

Spatial Analysis for Regional Development

A Case Study in the Bicol River Basin of the Philippines

Dennis A. Rondinelli

RESOURCE SYSTEMS THEORY AND METHODOLOGY SERIES, NO. 2



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INTRODUCTION

Despite the impressive progress made in economic and social development in much of Asia over the past three decades, a substantial proportion of the population in Asian societies remains in dire poverty, and the gaps between the richest and poorest groups continue to widen. The World Bank has found that two-thirds of the world's poorest people—those living in “absolute poverty” with incomes of less than US \$50 a year—can be found in Asia. Most are concentrated in Bangladesh, Pakistan, India, and Indonesia, but large numbers of people also live at or near subsistence levels in rural hinterlands and on the fringes of the urban economy in Thailand, Burma, Sri Lanka, Malaysia, Korea, Nepal, the Philippines, and other Southeast Asian countries.¹ In its study of poverty in rural Asia, the International Labour Office notes that over the past two decades the incomes of many of the rural poor fell and the percentage of the rural population with incomes below the poverty line increased. The inequitable distribution of income and wealth in some countries was

more pronounced by the middle of the 1970s than at the beginning of the 1960s.²

The distribution and severity of poverty within Asian countries are related to patterns of regional resource development. The limited access of some regions and population groups to the natural and man-made resources needed to satisfy basic needs, increase productivity, diversify economic activities, and raise incomes is an underlying cause of poverty. Growing disparities in levels and rates of growth are evident between those countries that have been able to use their resources effectively to stimulate agricultural and industrial development, and those unable to mobilize resources for productive purposes.

Serious disparities in levels of development and standards of living also appear between urban and rural areas, and among subnational regions with different levels of resource endowment and productive assets.

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I. MARGINAL RESOURCES AND REGIONAL DEVELOPMENT

"Marginality" is a distinguishing characteristic of nearly all who live in poverty. In much of Asia the poorest groups inhabit sparsely populated and ecologically hostile environments—marginal and infertile areas subject to recurrent natural hazards such as droughts, floods, and insect plagues. The natural adversities are often exacerbated by man-made hazards of accelerating environmental destruction. These marginal zones are usually incapable of yielding large agricultural surpluses using traditional methods of cultivation, and the huge differentials in productivity between better-endowed and marginal zones within the same country often squeeze marginal people out of agricultural markets entirely, invariably leaving them more impoverished. The World Bank estimates that 40 per cent of the world's poorest people live in areas with seriously adverse climatic and ecological conditions—regions such as the arid and semi-arid uplands of Iran, most of the Himalayan chain from Afghanistan to Burma, vast drought-prone tracts of India, the swampy lowlands of Indonesia and East Malaysia, and the Philippine uplands and river basins.³

But the majority of Asia's poor live in densely populated areas with relatively favourable climates and with vast and potentially productive resources. They remain poor because of their marginal access to the means of procuring, transforming and delivering those resources more productively.⁴ They inhabit areas where competition for existing resources, especially agricultural land, is intense; where the physical, social, and administrative infrastructure needed to transform and use resources is scarce; or where deliberate patterns of government investment have placed them at a locational disadvantage for competing with other regions in national and international markets.

In most of Asia the intense competition for arable land is a primary cause of poverty. "Within the rural sector," the World Bank has found, "at the very core of the poverty problem are families who either own and cultivate very small holdings or own no land at all."⁵ Severe pressures on land resources from high rates of rural population growth are expected to continue in south and southeast Asia for at least the rest of this century.

But problems also arise from the marginal use of existing resources: from the inability to identify productive uses

for indigenous resources or from inefficient practices of resource transformation and delivery. The inefficient use of labour—its low productivity and sporadic employment—in rural areas is perhaps the most apparent example of under-used resources in Asia. The ILO has found, however, that "labor is not the only resource that is poorly utilized; in many countries land and other resources are not efficiently exploited." Inefficient farming practices reduce the overall productivity of land in many regions. Excessively long fallow periods, low intensity of cropping, large amounts of land left in natural pastures, and similar practices—especially on larger farms—reduce the possibility of raising yields from existing arable land. "At the same time," ILO analysts note, "many of the smallest farmers are forced to overexploit their land, with the result that useful land is destroyed through exhaustion of soil fertility."⁶

Inefficient or inadequate use of existing resources is often caused by another form of marginality: the limited access of the poor to supplementary services and facilities needed to procure, transform, and deliver productive resources. In many regions of Asia the intense competition for available resources is exacerbated by lack of credit facilities for small farmers and entrepreneurs, the shortage of marketing centres, the inadequacy of co-operative organizations or other arrangements for transporting and selling goods, poor communications, insufficient physical infrastructure and poorly organized agricultural extension services. Most subsistence activities, moreover, depend entirely on manual labour or animal power, sometimes aided by handmade, simple implements. New forms of technology needed to transform resources and increase the productivity of labour are not available to the rural poor. In addition, the administrative and institutional arrangements needed to maintain supplementary resources are often inadequate or missing entirely.⁷ "Underutilization of labor and land often is accompanied by underutilization of capital," ILO analysts found. "Large irrigation facilities are not used to capacity; irrigation canals and drainage ditches are allowed to fall into disrepair; fish ponds are permitted to become overgrown with weeds, mechanical equipment becomes inoperative because of poor maintenance and lack of spare parts."⁸

Moreover, the rural poor generally lack access to town-

based facilities and the health, education, and social services that would allow them to increase their productivity. Nor can they easily learn of new ways of identifying potentially productive resources or of using them more effectively. The limited access of rural people to market towns and small cities, in which the services and facilities needed to support rural resource development are located, places them at a serious disadvantage.

Marginality and Development Policy

The marginality of poor regions in Asia is not due entirely to differences in natural resource endowments. Disparities among regions in income and wealth—and in the overall ability to exploit existing resources productively—are often created by public investment and development policies. “The unequal distribution of benefits among the population and the unbalanced pattern of sectoral development that characterize Philippine growth for much of the past three decades,” the World Bank insists, “was closely linked to resource management policies and to patterns of resource allocation.”⁹ In many of the developing nations of Asia, as in the Philippines, investments were heavily concentrated in large-scale, capital-intensive industries, usually located in a primate city or a few metropolitan centres, and allocated to physical infrastructure development in a few favoured regions, usually in and around the metropolitan centre.¹⁰ The concentration of productive assets in the primate cities allowed these centres to exploit opportunities for development, create competitive advantages over other locations within the country, and drain peripheral rural areas of their resources.

These favoured locations now have concentrations of productive and social overhead assets vastly greater than their share of national population. They continue to attract human and capital resources from rural regions, thereby slowing or retarding rural development and maintaining subsistence populations in poverty. In the Philippines, for instance, although Manila has only about a quarter of the national population, it accounts for more than 72 per cent of the nation’s manufacturing firms, 80 per cent of all manufacturing employment and production, and 61 per cent of the nation’s hospital beds. It consumes 83 per cent of the nation’s electrical power and generates more than 65 per cent of the country’s total family income.¹¹ Similarly, Bangkok absorbs about 65 per cent of the annual investment in construction in Thailand, has 72 per cent of all commercial bank deposits, consumes 82 per cent of the nation’s electrical power and has 77 per cent of the nation’s telephones.¹² Jakarta’s growth is due in large measure to the overwhelming share of foreign and domestic investment it receives compared to other areas of Indonesia and to its percentage of the national population. Between 1968 and

1972, more than 32 per cent of domestic investments and 20 per cent of foreign investments approved by the government were located in Jakarta, which during that time had about 4 per cent of Indonesia’s population.¹³

The relatively high levels of economic development in the Central Luzon and Southern Tagalog regions of the Philippines cannot be attributed solely to their natural advantages. They are the result of sustained concentrations of public and private investments in infrastructure, services, and productive activities in these regions over a long period of time. In every aspect of economic and social development, these regions now have advantages over all others in the country. Agricultural production in Central Luzon outpaces that of other regions because 50 per cent of its cultivated land has been irrigated, as opposed to 13 per cent of cultivated areas in the rest of the Philippines. The region reports the highest percentage of farmers obtaining credit from institutional sources and greater access to fertilizers and other farm inputs than other regions of the country. For over a quarter of a century these two regions have received preference in government resource allocations. In fiscal years 1959 to 1961, for example, nearly 57 per cent of infrastructure expenditures were made in these two regions, slightly more than 70 per cent of expenditures on ports and harbours, 49 per cent on waterworks, 61 per cent on flood control and drainage, and almost 70 per cent on buildings, schools, and hospitals were made in and around metropolitan Manila. From 1971 to 1973, these two most urbanized regions received 56 per cent of all infrastructure investments, 64 per cent of port projects, 91 per cent of waterworks, 63 per cent of irrigation, 67 per cent of flood control and drainage projects, and 60 per cent of buildings, schools, and hospital investments.¹⁴

Moreover, Central Luzon and Southern Tagalog were favoured with higher allocations for social services and economic development expenditures. Nearly two-fifths of all community development projects funded between 1956 and 1973 were concentrated in these two regions, and 43 per cent of the enterprises assisted by the National Cottage Industries Development Administration (NACIDA) were found there. Indeed, these two regions accounted for nearly 70 per cent of the total capitalization of all NACIDA projects by 1972. More than 43 per cent of the Board of Investment’s (BOI) large-scale industrial assistance, by 1973, was allocated to firms located in these regions.¹⁵

It has become increasingly clear that the over-concentration of social and productive investments in a few favoured locations is not only detrimental to the marginal regions excluded from development, but to national economic progress as well. The inability to mobilize and use resources to develop marginal regions not only contributes to geographically unbalanced and socially inequitable growth, but leaves large numbers of the population on the fringes

of, or excluded entirely from, the national system of production, exchange, and consumption, thereby constraining expansion of the domestic economy. Indeed, the only market economies in Asia that have been able to grow rapidly with relatively equitable distribution of benefits are those that have taken strong measures to develop resources widely and to increase the access of a large majority of the population to productive assets and skills.

Rao notes of Korea, for instance, that "the broad distribution of land contributed importantly to the fact that farmers gained equitably from the growth of farm incomes, and the early spread of education enabled a wide segment of the population to participate in the rapidly expanding modern manufacturing sector and was instrumental in the extensive modernization of agriculture."¹⁶ In Taiwan, strong emphasis was placed on developing agricultural resources throughout the

country, equalizing wages and prices between urban and rural sectors, and decentralizing industry to peripheral areas. Moreover, in both Korea and Taiwan, physical infrastructure and basic social services were widely distributed in order to increase the productivity of labour and to enhance the capacity of rural villages to become economically viable. Taiwan extended rural roads to all parts of the island, expanded rail systems, created rural industrial estates, strengthened farmers' associations, and assisted raw materials-based industries in marginal areas.¹⁷

In Korea, primary and middle schools are well dispersed and are within easy access of most rural villages. Most villages are connected by roads and have access to telephone communications and electrical power. The government's Saemaul Undong programme continues to provide assistance for self-help projects in rural villages to increase their self-reliance, mobilize leadership and raise productivity.¹⁸

II. SPATIAL DIMENSIONS OF REGIONAL RESOURCE DEVELOPMENT

Studies of economic development in both industrially advanced and developing nations have shown that a key to internal economic growth has been the creation of mutually beneficial relationships between urban centres and the countryside. The emergence of a spatial system that stimulated the commercialization of agriculture, allowed natural resources from rural regions to be used productively within those regions, facilitated the dissemination of innovation and the delivery of public and commercial services, aided in the efficient production and exchange of goods throughout the national economy, and drew larger numbers of the population into productive economic activities, was crucial to widespread development.¹⁹

But in much of Asia such spatial systems are not well developed; systems of central places of different sizes, performing specialized functions, widely dispersed but linked together in a mutually beneficial system of production and exchange, have not yet emerged. Economic development has generally been dualistic, and the over-concentration of investments in infrastructure and services in one or a few major urban centres has created polarized spatial systems that inhibit further expansion of the domestic economy, adversely exploit the resource base of marginal regions, and prevent widespread distribution of the benefits of economic growth. In many countries, as in the Philippines, Thailand, and Indonesia, production and infrastructure investments have been so heavily concentrated in one major city and region that over time the largest metropolitan area has attained "primate city" status. That is, the city has grown so large as to dominate the entire national economy. Secondary cities either do not develop, or grow very slowly. They are usually few in number and not distributed widely enough to act as catalysts for development in marginal regions. In highly polarized spatial systems, market centres are usually small and scattered, and are poorly equipped to provide services to rural areas. Small cities and market towns are not efficiently linked to each other or to larger urban centres and thus marketing networks that could integrate rural areas economically and incorporate marginal populations cannot easily emerge. A large percentage of the urban population lives in the primate city and a few other secondary centres; but the overwhelming majority of people remain in rural areas, scattered in small settlements that are not large enough to support basic services

and facilities needed to promote economic growth and resource development.

International assistance agencies and governments in developing countries have increasingly recognized in the past few years that if they are to ameliorate rural poverty, integrate marginal areas, and incorporate subsistence population groups into the national economy, they must promote a more spatially balanced pattern of development based on "bottom-up" stimulation of rural economies. Redistribution alone would do little to overcome rural poverty of the magnitude found in Asia. The emphasis on "growth-with-equity" would require the development of new resources within developing countries and the steady inclusion of marginal and subsistence populations in productive economic activities. This in turn would require extensive investment in physical infrastructure, services, and productive activities in rural regions, located strategically in intermediate sized cities, smaller towns, and rural market centres. The growth of "rural service centres" that could link towns to rural hinterlands would also be encouraged in order to increase the access of the rural poor to basic services and facilities.²⁰ The investments, moreover, would have to be located in such a way as to create an articulated and integrated regional spatial system capable of facilitating, 1. the extension of markets for increased agricultural production and other rural resources, thereby raising income for rural families; 2. more widespread distribution of services such as health, education, family planning, and vocational training, the technical inputs needed for increased agricultural production such as new seed varieties, appropriate technology, farm-to-market roads, and rural electrification, as well as communications and transportation; 3. creation of new rural employment opportunities, especially in agro-processing, agribusiness, small-scale manufacturing, and cottage industries that use local resources as the primary inputs for production; and 4. a slowdown the rate and an alteration in the pattern of rural to urban migration.²¹

But the pattern and composition of spatial systems and the roles of various types of settlements differ drastically among developing nations, and any serious effort to shape spatial systems to promote more equitable and widespread development, especially in marginal zones, requires careful analysis and planning. Ruddle and Grandstaff point out

two of the dangers of inappropriate development policies in marginal regions. First, they note that these areas are not necessarily ecologically marginal and that the ecological stability of more populated and developed regions often depends on the stability of marginal areas. Major disruptions of ecological systems in marginal areas could have adverse effects on more developed areas of the country. Moreover, if development is inappropriate or ill-considered it would likely leave people in marginal regions worse off and more alienated. "Marginal area populations are particularly susceptible to this because their resource systems and ways of life are often radically different from those of more developed areas," they note. "There is, therefore, a real likelihood for increased poverty, alienation and cultural disintegration under conditions of radical disruption."²² In the past, however, spatial analysis for regional development had been constrained by three other problems: the failure to recognize the importance of spatial factors in national and regional resource development; the lack of an operational framework for integrated spatial analysis; and the paucity and unreliability of data in rural regions for formulating effective development plans.

* * *

This paper describes and evaluates a pilot project undertaken from 1976 to 1978 in the Bicol River Basin of the Philippines to address these problems and to develop an operational framework for integrated spatial analysis and regional resource development. It describes the background and rationale of the project, outlines principles for selecting applied research methodologies, describes the methods and techniques that were used in the Bicol River Basin, and compares them with methodologies tested in previous experimental projects in other developing countries. In addition, it identifies the results of the project and evaluates the behavioural and organizational problems of implementing it.

The Bicol project is of general interest to resource development planners for three reasons. First, the analyses employed in the Philippines are potentially replicable, with appropriate testing and adaptation, for integrated spatial development planning in rural regions of other developing countries. Second, the problems of designing applied policy analyses for spatial development in Bicol are quite common in much of the developing world. And, finally, the results of the analysis provide insights into the spatial dimensions of regional resource development, especially the relationships between urban and rural sub-systems.

III. BACKGROUND AND CONCEPT OF THE "URBAN FUNCTIONS IN RURAL DEVELOPMENT" PROJECTS

The Bicol River Basin of the Philippines was chosen as the site for the first of a series of projects to test approaches to and methodologies for strengthening urban analysis and for locating services and facilities in urban centres that can promote rural development.²³

The designers of the project contended that spatial factors were crucial to the success of the "new directions" in international aid policy, which is aimed at assisting the poor majority in the Third World, primarily through intensified rural development. Moreover, they argued that the functions of urban centres are essential to stimulate growth in rural economies and to increase the access of the rural poor to those services and facilities needed for development. "In addition to being the loci of opportunities for off-farm employment," they noted, "urban centers provide marketing, storage, processing, supply, credit, health, educational and other services to the rural areas they serve." They concluded that rural areas without access to urban centres and services cannot prosper and "those without access to fully functional and efficient [urban] centers are denied their full development potential."²⁴

The projects would both gather additional information about the nature of the relationship between urban and rural development and test analytical and planning methodologies for promoting integrated spatial development in rural regions. The sponsors of the Bicol study pointed out that:

The linkages between rural development and urban centers are clear, and the existing literature identifies and provides considerable insight into the kinds of general services and functions required at the level of the rural market town to support rural development. Less progress has been made in identifying similar facilities and services at other levels of the urban hierarchy—i.e., in the regional and supraregional centers—and little has been written of a comprehensive nature. More understanding is needed of the mix, magnitude and timing (i.e., order of priority) and location of facilities and services at all levels and for different types of agricultural patterns. In addition, practical information is needed on alternative ways of providing the required services and facilities.²⁵

The ultimate outputs of the pilot projects would

be a process of analysis and a "package" of analytical techniques and methods for planning that would assist developing country planners to design policies and programmes for strengthening the role of urban centres in rural development. The methods tested and proven effective in these developing countries would be disseminated to development institutions throughout the world.

The Conceptual Framework

The importance of the spatial dimension to "growth-with-equity" policy was strongly confirmed in preparatory research conducted in 1976.²⁶ The study found that spatial systems in most developing countries were not conducive to equitable growth. Although metropolitan centres and smaller cities could play an important role in stimulating rural economies, in most less-developed countries they were not well dispersed, and were often poorly linked to rural hinterlands and, thus, the rural poor generally lacked access to the services, facilities, and productive activities located in them. As a result the cities did not provide inputs needed to develop new resources, increase agricultural production, or meet basic human needs in rural regions.

The report proposed a general framework for analysing rural regions and determining the degree of articulation and integration of the settlement system, and the linkages between urban and rural areas. Functional analysis of settlement systems in developing countries could help determine the types of "urban" services and facilities needed at each level of the spatial hierarchy and the means of providing better access for the rural poor to those functions. The study pointed out, however, that any analytical framework would have to be modified in application, adapted to local conditions, and tested in a number of developing countries. The scarcity of data and general unreliability of statistics in developing nations, and the need for analytical techniques that could be easily applied by planners and readily understood by policy-makers in rural regions, mandated substantial testing through experimental and pilot projects.

The report suggested that the pilot projects focus on three areas of analysis.

1. *Analysis of Regional Resources and Activities:* including such factors as physical characteristics of the region, land and resource uses, cropping patterns, volume and diversity of agricultural production, population distribution and rural settlement patterns, services and facilities distribution, non-agricultural and commercial activities, and subsistence system characteristics.
2. *Analysis of Central Places:* including the location of market towns, small cities, intermediate or regional centres; the size, composition and density of towns, the location, concentration and dispersion of central functions, changes in the size and concentration of social and economic activities over time, and the labour force and income distribution characteristics of settlements.

3. *Analysis of Regional Spatial Linkages:* including physical, economic, population movement, technological, social service delivery, political and institutional interaction patterns among settlements within the region, and linkages with external centres.

A number of specific analytical techniques, and the types of information needed to apply them, were also delineated. The report emphasized, however, that the pilot projects should be tailored to the needs and constraints found in the regions under study. A predesigned package of methods could not be imposed; methodology should be designed in collaboration with planners and researchers in the country chosen for study only after initial data inventories and surveys of available information were conducted.

IV. SELECTION OF THE BICOL RIVER BASIN

An economically depressed region on the southwestern end of the Luzon peninsula, the Bicol River Basin manifests almost classic characteristics of marginal areas in developing countries. The Basin's marginality is owed in part to its physical isolation from Manila and other regions of the Philippines and to a physical environment that is hostile to productive activity for much of the year. Income is low and inequitably distributed. Production and marketing technologies are inefficient compared to the rest of the Philippines and other Asian countries. Infrastructure and capital are scarce and local government institutions are weak and ineffective. High rates of population growth prevent appreciable increases in standards of living even in developing sections of the Basin, and in much of Bicol the land-tenure arrangements constrain increased agricultural production and more equitable distribution of income. Poverty and the lack of modern sanitation facilities perpetuate widespread health and nutrition problems.²⁷

Background and Conditions

The Basin is a sub-area of the Bicol Region consisting of two provinces—Camarines Sur and Albay—with 700,000 acres of land, about half of which are arable, and nearly 1.8 million people.²⁸ (See Fig. 1.) For decades, the Bicol River Basin has experienced high levels of rural poverty. The predominantly subsistence agricultural economy has created chronic underemployment and serious malnutrition among the population and encouraged relatively high rates of migration. In 1971, over 80 per cent of the population had incomes below the national poverty level. By 1975, nearly 90 per cent of the Basin's families had annual incomes below the poverty threshold and nearly 65 per cent had incomes of less than half of the poverty mark, classifying them as the "poorest of the poor" (Table 1). About 28 per cent of the labour force is either unemployed or seriously underemployed, and non-agricultural job opportunities in the Basin's towns

TABLE 1. Regional Poverty Threshold and Income Levels, Philippines
1971 and 1975

Region	Number of families (in thousands)		Average family incomes (in pesos)		Families with income below food threshold, 1971		Families with income below poverty threshold, 1971	
	1971	1975	1971	1975	Number (000s)	Per cent	Number (000s)	Per cent
Ilocos	346	558	3,299	5,525	213	72.6	447	85.2
Cagayan Valley	260	329	2,390	5,102	231	75.8	293	84.8
Central Luzon	855	662	4,127	5,773	224	36.5	178	68.5
Southern Tagalog	869	888	4,332	5,441	436	30.6	466	54.5
Bicol	496	518	2,784	4,280	351	70.9	759	87.3
Western Visayas	670	679	3,260	5,484	418	65.3	419	84.5
Central Visayas	980	441	2,548	4,834	388	70.7	572	85.4
Eastern Visayas	NA	595	NA	5,172	718	73.3	847	86.4
Western Mindanao	522	370	3,062	3,803	NA	NA	NA	NA
Northern Mindanao	825	433	3,577	6,307	339	65.1	449	86.1
Southern Mindanao	NA	314	NA	5,662	480	58.3	654	79.8
Central Mindanao	NA	301	NA	5,025	NA	NA	NA	NA
Manila and suburbs	525	770	7,785	10,469	128	24.7	NA	NA
The Philippines	6,347	6,859	3,736	5,840	3,774	59.0	5,039	79.4

Sources: National Census and Statistics Office, Special Release No. 190, and National Economic and Development Authority, *Statistical Yearbook*, 1975. Manila: NEDA, 1975.

and villages are limited. Income levels of the Bicol River Basin's population are not only low, but income and wealth are inequitably distributed. Ten per cent of the households in the Basin receive 43 per cent of the total income, and the poorer 50 per cent of the population receives only 13 per cent of income. The poorer half lives on about US\$45 per capita a year, only enough to buy rice, occasionally some fish, and the barest necessities of life.²⁹

Standards of living in the Basin are far below those of the Philippines. Although outright starvation is not prevalent in the area, 80 per cent of pre-school children suffer from serious malnutrition. A majority of the population is afflicted with water-borne enteric diseases and intestinal parasitism, resulting from contaminated water supplies and poor environmental sanitation. Nearly 73 of every 1,000 infants born in the Bicol River Basin die during their first year, primarily of pneumonia, gastro-enteritis, and bronchitis. There is only one physician for every 4,600 people and most of the doctors are located in larger towns, inaccessible to rural people. Surveys estimate that no more than one-quarter of all women living in the Basin have ever visited a health clinic, hospital, or family planning centre; most rural families seek assistance from healers, or from midwives during pregnancy. Housing conditions outside of the larger towns are also poor. In rural areas homes are built of scrapwood and *nipa*, with grass roofs and bamboo or dirt floors. Less than one-third of the Basin's households have adequate water supplies or sanitary toilets. Sounder structures, more typical of the towns, are scattered in rural barangays, but the overwhelming majority of houses throughout the Basin are constructed of weak building materials and are highly susceptible to fire, flooding, or destruction during typhoons. Few homes are served by piped water or electricity; in the vast majority kerosene or wood is used for lighting and cooking.

The population growth rate of 3.3 per cent a year results in a high dependency ratio—nearly half of the population is under 14 years old—and more than one per cent of the population migrates out of the Basin each year. Most migrants are younger, more productive people seeking job opportunities in larger towns outside the Basin, and usually in metropolitan Manila. The Bicol Region, of which the Basin is a part, has had the lowest net domestic product (NDP) in the Philippines over the past decade; it declined in real terms by an average of 1.5 per cent between 1972 and 1974, at a time when the national average was growing by nearly 4 per cent. The Bicol Region in the early 1970s had the lowest share of employment and production among all regions in the Philippines as well as the lowest proportion of modern manufacturing establishments to population in the country. Indeed, the only industrial capacity in the Basin takes the form

of small, family-owned agro-processing and cottage industries. Nearly all manufactured goods sold in Bicol are imported from Manila.³⁰

Development Problems

Ironically, most Bicolanos live in poverty in a land of great natural beauty and abundant natural resources (Fig. 2). Properly irrigated and cultivated, the Basin's rich alluvial soil could produce enough rice to sustain an additional 8 million people. Production of corn, abaca, sugar, coconuts, and vegetables is only a fraction of the Basin's potential under favourable conditions. The Bicol also has a wealth of untapped mineral resources—about 30 per cent of the marble deposits, 75 per cent of the perlite and about 20 per cent of the coal reserves of the Philippines. The Tiwi geothermal plant, located on the Basin's northeastern border, will soon generate substantial amounts of relatively cheap energy.

But as a regional economy, the Bicol River Basin currently is poorly equipped for increased productivity and widespread development. Through much of the year the Basin is battered by frequent typhoons, bringing high winds and heavy rains. The perennial flooding destroys crops and homes, pushes saline water into interior rice fields and causes widespread silting and erosion. The area is physically isolated from the rest of the Philippines during the worst of the typhoon season and poorly linked to other regions or to Manila even during good weather. A single paved highway that weaves tortuously through the mountains of central Luzon connects Bicol to Manila. During the typhoon season even this link becomes tenuous as sections of the road are washed out and collapse down the sides of steep mountains. Daily flights to and from Manila, buses, and one railway provide limited capacity for travel or interregional communications, and small ports in coastal villages provide limited access for inter-island trade. Regional transportation and communications are not much better, limiting travel and marketing, and leaving the Basin's settlement system a scattering of relatively isolated and poorly integrated clusters of villages.

Nor are current land-tenure arrangements conducive to increasing family incomes. Farmholdings are small and fragmented. From a third to half of all rice and corn farmers work as tenants or landless labourers, and farm productivity is nearly 10 per cent lower than that of the Philippines. Owners of large landed estates have reinvested little of their profits in the Basin over the years, and agricultural technology on both large and small farms is primitive. Manpower and draught animals provide the bulk of agricultural labour. Relatively few milling or processing facilities have been established, marketing networks in

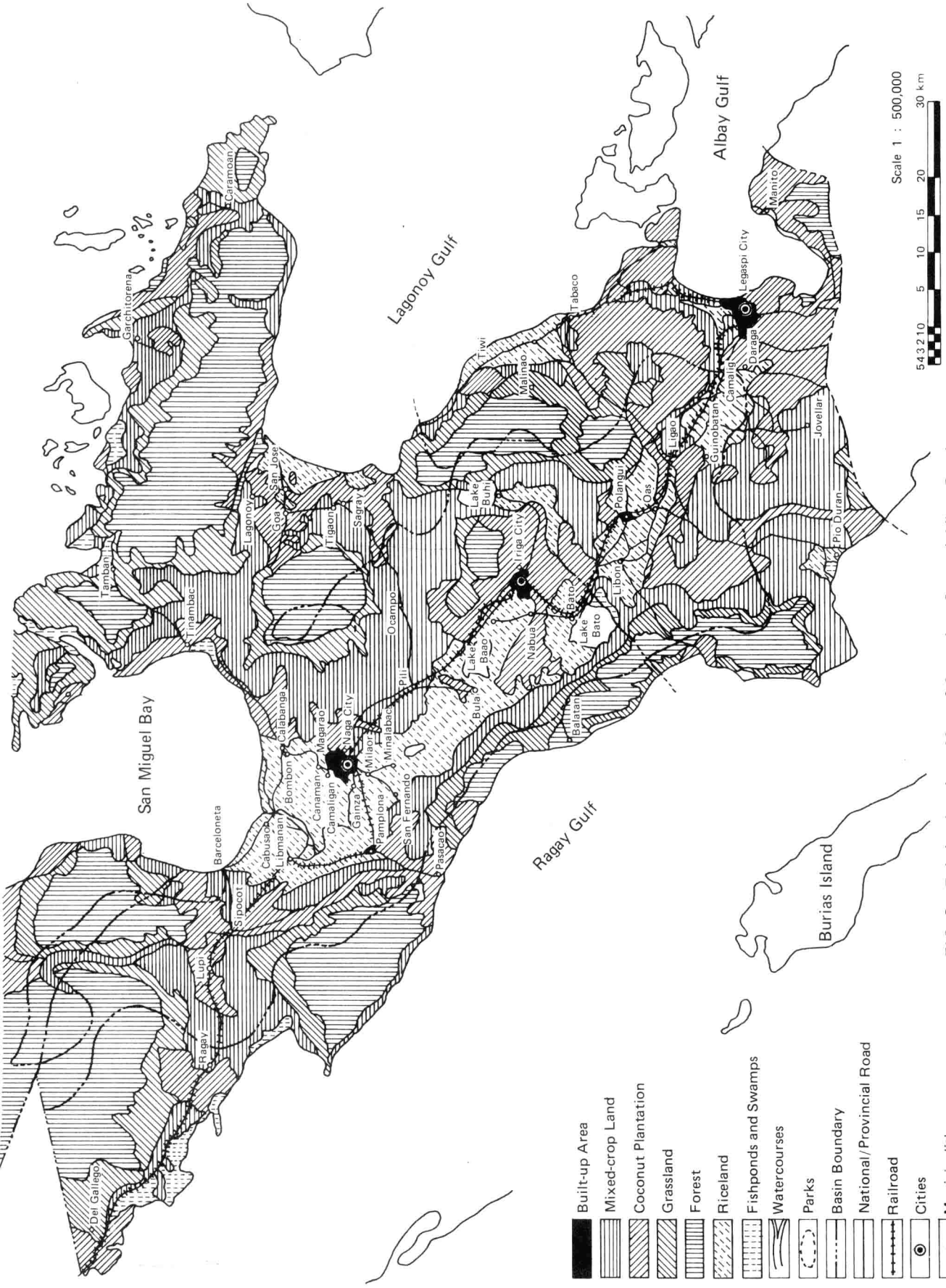


FIG. 2. Existing Land-use Map of Camarines Sur and Albay Provinces