basin market systems

A total of 17 periodic (weekly) markets, which command a rather large service area of about 30 other villages, were identified during preliminary reconnaisance. There were almost the same number of very small periodic markets which service only two or three adjacent villages. These were not studied. Of the 17 rather large periodic markets, a sample of six were chosen: three each from the two provincial administrative units within the basin. The six periodic markets were studied in depth and case studies were contracted out to local researchers. The intent of the case studies was to determine how these periodic markets were formed and grew over time, assess their viability, their geographic reach, and their potential for assuming higher functions in the future. Many of the periodic markets were found to start out as places for cockfight gambling during holidays! Map 5 shows the approximate geographic reach of the six sampled periodic markets in the Bicol River Basin.

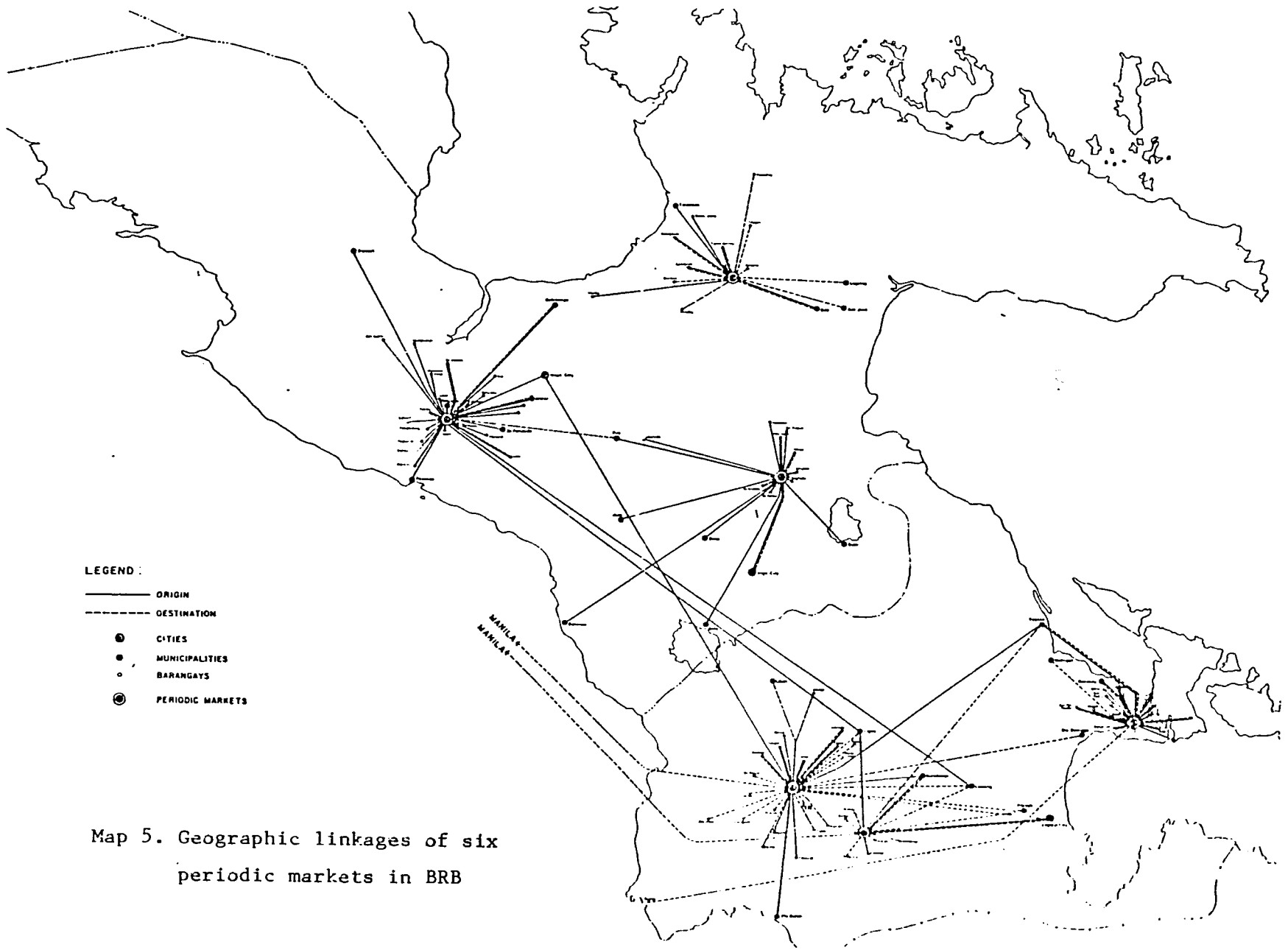
3.2 Transport and Travel Analysis

The pattern of settlement clustering is best indicated by the network of roads and transport routes, and of travel patterns of residents. The number and quality of roads and transport facilities determine the degree of interaction between settlements and express in a forthright manner the isolation of settlements without roads nor transport. The project was fortunate to have two very important studies already available when the research started in early 1977. First, the BRBDP Transport Study was undertaken by the regional office of the department of public highways and the two provincial engineer's office two years earlier and the results was in the process of printing. Second, the Travel Pattern Study of the Social Survey Research Unit, a university-based evaluation and monitoring outfit in Bicol, had printed its final report.

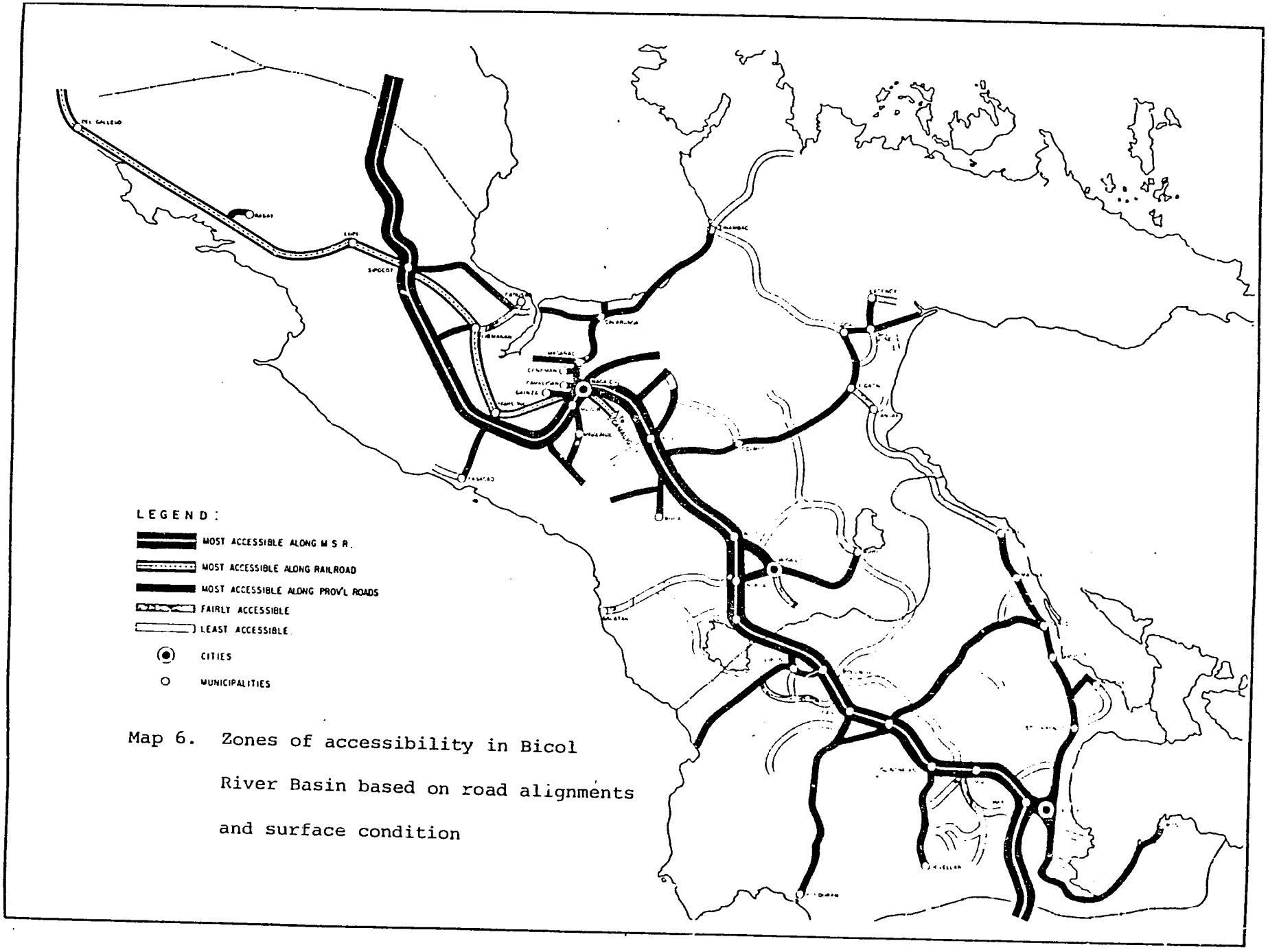
The transport study was comprehensive. It set up O-D checkpoints in selected roads to interview travellers for certain periods of the year to represent a full annual cycle. This was complemented by a socioeconomic survey of settlements in "traffic zones" to provide data on present and potential generation of freight and passengers in the basin. Finally, an inventory of all roads and transport facilities was done to provide a baseline for transport development. These data were complemented by the UFRD staff with secondary data from the census office to come up with measures of accessibility of rural settlements in the Bicol River Basin.

The travel pattern study, on the other hand, interviewed random samples of travellers in Camarines Sur province and asked for their destination, the frequency of trips annually, the nature of the trip, and their places of residence. Care was made to cover all 33 municipalities of Camarines Sur for traveller-samples.

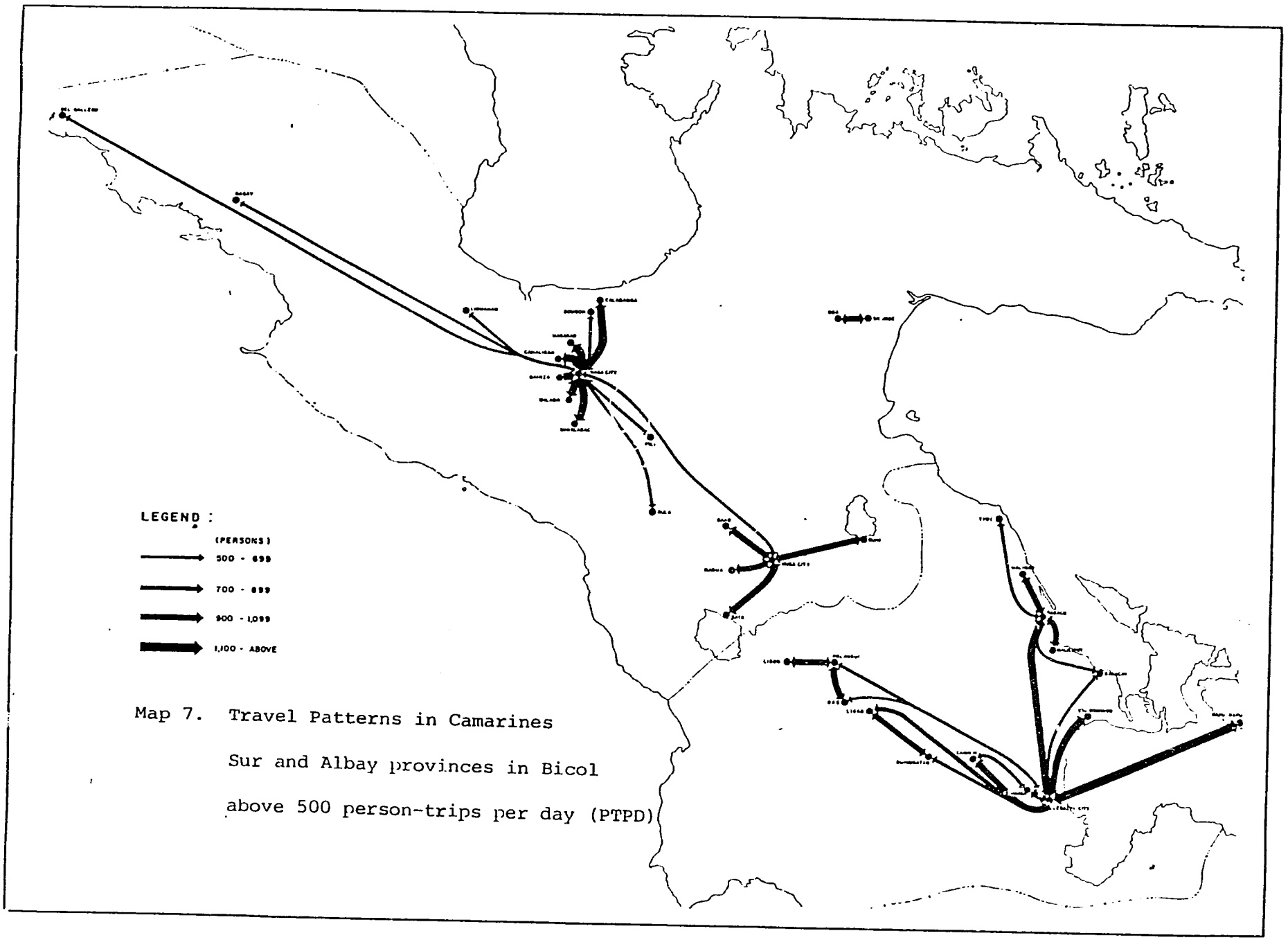
The results of the analysis are presented in several maps and tables. Map 6 shows approximate zones of accessibility based on road network and road condition. It will be noted that good accessibility exists only for settlements along the major trunklines. Map 7 summarizes the travel patterns of BRB residents indicating settlements of intensive inter-actions vis-a-vis the two provincial centers. The map shows that even the two provincial centers do not link together below 500 person trips per day, indicating that no unified spatial system existed within the planning area.



Map 5. Geographic linkages of six periodic markets in BRB



Map 6. Zones of accessibility in Bicol River Basin based on road alignments and surface condition



Map 7. Travel Patterns in Camarines Sur and Albay provinces in Bicol above 500 person-trips per day (PTPD)

Table 8 shows the distribution of roads by province, by type and condition of surfacing. Table 9 shows the distribution of population and settlements served by various types of roads in the basin. It will be noted that fully half of BRB settlements could be considered as isolated since they are served only by footpaths and infrequent watercrafts. Table 10 shows the increasing cost of transporting agricultural produce in interior as compared to roadside areas. Table 11 shows the wide range of waiting times for passenger vehicles in BRB. Table 12 shows a portion of a matrix showing the distribution of travellers in Camarines Sur according to their destination.

3.3 Origin Studies

During the early stages of the project, the question of generating data that will indicate a "flow" or the movement of people from a place to another posed a research problem to the UFRD staff. While "static" data or information that was oriented to a certain fixed location were available from usual sources (BRB office, office of census and statistics, offices of local governments and line agencies, etc.), "flow" or "movement" data were unavailable. There was no alternative but to conduct primary surveys to generate this type of data.

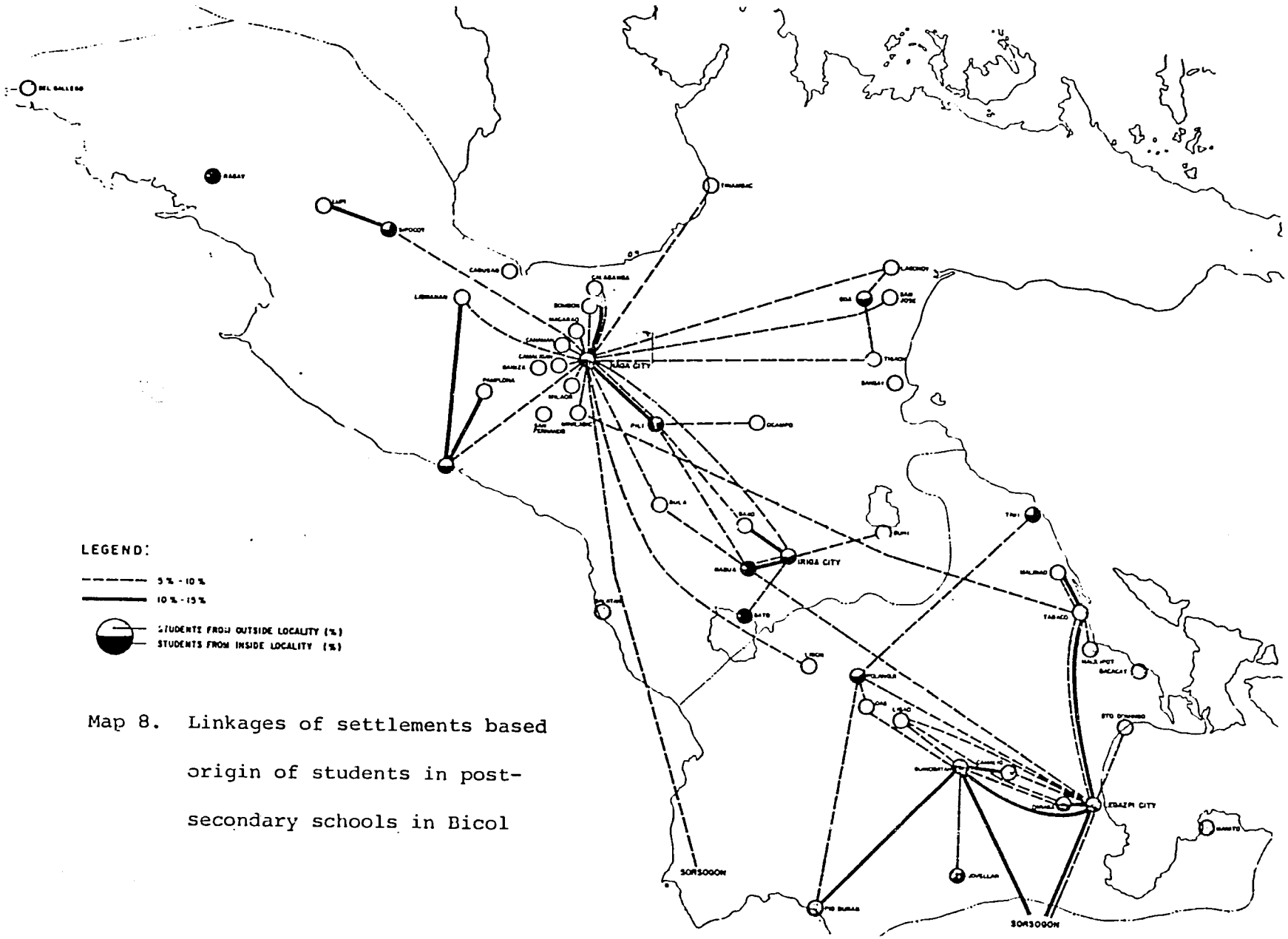
The purpose for generating "flow data" was to determine linkages between urban centers and rural settlements, determine the clustering (spatial grouping) of settlements and approximate the geographic reach of the urban centers through its services and facilities. Many alternative functions with high centrality offered themselves: the system of distribution of goods through private dealers and distributors, bank transactions (deposits and loans), origins of clients of urban professionals such as engineers, surveyors, medical specialists and the like; schools of higher learning and large hospitals. Analyzing these alternatives and many others from the usual research constraints of time, money and organization, and the criterion of relevance to the rural poor, the staff decided on tracing the origin of students of post-secondary schools and patients of hospitals. Origin of brides and grooms were included on the knowledge that rural clannishness ties families, and therefore, settlements, together.

i) Origin of Students

All 32 schools in the basin offering post secondary education were sampled for a student inventory as to their places of permanent residence. These schools are located in the larger towns of the basin. They offer general college courses or specialized/vocational ones. Registration records of every 10 students were sampled which provided a total sample of 3,220 students. The idea was to identify out-of-town students and from where they come. The results are visually shown in Map 8. Table 13 displays the distribution of out-of-town students in relation to size of schools and to types of schools, respectively.

ii) Origin of Hospital Patients

This special study was undertaken by the regional office of the department of health which also suggested the sampling. Hospitals of 10 beds and more were included and 10 percent of all patients were surveyed. This sampling frame



Map 8. Linkages of settlements based origin of students in post-secondary schools in Bicol

yielded 43 hospitals and 20,000 patients. Hospitals were classified into small, medium and large, depending upon their bed capacity. Like the schools study, the purpose was to determine the permanent residence of patients and focus on the out-of-town cases. If a high percentage of patients are out-of-town, then hospitals perform a high degree of central function. Their places of origin also identify places that are linked to the urban centers where the hospital is located. Table 16 details the places linked to the hospital or its approximate service area and the intensity of cases from places within the service area.

iii) Origin of Brides and Grooms

Intermarriages between settlements serve to link these settlements and become permanent social linkages. In Bicol, as in many regions of the Philippines, especially in rural areas, social linkages are also the preferred channels for economic and political activities. The Bicol Study decided to do a 10 percent sampling of marriage licenses filed in the civil registrar's office of all 54 municipalities in the basin. The study concluded that linkages between settlements due to inter-marriages are not significant. Out-of-town brides and grooms, where cases are present, do not go too far from the municipality.

iv) Historical Analysis of Settlements

Based on the scant materials available from the Ateneo de Naga, a religious school in the basin offering collegiate courses aside from elementary and high school, it was established that the primacy of major urban centers in Bicol traces its roots from the 16th century when Spanish conquistadores decided to widen their influence outside of Manila and "pacified" the Bicol Region, for the cross and the crown. The methodology used is analysis of historical and mythological accounts. They were restated in spatial terms (settlement location, access, linkages, etc.) and viewed in the light of locational decision-making that has persisted to this day. The historical analysis confirmed Brutskus' contention that colonial cities persist even if their functions no longer hold and the purpose for which they were founded have been outdated (See footnote6).

v) Politico-Administrative Linkages

Case studies were contracted to the College of Public Administration, University of the Philippines located in Manila. The studies included an examination of the system of delivery of health and education services to rural villages, a notorious attempt to merge two adjacent municipalities, one of them a provincial capital (the merger was successfully resisted by the smaller town), the continuing inability of a province to realize its plans for a provincial capital and the system of regionalization introduced in the mid-70's.

The studies relied on published policies and in-depth interviews of participants in the political decision-making and in administrative processes. Clients were asked to assess the adequacy of government decisions and the services made available to rural settlements. The case studies found a strong case of over-centralization and a common thread of lack of participation of the public

clientele in decision-making. The studies pointed to a limited group of elites that prevades government and which, in turn, perpetuates processes that shape decisions that often are irrelevant to the needs of the rural clientele. For instance, access to government services such as health services or grain-buying centers continue to be concentrated in urban areas or, when located outside urban centers, are located along well-travelled main roads, perhaps to facilitate access of bureaucrats. Some basin planners observe that such practices are reminiscent of past colonial policies.

PART II. SUMMARY OF MAJOR FINDINGS

If services and facilities located in urban centers are to support planned rural development in the Bicol, overall, the study concluded that functionally and locationally, they do so but in a limited scope which should be expanded if rural development is to be accelerated. Not only higher level cities in the basin (the provincial capitals) but also intermediate and lower level centers must be given attention in planning and development to structure an interlinked hierarchy of service centers. The long term objective of such a spatial strategy is to be able to reach down deep into the rural settlements, by way of services and facilities vital to rural residents, to stimulate the internal economy and social well-being of the river basin population.

The study found that urban functions are not only inadequate but also highly concentrated in a few small central places that are not widely accessible to people living outside their immediate boundaries: two provincial cities and 10 small town centers. The former are ranked nationally in the third order but in terms of population are about 1/50th of the national capital. The other small town centers contain only half of the functions present in the two provincial centers. Even the public markets outside the two cities in the basin do not operate daily as buying facilities for farm produce. Figure 3 shows the skewed hierarchy of settlements.

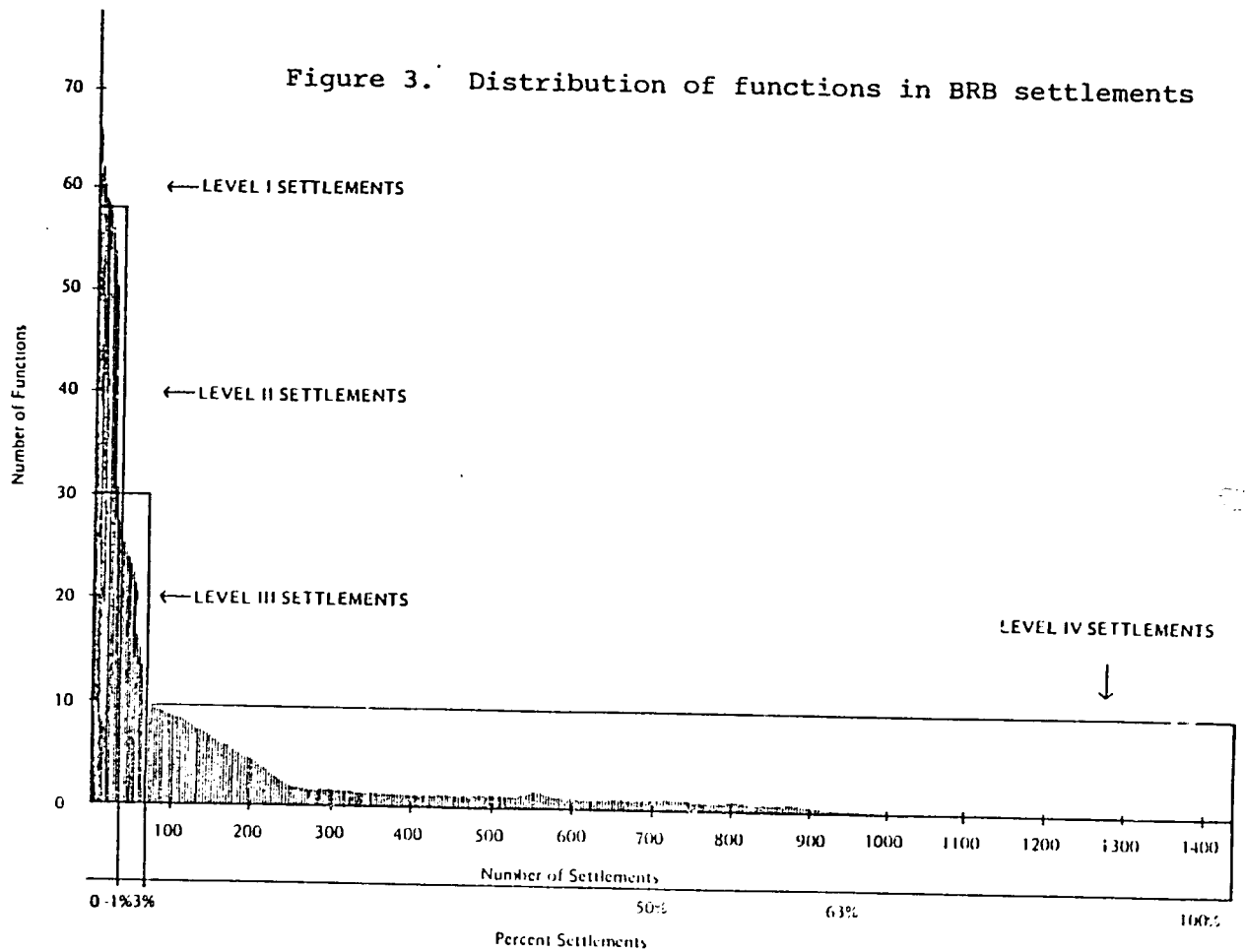
Limited Reach of Urban Centers

The dozen urban centers that are supposed to serve 1,419 settlements and which perform central functions have very limited geographic reach. The two provincial cities, for instance, indicate intensive linkages with their respective service areas for an average radius of only 40 kilometers.[12] Yet, they are 110 kilometers apart along the regional trunkline and on the average each city must serve 3,837.8 km^2 of rural sub-space. The middle level centers assisting these two primate cities reach out to only less than half the average radius of these two cities. But while they appear to serve the interstices of the spatial system covered by each primate city, the poor state of transport accessibility exacerbate whatever complementation is supposed to be performed by the middle level centers.

Poor Physical Accessibility

The rural areas of the Bicol River Basin, like many other rural areas in Third World countries, has one distinquishing characteristic: poor physical

Figure 3. Distribution of functions in BRB settlements



access. The study found that less than half of settlements are connected by roads. Of these, 80 percent are linked by bad roads These roads are difficult to traverse because of disrepair or become completely impassable during rainy season because they are earth-surfaced. The region is located right in the typhoon belt of the Philippines and plays host to an average of a third of the 100 typhoons that visit the country annually. Its rainy season lasts for half a year but occasional rains are almost evenly distributed throughout the year.

Basinwide, 4 out of 10 rural settlements are linked by mere footpaths while 7 percent can be reached only by unscheduled small watercraft that can only navigate during good weather. While the large Bicol river has a regular fleet of riverboats, the study counted only 13 riverine settlements along its routes.

In terms of numbers of people, physical access by road is available to close to 950,000 people but fully 760,000 of them are served only by bad roads. About 630,000 people have to do with mere footpaths while over 110,000 people can be easily stranded in their villages when boats cannot navigate the seas. At the most, the study estimated that only 5 percent of the basin population, those residing along the concrete regional highway, can be considered to have excellent, 24-hour transport facilities, another 10 percent is classified as having fair access (daytime transport only), while the overwhelming majority, 85 out of 100 basin residents have either poor access or no access at all.

This poor condition of transport facility is reflected in the highly skewed costs of transporting farm produce from rural settlements. For those served by roads, the cost is six times higher in interior areas compared to roadside areas. Waiting time for public transport can reach as much as 215 to 256 minutes per person trip per day in rural areas to only a minute within the two provincial cities. The overall basin average is 60 minutes waiting time for public transport. Perhaps because of transport difficulty, 87 percent of movement of people and goods are found to be within one's municipality and 6 out of 10 trips are made on foot.

Levels of Municipal Development

Using selected social and economic secondary data from the census and other government offices, the study formulated a three-level classification of municipalities which correlated highly with the functional analysis of settlements mentioned above.

Group I. Four municipalities are rated as "developed." They contain the most number of services and facilities, are 41 percent urban (which is five times the basin level of urbanization). With 22 percent of the total basin population and with an average population size per municipality of 100,000, almost all banks and financial houses are located in this group. They are considered to hold 90 percent of the basin's total financial resources, generate 95 percent of total public market receipts among 54 public markets, has half of all economic establishments, and 70 percent of all basin households served by piped water. The number of households with electricity in this group is four times the total of the rest of the 50 other municipalities.

Group II. Ten municipalities are grouped together as "less developed"; they contain a fourth of the total basin population. This group is only 8 percent urban compared to the 41 percent urbanization level of Group I municipalities. The drop in available services and facilities is very sharp. In financial resources, it has only 5 percent of what is in Group I, a third of Group I's municipal income, a fifth in post-secondary school facilities, only 60 percent of Group I's economic establishments, and household served by piped water supply is only half of Group I. The number of houses with electricity is only an eighth of the number in Group I.

Group III. The rest, 39 municipalities with 55 percent of the basin population, are classified as "underdeveloped." The average population size per municipality is small: only half that of Group II or a fourth of Group I. These municipalities are 88 percent rural and have the least services and facilities compared to Group I and II. Their town public markets operate only twice a week.

Conclusions and Recommendations

The study findings very clearly established that the skewed distribution of urban functions in few settlements, combined with very low levels of physical accessibility between settlements, do not only retard rural development but bring about serious inequalities between urban and rural settlements. The overriding conclusion of the Bicol spatial analysis appears to be a geographic measure of poverty and underdevelopment: the lack of development increases with the distance of rural settlements from urban centers.

Intervention into the rural development decision-making processes may have to consider the recommendations of the Bicol study, as follows:[13]

1. Planning must go beyond systems analysis based predominantly on physical programs such as water resources for irrigation and flood control which BRBDP emphasizes and "... begin to coordinate spatial and economic factors." This means shifting focus from agricultural production "on-the-farm" to the stimulation and growth of rural market centers especially in areas not effectively covered by existing urban centers. Locational decisions for project investments must seek to diversify and strengthen a spatial structure that will link settlements together in a "mutually reinforcing internal economy."

2. A spatial framework plan will need to be formulated that will allocate services and facil[illegible] in varying capacities suited to the area being served. These facilities, [illegible] as roads, transport terminals with servicing facilities, small to large-sc[illegible] groprocessing and milling facilities, transfer and other complementary so[illegible] services, such as health, education, and water supply must be strategicall[illegible]en and centrally-located in settlements that are well linked with a nu[illegible] of lower order settlements.

3. A three-tiered hierarchy of centers is recommended: urban centers, market centers and rural service centers, in descending order. Urban centers can be developed into industrial nodes that will also link with higher regional centers. Market centers, usually located in township capitals, will function as intermediate exchange centers for higher assembly of agricultural

products from the outlying farms, for the distribution of farm inputs and farm machines, and for supply of essential household goods. Rural service centers will provide direct economic and social services to farming families, especially basic social services in health and education. It will also be an information center for agriculture and other farm-related news, such as market information, family planning and the like. The strategy of emphasizing this lowest order of service center is to cut down effectively the cost and time of travel for rural households to primary centers for even very basic services and facilities, as it now exists in the Bicol River Basin.

PART III. SPATIAL PLANNING FOR BASIC SOCIAL SERVICES IN INDONESIA

The research approaches and analytical methodologies developed in the Bicol Study are found to be applicable to the planning of basic social services within the larger context of area development planning in Indonesia. The joint program of UNICEF and the Government of Indonesia in the current 5-year development plan (the third since 1970 when development planning was started) contains an "area program." This is an experimental effort to coordinate sectoral programs in the delivery of basic social services to urban slums and rural villages. The program is being implemented in four cities and eight sub-provincial areas (the next lower administrative unit below the province is a regency or kabupaten).

In the rural area half of the program, the Directorate of Urban and Regional Planning of the Department of Public Works is developing a planning guideline for local government planners that includes a set of methodologies for spatial analysis leading to the structuring of a spatial framework. The spatial plan reflects the areal priorities of local government regarding the location of sectoral projects in health, education, water supply, nutrition, food production, small scale village industries, roads, small irrigation/reservoir projects, and block grants for community development exercises. These areal priorities are formulated in consultation with sectoral line agencies in order to "converge" the location of their annual projects according to these spatial framework.

The spatial planning methodologies incorporated in the guidelines, which are now being tried in Lombok Island, Province of Nusa Tenggara Barat and is included in the annual 6-week training course for sub-national planners in Bali, include the following:

1. Identification of service centers and the structuring of a hierarchy based on an inventory of services and facilities related to basic social-economic services programs. Analysis is at village level.

2. Linkage analysis between settlements based on preferred destinations for social and economic services not available in one's settlement. This identifies a central location for services and identifies spatial groups of settlements.

3. Classification of kecamatans (districts, the administrative unit lower than the regency) based on selected social, economic and physical indicators into:

   3.1 Sub-areas of good economic potential (food production and small scale rural industries);

   3.2 Sub-areas which are considered "critical" in social terms (high incidence of poverty; very low on health, water supply and education services; high illiteracy, high drop-out rates, etc.);

   3.3 Sub-areas which are combinations of both the above.

4. Approximation of levels of physical accessibility between rural villages and capital towns (provincial, regency and district capitals where a greater mix and number of services and facilities are usually located) based on availability of road connection, road distances, condition of road, frequency of public transport per day, and travel time.

The results of spatial analysis are mapped for visual presentation to planners and policy makers of participating sectors to encourage them to adopt common locations for their projects, and where possible, to achieve spatial integration as a prelude to better functional coordination. Since spatial planning for locating basic social services is undertaken by the regency planning office together with planners from participating sectoral agencies, the benefits from the inter-agency planning exercise, aside from improving local area planning technology, is the built-in mechanism for local government and sectoral agencies planning location of projects in the area together. This is held to improve field implementation, provide the local governments some measure of participation in a sector-dominated programming-budgeting system, make locational decisions of sectoral projects more relevant to local area needs, and start a long process of adapting national standards of program planning according to regional/sub-regional conditions. In the long run, area development planning hopes to open government planning, implementation and monitoring mechanisms to community participation, down to the village level.

FOOTNOTES

1. The project was inititated and funded by the Technical Assistance Bureau/ Urban Development, USAID Washington. The Bicol River Basin Development Program (BRBDP), a sub-regional area development project of the National Council in Integrated Area Development (NACIAD) implemented the research project in 1976. It engaged the Center for Policy and Development Studies (CPDS) of the University of the Philippines at Los Banos (UPLB) which in turn contracted two urban and regional planners who had worked in Bicol as principal investigator and co-investigator. The study lasted for 16 months and ended officially in May 1978.

2. The Bicol River Basin was one of seven area development projects given top priority for rural development by the Philippine Government in the early 1970's when the concept of regional planning became an operational tool for development. Each of the seven is a national government project directly supervised by a cabinet member under the coordination of the NACIAD (see footnote 1, above) which is headed by the President and has the Agriculture Minister as Operating Vice Chairman.

3. The project paper for UFRD observes that while linkages between rural development and urban centers are clear, the concept of the city as playing a crucial role in rural development is a relatively new concept, hence, its role is seldom defined nor highlighted in development programs. (See Foreword, Final Report of UFRD, May 1978, CPDS-UPLB, p.1.)

4. UFRD Final Report, CPDS-UPLB and BRBDP, May 1978, P. 5.

5. See the works of Dr. Dennis A. Rondinelli. Since 1976, Rondinelli in several books and publications had advocated for the reallocation of resources "to create an articulated network of development centers integrated into the national system of production and exchange that provides access to economic and social opportunities for the majority of the population who reside outside urban centers." (Urban Functions in Rural Development, a state-of-the-art work together with Kenneth Ruddle which was later published in book form by Praeger in 1980).

6. E. Brutskus, "Central vs Decentralized Patterns of Urbanization in Developing Countries," ITCC Review, Vol. 1, No. 2, Tel Aviv, April 1977.

7. While there was no problem of merging two village administrative units into one spatially-defined settlement, there were cases when one large village administrative unit had to be broken down into two or more spatially-defined settlements considering that village data are defined administratively, not spatially.

8. Dennis Rondinelli headed a team of senior U.S. consultants who visited the project periodically. Aside from the three from USAID Washington, three economic geographers also provided advise.

9. Two other studies were conducted: in Upper Volta and in Bolivia.

10. Most of the literature scanned by the project investigators concerned industrial location, wholesale and retail marketing systems, the organization of space in China, threshold analysis in Canada and studies of markets in Latin America, in Africa, and Thailand.

11. One of the lessons learned during the Bicol Study is that the depth and sophistication of data collection is severely circumscribed by the manpower and facilities available for data processing and analysis in the basin. Very early, it was decided that if the research methodologies were to be relevant to the planning capability of the basin, the technology used should be according to the facilities available. This ruled out computerization (although a computer was used in Guttman scaling at Los Banos, this proved a mistake since the computer center was not functioning well). The other lesson learned was that while Bicol River Basin was reputed to be "data rich" it was not so for spatial planning. Much of what was available was not suited for spatial analysis. Many data were very detailed project feasibility level data, some were very unevenly distributed geographically, some data (like income) were sampled at provincial level, etc. For linkage data, the study had to generate primary data.

12. The average geographic reach is calculated from four linkage data: the O-D survey in the transport study with a cut-off point of 500 person-trips daily, the average distance of origin of students (37 kms), of patients (36 kms) and of markets (15 kms).

13. UFRD Final Report, op.cit., p. 6.

ANNEXES - TABLES

No.	Short Title
1.	Selected Major Indicators, Bicol River Basin
2.	Classification of Municipalities
3.	Profile of Levels of Settlements
4.	Functions and Threshold Values
5.	Places of Intensive Links to Major Market Centers
6.	Structure of Market Centers, BRB
7.	Reach of Each Market Center in km
8.	Percentage Distribution of Roads by Type and Condition
9.	Distribution of Population and Settlements served by Types of Roads
10.	Average Transport Cost (in pesos) per ton-km
11.	Passenger Vehicle Waiting Time (mins.)
12.	Percentage Distribution of Daily Trips
13.	Percentage Distribution Origin of Students and Average Distance (km)
14.	Approximate Service Area of Hospitals Based on Places of Origin of Patients

Table 1. Selected Major Indicators, Bicol River Basin
(NCSO: Census of population and housing and Census of agriculture, 1970-75.)

No.	Selected Indicators	BRB	Region V (Bicol Region)	Philippines
1	1975 land area (sq. km)	7.657.6	17,632.5	3000,000.0
2	1975 population (000)	1.730.0	3,193.7	43,070.6
3	1975 population density (persons per sq. km)	226	181	140
4	Annual population growth 1970-75 (%)	1.5	1.4	2.9
5	1975 urban population (%) to total population	18	15	30
6	Percent population 14 years & below, 1975	44	45	40
7	1975 literate population (%)	70	70	80
8	1970 total labor force (% to total population)	67	61	58
9	1970 experienced workers (% to total labor force)	48	47	47
10	1970 employed (% to labor force)	46.3	54.5	45.2
11	1970 households w/flush or water-seated toilets	12.5	9.2	16.2
12	Dwelling unites served by electricity	13.5	6	15.8
13	1975 municapital total income (million pesos)	32.2	51.6	1,499.3
14	1975 financial resources (million pesos)	539.71	NI (a)	NI (a)
15	1976 market collection (million pesos)	3.3	NI (a)	NI (a)
16	Total agricultural land area (000 ha)	415.5	921.2	8,493.7
17	Total arable area (% to total agri. land area)	45	40	55
18	1970 rice productivity (mt per ha)	1.8	1.7	1.8

Table .2. Classification of Municipalities

Type of Municipality	1975 Pop Total (000)	Ave (000) Per municipality	Urban Pop (percent to total pop average)	Literacy (ave. %)	Employment (ave %)	Financial Resources (per capita)	MTI[b] (per capita)	Market Receipts (per capita)	Post Elem School (per 000 pop)	Hospital Beds (per 000 pop)	EW[c] in farming, fishing etc, (ave.%)	Economic Establishments (per pop)	No. of HH[d] served by water supply	No. of HH Served by power supply
Developing municipalities (4)	386	96	41	87	45	1,326	37	6	09	3	34	20	48	8
Less developed municipalities (10)	456	45	8	86	45	60	14	2	02	5	61	13	20	1
Underdeveloped municipalities (38)	885	23	12	85	48	57	13	0.3	01	2	68	11	8	1
Basin Total	1,727	33	18	86	46	341	19	19	03	9	64	14	20	3

Table 3. Profile of levels of settlements in the Bicol River Basin

Level of Hierarchy	# of settlements	Range of functions	Average # of functions	# of settlements =, than average # of functions	Average centrality index	Settlements	Functional characteristics
I	2	60 - 61	60	2	403	Legaspi-Daraga Iriga City, Tabaco, Pili BUA, Ligao, Baao Nabua, Libmanan, Goa, Tagaon	Provincial service centers
II	11	31 - 54	39	4	140		Local service centers
III	43	10 - 28	18	21	40	37 poblacions, 6 large barrios	Small rural centers
IV	1,363	0 - 9	2	637	1.3	2 poblacions, 1,136 barrios	non-central places

Table. 6. Structure of Market Centers, Bicol River Basin (Cont'd)

Level	Market Center	Large Market Center	Population 1975 (000)	Market Receipts 1975 (000)	Distance from Large Market Center (km)
II. Secondary Markets	Iriga	Naga	73.6	298.6	38.0
A. Neighboring areas					
1. Baao		Iriga	30.2	21.8	8.0
2. Nabua		Iriga	48.6	86.3	5.7
3. Buhi		Iriga	44.2	29.8	14.0
4. Bato		Iriga	28.4	10.6	12.2
5. Balatan (linked to Nabua)		Iriga			f
Total (average)			151.4	148.5	(10.0)
III. Tertiary Markets					
A. Goa	Naga		34.0	100.8	52.0
1. Immediate areas					
a. San Jose		Goa	21.8	NM	3.5
b. Lagonoy		Goa	33.2	NM	7.3
c. Tigaon		Goa	25.2	71.0	7.5
d. Sangay		Goa	18.0	2.0	12.5
e. Ocampo		Goa	36.9	3.2	24.5
Total (average)			135.1	76.2	~~(25.3)~~ 17.5
ALBAY					
I. Primary Markets	Legaspi	Manila	88.3	271.0	556.0
A. Neighboring areas					
1. Daraga		Legaspi	63.2	237.5	2.8
2. Camalig		Legaspi	41.7	35.6	11.5
3. Manito		Legaspi	13.6	1.8	41.5
4. Sto. Domingo		Legaspi	17.5	15.4	14.0
Total (average)			136.0	290.3	(22.3)
II. Secondary Markets	Tabaco	Legaspi	65.2	394.0	29.4
A. Neighboring areas					
1. Malilipot		Tobaco	20.4	5.0	4.5
2. Malinao		Tobaco	24.8	3.6	5.0
3. Tiwi		Tobaco	24.3	20.4	12.5
4. Bacacay		Tobaco	39.5	14.3	13.2
Total (average)			109.0	43.3	~~(15.2)~~ 5.5
III. Tertiary Markets					
	Guinobatan	Legaspi	49.7	130.0	18.2
	Jovellar	Guinobatan	14.1	2.0	17.5
	Polangui	Legaspi	52.5	135.0	35.9
	Oas	Polangui	50.2	34.2	4.6
	Libon	Polangui	47.8	8.0	5.8
	Ligoa	Legaspi	61.5	74.4	27.8
	Pio Duran	Ligao	31.1	42.9	36.0
Total (average)			143.2	87.1	~~(16.9)~~ 20.5

Table 5. Places of Intensive Links to Major Market Centers

Intensity of linkages	MARKET CENTER																	
	NAGA (CS)[a]			LEGASPI (AL)[c]			TABACO (A[1])			IRIGA (CS)			LIGAO (AI)			GOA (CS)		
	Place	%	Km[b]	Place	%	Km	Place	%	Km	Place	%	Km	Place	%	Km	Place	%	Km
Primary : More than 10%	Naga	47	0	Legaspi	47	0	Tabaco	60	0	Iriga	26	0	Ligoa	53	0	Goa	46	0
	Manila	11	454	Manila	12	556	Malinao	10	5.0	Buhi	12	14.0	Legaspi	12	27.8	San Jose	22	3.5
										Nabua	12	5.7				Lagonoy	15	7.3
										Bato	10	12.2						
Secondary : 3 % t0 10%	Calabanga	8	12.5	Sto Domingo	7	14.0	Legaspi	8	29.4	Baao	9	8.0	Tabaco	8	57.2	Tigaon	5	7.5
	Magarao	5	4.3	Tabaco	5	29.4	Bacacay	8	13.2	Manila	8	492.0	Pio Duran	5	36.0	Manila	4	452.4
	Pili	4	15.0	Daraga	5	2.8	Naga	4	138.7	Naga	4	38.0	Oas	4	4.5			
	Camaligan	3	2.0	Camalig	4	11.55	Malilipot	3	4.5	Pili	3	23.0	Polangui	3	9.1	Naga	3	52.0
	Legaspi	3	102.0	Oas	4	32.30	Manila	3	583.5				Goa (CS)	3	92.5			
				Guinobatan	4	18.25												
				Pio Duran	3	63.80												
				Malilipot	3	24.90												
Tertiary : 1 % to 3 %	Tigaon	2	44.5	Naga(CS)	2	102.0	Tiwi	2	12.5	Polangui	2	28.2	San Jose	2	96.0	Calabanga	1	64.7
	Tabaco(AI)	2	138.7	Polangui	1	36.9	Polangui	2	30.2	Balatan	2	30.2	Legaspi	2	27.8	Pili	1	37.0
	Canaman	2	4.7	Ligao	1	27.8	Sto Domingo	1	15.4	Legaspi	2	64.1	Guino batan	2	9.55			
	Iriga	1	38.0				Ligao	1	57.2	Ocampo	2	35.5	Daraga	1	25.0			
	Sipocot	1	37.9							Bula	2	33.0	Manila	1	471.5			
	San Jose	1	55.5							Tabaco	1	108.8						
	Libmanan	1	31.0							Oas	1	31.8						
	Minalabac	1	3.4															
Occasional : Less than 1 %	13 CS towns 2 AI Towns 7 outside region			4 CS Towns 2 AI Towns 5 outside region			2 CS towns 2 AI towns 2 outside region			6 CS towns 2 AI towns			6 CS towns 3 AI Towns 1 outside region					
No Links	15 CS towns 2 AI towns 7 outside region			5 CS towns 12 AI towns 6 outside region			3 CS towns 8 AI towns 3 outside region			15 CS towns 8 AI towns 1 outside region			12 CS towns 3 AI towns 2 outside region					

6. Structure of market centers, Bicol River Basin

Level	Market Center	Large Market Center	Population 1975 (000)	Market Receipts 1975 (000)	Distance From large Market Center (km)
KAMARINES SUR.					
1. Primary[a] Market	Naga	Manila	83.0	960.0	454.0
A. Neighboring areas[b]					
1. Camalingan		Naga	9.8	NM[c]	2.0
2. Milaor		Naga	13.1	NM	3.2
3. Magarau		Naga	11.8	NM	4.3
4. Canaman		Naga	14.5	NM	4.7
5. Gainza		Naga	5.9	NM	5.3
6. Minalabac		Naga	27.0	NM	3.4
7. San Fernando		Naga	15.5	NM	8.2
8. Bombon		Naga	7.4	NM	9.4
				NM	
Total (average)			105.0		(5.3)
B. Immediate areas[d]					
1. Pamplona		Naga	18.3	7.7	12.5
2. Calabanga		Naga	40.0	25.1	12.7
3. Pasacoa		Naga	21.0	4.8	26.0
4. Tinambac		Naga	34.4	12.0	34.2
5. Pili		Naga	38.6	77.5	15.0
			150.3	127.1	(20.0)
C. Intermediate Areas					
1. Bula		Naga	30.2	21.8	8.0
2. Libmanan		Naga	66.6	77.6	31.8
3. Cabusao		Naga	10.1	NM	22.9
4. Sipocot		Naga	39.4	63.6	37.9
5. Lupi		Naga	19.6	NM	46.1
6. Ragay		Naga	32.7	NM	65.0
7. Del Gallego		Naga	13.7	6.2	e
Total (average)			212.3	169.2	(35.1)

Table. 6. Structure of Market Centers, Bicol River Basin (Cont'd)

Level	Market Center	Large Market Center	Population 1975 (000)	Market Receipts 1975 (000)	Distance from large Market Center (km)
II. Secondary Markets	Iriga	Naga	75.6	298.6	38.0
A. Neighboring areas					
1. Baao		Iriga	30.2	21.8	8.0
2. Nabua		Iriga	48.6	86.3	5.7
3. Buhi		Iriga	44.2	29.8	14.0
4. Bato		Iriga	28.4	10.6	12.2
5. Balatan (linked to Nabua)		Iriga			f
Total (average)			151.4	148.5	(10.0)
III. Tertiary Markets					
A. Goa	Naga		34.0	100.8	52.0
1. Immediate areas					
a. San Jose		Goa	21.8	NM	3.5
b. Lagonoy		Goa	33.2	NM	7.3
c. Tigaon		Goa	25.2	71.0	7.5
d. Sangay		Goa	18.0	2.0	12.5
e. Ocampo		Goa	36.9	3.2	24.5
Total (average)			135.1	76.2	~~(35.3)~~ 17.5
ALBAY					
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4. Sto. Domingo		Legaspi	17.5	15.4	14.0
Total (average)			136.0	290.3	(22.3)
II. Secondary Markets	Tabaco	Legaspi	65.2	394.0	29.4
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3. Tiwi		Tobaco	24.3	20.4	12.5
4. Bacacay		Tobaco	39.5	14.3	13.2
Total (average)			109.0	43.3	~~(35.2)~~ 5.5
III. Tertiary Markets					
	Guinobatan	Legaspi	49.7	130.0	18.2
	Jovellar	Guinobatan	14.1	2.0	17.5
	Polangui	Legaspi	52.5	135.0	35.9
	Oas	Polangui	50.2	34.2	4.6
	Libon	Polangui	47.8	8.0	5.8
	Ligoa	Legaspi	61.5	74.4	27.8
	Pio Duran	Ligao	31.1	42.9	36.0
Total (average)			143.2	87.1	~~(16.9)~~ 20.5

Table 17. Reach of each market center, average distance (in km) by source and destination, Bicol River Basin, 1976.

Market Center	Agricultural		Manufactured		Wtd. Average Reach		
	Source	Destination	Source	Distination	Agric	Mfd	Mean
Naga City	17.8	16.9	12.3	10.8	17.3	11.2	15.0
Legaspi City	18.3	10.7	34.7	7.6	14.7	12.8	14.0
Iriga City	8.1	9.7	18.7	14.7	9.0	15.8	14.8
Tabaco	12.3	2.0	37.0	10.6	8.0	20.3	12.8
Ligao	12.2	17.8	38.3	26.3	15.0	31.0	17.8
Goa	9.2	5.6	18.2	6.7	7.0	9.6	7.5
Average	13.2	10.3	23.2	12.9			
Average for agricultural or manufactured goods	11.7		15.7				
Average for both manufactured goods	13.6						

Table. 8. Percentage distribution of roads by province and by type and condition of surfacing (1975).

Road Type	Albay		Camarines Sur		Total	
	Good to fair	Bad	Good to fair	Bad	Good to fair	Bad
Concrete	5		4		5	
Asphalt	13	6	10	6	11	5
Gravel/earth	9	67		80	4	75
Sub-total	27	73	14	86	20	80
Total percent	100		100		100	

Table. 9. Distribution of Population and Settlements Served by Types of Roads, Albay and Camarines Sur

	POPULATION SERVED [a]			SETTLEMENTS SERVED [b]					
	Albay % to Albay population	Cam. Sur. % to Cam.Sur population	Total	% to Basin population	Albay % to Albay settlements	Cam. Sur % to Cam.Sur Settlements	Total	% to Basin settlements	Ave population size/settlements
Road									
Concrete (HSR)	9	9	155,977	9	3	4	52	4	3,000
Asphalt (provincial road)	13	4	124,606	7	6	2	49	4	1,543
Gravel and earth (athers)	46	35	677,751	40	48	39	600	42	1,141
Sub Total			958,334	56			701	49	
Footpath [c]	30	42	629,942	37	39	41	580	41	1,086
Other Means									
Watercraft	-	7	71,827	4	3	12	104	7	690
Railway	2	3	39,966	3	3	2	34	2	1,175
Bicol River [d]	-	(2)	(229,372)	(14)					
Total	100	100	1,700,069	100	100	100	1,419	100	

Table. 10, Average transport cost (in pesos) per ton-km (1975)

Commodity	Average Cost				Range of cost			
	Interior		Roadside		Interior		Roadside	
	Albay	Cam. Sur	Albay	Cam. Sur	Albay	Cam. Sur	Albay	Cam. Sur
Rice	21.44	18.30	2.78	3.99	11.34	3.62	1.54	1.09
					32.61	44.28	6.03	8.97
Copra	18.81	17.55	2.85	4.04	8.33	4.75	1.34	1.05
					55.56	47.14	4.92	11.34
Corn	25.79	21.93	2.49	3.33	12.50	6.67	1.44	1.00
					55.60	53.99	4.62	5.56
Abaca	14.54	23.60	3.17	6.79	6.25	6.34	1.01	1.17
					25.00	62.91	3.33	16.00
Vegetables/fruits	37.80	21.76	3.30	5.51	19.52	6.25	2.04	1.27
					55.56	47.61	6.20	13.00
Average (all goods)	23.68	20.63	2.92	4.73	11.59	5.53	1.47	1.12
					44.87	51.19	5.02	10.97
Average (Allbay and CS)	22.15		3.82		8.56-48.03		1.30-8.00	
Average difference between interior and roadside	5.8 times				6.6 to 6 times			

Table 11. Passenger vehicle waiting time in minutes

Item	Albay	Cam. Sur
Range of ave. waiting time	14-94	2-107
Range of max. waiting time	24-215	16-256
Range of min. waiting time	1-16	1-120
No. of roads with observation	10	24

Table 12. Percentage distribution of daily trips in Albay and Camarines Sur.

Item	Albay	Cam. Sur
Sample population (000)	24	20
Trips within municipality/city	88	85
Trips within province	99.3	99.6

Table.13. Percentage Distribution Origin of Students and Average Distance (kms)

Type	Total Sample	origin of Students		Weighted Ave.Distance[a] (km).
		From within school location	From outside school location	
General	2,472 (100.0)	1,059[b] (42.8)[c]	1,415 (57.2)	39
Tecnical	252 (100.0)	107 (42.5)	145 (57.8)	35
Agr'l-trade	334 (100.0)	141 (42.2)	193 (57.8)	42
Other specialized Schools[d]	160 (100.0)	24 (15.0)	136 (85.0)	39
All types	3.220 (100.0)	1,331 (41.3)	1,889 (58.7)	37

Table. 14. Approximate Service Area of Hospitals Based on Places of Origin of Patients

Hospital Location	No. of Hospitals	Eve . % of patient from Out side	Service Area					
			1 - 5 %		5 - 10 %		10 % and above	
			No. of places	Ave. % per places	No. of places	Ave . % per places	No. of places	Ave. % per places
Legaspi	7	43	37	1.0	5	7	3	14
Tabaco	5	36	20	0.9	6	7	3	17
Naga	4	45	64	1.0	2	7	-	-
Polangui	4	33	18	1.0	2	6	4	19
Ligao	4	29	13	1.0	1	8	2	18
Daraga	3	40	35	0.5	2	6	2	37
Iriga	3	36	25	0.8	4	7	2	13
Lobon	3	6	4	0.7	-	-	1	15
Pio Duran	2	26	9	0.6	2	6	2	11
Camalig	1	0	0	0	0	0	0	0
Guinobatan	1	9	4	2.0	0	0	0	0
Malilipot	1	77	13	0.5	1	9	3	20
Oas	1	20	12	0.8	0	0	1	10
Baao	1	23	7	0.6	0	0	1	17
Cabusao	1	49	29	0.7	1	5	1	17
Libmanan	1	14	12	0.4	1	9	0	0
San Jose	1	21	3	1.0	0	0	1	16
Tinambac	1	2	1	1.0	0	0	0	0