ISSN 0031-7551

PHILIPPINE GEOGRAPHICAL JOURNAL

VOLUME XXIV October-November-December, 1980 NO. 4

ARTICLES

PUBLISHED QUARTERLY BY

The PHILIPPINE GEOGRAPHICAL SOCIETY And The NATIONAL COMMITTEE ON GEOGRAPHICAL SCIENCES, NRCP

MANILA, PHILIPPINES

CamScanner

The PHILIPPINE GEOGRAPHICAL JOURNAL

DOMINADOR Z. ROSELL
Editor-in-Chief & Business Manager

AURORA S. TOLENTINO
Assistant Editor

LYDIA PARAISO-ORDOÑEZ
Managing Editor & Asst. Business Manager

DOROTHY M. CORPUZ
Assistant Editor

SHIRLEY G. CONDE
Secretary

MELITON B. JUANICO
Editorial Consultant

MANUEL P. POLIQUIT
Circulation Assistant

CONTRIBUTING EDITORS

DOMINGO C. SALITA
Chairman
National Research Council of the Phils.
Bicutan, Tagig, Metro Manila

PEDRO G. AFABLE
Chairman, Division I, NRCP
Bicutan, Tagig, Metro Manila

ALEJANDRO R. APACIBLE
Past Chairman, Div. of Agri. & Forestry
National Research Council of the Phil.

MANUEL O. HIZON
Chairman, Division II, NRCP
Bicutan, Tagig, Metro Manila

BIENVENIDO T. MIRANDA
Representing Div. IV, NRCP
Dept. of Chemistry, UP
Diliman, Quezon City

MELITON U. ORDILLAS
Chairman, Division VII, NRCP
Bicutan, Tagig, Metro Manila

JUAN V. PANCHO
Representing Div. V, NRCP
Museum of Natural History
UPLB, College, Laguna

EDILBERTO D. REYES
Representing Division VI, NRCP
College of Agriculture
UPLB, College, Laguna

ANDRES L. REYES, JR.
Representing Division III, NRCP
Dept. of Medicine, UP-PGH
Taft Avenue, Manila

FELICIANO M. LAPID
Researcher
NRCP Project IH-78

THE COUNCIL OF THE PHILIPPINE GEOGRAPHICAL SOCIETY

DOMINADOR Z. ROSELL
President

JOSE O. JAUG
Secretary

DOMINGO C. SALITA
Vice-President

AURORA S. TOLENTINO
Treasurer

ARTURO ALCARAZ
Director

ARTEMIO E. GESMUNDO
Director

ALEJANDRO R. APACIBLE
Director

——— oOo ———

Neither the *Society* nor the *Journal* assumes responsibility for the statements of fact or opinion by authors.

The *Philippine Geographical Journal* is published quarterly by the Philippine Geographical Society and National Committee on Geographical Sciences, NRCP in Manila, Philippines and is sent to all members.

The subscription rate in the Philippines is ₱7.50 a year; foreign is U.S.$7.50; single copies (regular issue) ₱1.90; foreign is U.S.$1.90; single copies (special issue) ₱3.75; foreign is U.S.$3.75. Make all remittances payable to the *Philippine Geographical Journal.*

Editorial correspondence should be addressed to The Editor-in-Chief, *Philippine Geographical Journal*, P.O. Box 2116, Manila, Philippines.

Business correspondence should be addressed to the Business Manager, *Philippine Geographical Journal*, P.O. Box 2116, Manila, Philippines.

Re-entered as second-class mail permit at the Manila Post Office on July 5, 1963

The
PHILIPPINE GEOGRAPHICAL JOURNAL
VOL. XXIV OCTOBER-NOVEMBER-DECEMBER, 1980 NUMBER 4

GEOGRAPHICAL VIEWPOINT

GEOGRAPHY AND ENVIRONMENTAL PROBLEMS IN THE PHILIPPINES[1]

by

DOMINGO C. SALITA[2]

The discipline of Geography is closely linked with the study of the environment. The term environment broadly means the aggregate of all the external conditions and influences affecting the life and development of all organisms. In a nutshell, the human environment is the earth itself with all its components, namely: the atmosphere, the hydrosphere, the lithosphere, the biosphere, the energy sphere and the sociosphere. It includes the physical, biological, and socio-cultural environments.

The study of the environment received world wide attention since the United Nations Conference on the Human Environment was held in Stockholm in 1972. This focused attention on the frailty of the biosphere and the impacts of modern technology. Among the legacies of that conference is the declaration on environmental education which encourages all persons, young and adults, as well as the mass media to study and disseminate information on the need to protect and improve the environment in order to enable man to develop in every respect with vigor and dignity.

The Philippines which is fast approaching an agro-industrial pattern of development is now facing serious environmental problems. These problems can be grouped under three general headings, namely: 1) population explosion; 2) resource depletion; and 3) pollution. These three problems are not independent and isolated from each other but they are inter-connected with population as the main culprit.

---

[1] Presented during the 24th International Geographical Congress held in Tokyo, Japan from 31 August — 5 September 1980.

[2] Professor of Geology and Geography, University of the Philippines and Chairman, National Committee on Geographical Sciences, National Research Council of the Philippines.

GROWTH OF PHILIPPINE POPULATION

As of July, 1980, the computed population of the Philippines has reached the staggering figure of more than 47 million scattered over a land area of 300,000 square kilometers. This makes the Philippines the 16th largest populated country in the world and the 15th densest nation in Asia. The following table shows the growth of Philippine population:

Year	Population	Rate of Growth
1521	500,000	
1903	7,635,426	
1918	10,314,310	1.90%
1939	16,000,303	2.22%
1948	19,234,182	1.91%
1960	27,455,799	3.18%
1970	36,684,486	3.01%
1973	40,218,819	3.00%
1980	47,000,000 (estimated)	2.40%

When Magellan landed in the Philippine soil in 1521, historians told us that the country's population was only half a million. It is obvious that the population has now multiplied by at least 94 times while the land area remains the same. Between 1903 and 1980, covering a period of 77 years, the population had multiplied about six times. This will mean increased pressure on the land. In simple language, it means more mouths to be fed, more bodies to be clothed, more houses, schools, and hospitals to be built and more opportunities for employment to be provided. While we have endeavored to reduce our rate of population growth from 3% in 1970 to 2.4% in 1980, the pattern is shaping that we will reach the 100 million mark by the year 2020. The 100 million mark is significant because it is considered the optimum population which the country can permanently support with a reasonable quality of life for the Filipinos.

Beyond this figure, the inhabitants will face a land shortage not only for agricultural purposes but also for residential, commercial and industrial uses. Even now it is hard for an average income family to get a residential land within Metro Manila so much so that even good prime agricultural lands are being converted into subdivisions for settlement and urban purposes. This reduced our good agricultural lands available for production. The uncontrolled rural-urban migration is another environmental problem which grew out of the rapid population growth in the rural areas. This further aggravates the congestion and the socio-economic problems of the cities. The problem of housing and human settlements have become very acute in the urban areas. The traffic problems, sanitation, police and fire services are strained to provide the amenities for better living.

CamScanner

RESOURCE DEPLETION

With the rapid growth of the population, the natural resources of the country are rapidly being exploited. This is especially true in our timber and mineral resources. The forest resources of the Philippines are among the most diversified in Southeast Asia. The bulk of the forests belongs to the type known as tropical rainforest. They contain about 3,000 species of trees and are rich in timber and forest products.

The activities of forest concessioners who give more emphasis on the immediate profit and neglected the technical requirements of selective cutting has led to over cutting and impoverishing the forest. The work of reforestation has lagged behind so much that if the present rate of utilizing the forest is not properly regulated, the time will come when our supply of good lumber will be exhausted in 50 years. Aside from the concessioners, the kaingineros are also contributing in the destruction of the forest. Their modus operandi is slash and burn so that the land once cleared of trees can be used for subsistence farming.

With the rapid depletion of the forest resources, the effects of soil erosion has become more rapid and floods have become more frequent. This also brought about the extinction of some flora and fauna as well as the denudation of the watersheds. Moreover, since the bulk of the logs obtained are being exported without undergoing any processing, the income derived therefrom is certainly smaller than if the logs were processed locally. The establishment of wood processing plants is necessary which will provide opportunities for employment and more revenue will accrue to the government.

In order to remedy the situation, the Philippine government has enacted the Forest Reform Code of 1974 which vest on the Bureau of Forest Development the responsibility for the efficient management and conservation of the forest resources of the country. Toward this end, the exportation of logs will be gradually phased out and the development of local wood processing plants will be accelerated. A more vigorous program of reforestation especially the denuded areas are to be given priority.

The Philippines is reputedly rich in mineral resources. In terms of comparative volume of some of its mineral contents, the country has the world's largest deposits of chromite and one of the richest nickel resources. Its contribution to the national economy is significant in terms of foreign exchange earned and the number of people dependent on the mining industry. The mineral exports of the country which include copper concentrate, gold, silver, chromite and iron contribute about 17% of the total export trade. Japan and the United States, are the principal importers of our minerals.

CamScanner

Up to now these minerals are being exported in the form of raw materials. While certain amount of foreign exchange is realized, the benefit is only an insignificant portion of what can be possibly obtained if these metals are processed locally to produce the desired products that will satisfy the people's needs. Moreover, with the rapid extraction of the minerals the known resources may be exhausted within the next one hundred years. Since minerals are non-renewable resources it is desirable that proper conservation measures and recycling of scrap metals be observed to meet the long range agro-industrial program of the country.

POLLUTION

In order to meet the rising expectation of the people, the country has moved toward a program of industrial development. The factories that were built within Metro Manila and other urban centers are causing pollution of the rivers, air and land of the metropolis to such an extent that the health of the inhabitants is affected giving rise to more cases of respiratory diseases. Fishermen complain of the low catch that they now derive from rivers and coastal fishing regions. In the mining areas of the country, the environmental effects of mining operations involve four related areas of concern; namely: a) dumping of mine and mill tailings into the local rivers and streams which bring pollution to the farm lands; b) uncontrolled deforestation and soil erosion; c) discharge of acid mine waters into the drainage system; and d) ground subsidense resulting from the collapse of underground workings after abandonment of the mines. Even in agricultural lands the use of fertilizers and pesticides are sources of pollution.

As a solution to these problems, the government has created the National Pollution Control Commission with the duty to abate, control, and prevent pollution in all its forms. The Commission is mandated to promulgate rules and regulations for the maintenance of a reasonable standard of purity in the waters and atmospheric air of the country. In a recent Presidential Decree, highly pollutive and hazardous industries are prohibited from being established within a radius of fifty kilometers from the city hall of Manila.

With respect to the ecological problems resulting from mining operations, the government created an inter-agency committee which recommended the following measures which are now in various stages of implementation: reforestation, regeneration of tailing-covered areas, watershed development, slope stabilization and development of alternative employment opportunities when the mines are exhausted.

Recently, the National Environmental Protection Council was created which requires that any industry which may significantly affect the quality of the human environment is required to submit an environmental impact statement. This will serve as the basis in deciding whether the proposed industry will be allowed or not.

CamScanner

ENVIRONMENTAL GEOGRAPHY

How then is the discipline of Geography related to the study of environmental problems? The solution of environmental problems requires a knowledge of environmental science education. In a joint inquiry conducted by the International Bureau of Education and UNESCO, it was found out that the study of the environment is an essential part of every subject and geography was ranked first in terms of its contribution. Considering the richness and orientation of the contents of geographical studies, this discipline can provide the core and the framework in the emerging field of environmental education. The term geography is derived from the Greek word "geographia" which means earth description. This historic concept has evolved into a comprehensive definition so that Geography is now defined as the study of the interrelationship between man and his environment, their spatial causes and consequences as well as the resulting regional patterns or structures that have emerged on the earth's surface.

With this broad definition, three aspects of geographic study can be noted, namely: (a) geographers share with the other members of the earth sciences a concern with a common arena, the earth surface. They are concerned about the earth as the environment of man, an environment that influences his mode of living which he himself has helped to modify and build; (b) geographers focus on man's spatial organization and his ecological relationship to his environment. He seeks way on how to efficiently conserve and manage the earth resources through better planning and organization; (c) geographers realize the diversity in the features and distribution of the earth resources. Toward this end, the interdependence of man and nations as well as the promotion of world peace and understanding is an important thrust in geographic study. In brief, the spatial, ecological solution of the problems of the environment.

Geographic study will help develop a world population that is aware of and concerned about the environment and its associated problems so that he shall acquire the necessary knowledge, skills, attitudes and commitments to work for the survival of man on this planet. The problems of population explosion, resource degradation, pollution, energy crisis, human settlements and natural hazards as well as land use and planning are issues in geographical study. No other discipline can cover as much ground on the various aspects of man's relation to the physical, biological, and social environments than the field of geography. In simple language, geography is the science, the art, and the philosophy in the study of the earth as the home of man with the ultimate objective of making the earth a better place to live in. In the final analysis, Geography is primarily the study of man and his environment.

CamScanner

REFERENCES

Detwyler, T.R. and Macus, M.G. Urbanization and Environment. Belmont, California: Wadsworth Publishing Co., Inc., 1972.

Ehrlich, P.R., Enrlish, A.P. and Holdren, J.P. Human Ecology. San Francisco: W.H. Freeman and Company, 1973.

Greenwood and Edware. Human Environments and Natural Systems. Belmont, California: Woodsworth Publishing Co., Inc., 1973.

Hare, F.K. and Jackson, G.I. "Environment: A Geographical Perspective," Philippine Geographical Journal. Manila: The Philippine Geographical Society, Vol. XIX, No. 2, April-June 1975.

Luna, T.W. "Problems and Status of Environmental Quality in the Philippines." Philippine Geographical Journal. Manila: The Philippine Geographical Society, Vol. XIX, No. 2, April-June 1975.

Odum, Eugene P. Fundamentals of Ecology. (reprinted) Quezon City: JMC Press, Inc., 1975.

Salita, D.C. Geography and Natural Resources of the Philippines. Quezon City: College of Arts and Sciences, University of the Philippines, 1975.

Salita, D.C. "Environmental Programs in Environmental Sciences at the University of the Philippines Systems," Philippine Geographical Journal. Manila: Philippine Geographical Society, Vol. XVIII, No. 3 & 4, July-December 1974.

Salita, D.C. "Geography — The Core in Environmental Education," Philippine Geographical Journal. Manila: Philippine Geographical Society, Vol. XX, No. 3, July-September 1976.

Wagner, Richard. Environment and Man. New York: W.W. Norton and Company, Inc., 1971.

Wang, J.Y. Introduction to Environmental Studies. California: Milieu Information Service, San Jose State College, 1970.

"The Belgrade Charter," Connect. Paris: UNESCO-UNEP Environmental Newsletter, Vol. I, No. 1, January 1976.

——oOo——

Dr. RONALD E. SEAVOY is professor at the Department of Geology, Bowling Green State University, Bowling Green. Ohio. He is also a consulting geologist for Terra Consultants (Consulting Exploration Geologists). As consulting geologist for the Aluminum Company of America in 1970-1971, he became interested in peasant food production and wrote a manuscript on "Famine in Peasant Societies." Presently, he and Prof. Joseph J Mancuso of Bowling Green State University are writing a manuscript entitled "The Mineral Resources of Southeast Asia," which is expected to be completely by 1983.

CamScanner

SLOPE STABILITY OF THE IFUGAO RICE TERRACES: BANAUE, PHILIPPINES*

by

RONALD E. SEAVOY**

The Philippine Tourist Board accurately describes the rice terraces in Ifugao and Mountain provinces as the eighth man-made wonder of the world. The most extensive terraces on the steepest slopes are found at Banaue and Bontok in the Ifugao-Igorot tribal areas of north central Luzon (Figure 1). Judging by pictures of the Bontok district, the bedrock there is different from the Banaue district because many more fitted stone terrace walls have been built there than in the Banaue district.[1] This article describes only the Banaue district. The town of Banaue is built at the bottom of a V-profile valley at an elevation of 1050 meters (3400 feet). Peaks adjacent to the valley rise to over 1800 meters (6000 feet). Wet rice terrices are built over a relief of more than 800 meters in the Banaue district, between the 700 and 1500 meter contours and they appear to be restricted to the outcrop area of a thick series of massive volcanics and related tuffs of probable Miocene age.[2]

The central mountains were probably first populated by refugee tribes from the lowlands who lacked the political organization to defend themselves. Tribal groups with better political organization drove them into the mountainous interior where, in spite of building an intricate system of wet rice terraces, they have retained a very primitive political organization.[3] The central mountains continued to be an area of refuge after the arrival of the Spaniards because they were easily defendable.

* I would like to thank the International Rice Research Institute who made it possible for me to examine the rice terraces of Banaue.

** Department of History, Bowling Green State University, Bowling Green, Ohio 43403, U.S.A.

1 Albert E. Jenks, *The Bontoc Igorot* (Manila: Ethnological Survey Publications, Vol. 1, 1905), p. 90, Plate IX.

2 Harold C. Conklin, "Land Use in Central Ifugao: Gohang Bannawol, Kinnakin Topographic Sheets," *American Geographical Society*, 1972. Henry E. Fernandez, Florian V. Mamasco, "Gold Deposition in the Baguio Gold District and its Relationship to Regional Geology," *Economic Geology*, Vol. 74, 1979, 1867.

3 Albert E. Jenks, The *Bontoc Igorot* (Manila: Ethnological Survey Publications, Vol. 1, 1905), pp. 32-33. William H. Scott, *The Discovery of the Igorots* (Quezon City: New Day Publishers, 1974), p. 324. N. van Breeman, L.R. Oldeman, W.J. Plantinga, W.G. Wielemaker, "The Ifugao Rice Terraces," in *Aspects of Rice Growing in Asia and the Americas* (Wageningen, Netherlands: Veenman and Zonen, 1970, Miscellaneous Papers No. 7, Landbouwhogeschool), p. 43. Lawrence A. Reid, "Wards and Working Groups in Guinaang, Bontoc, Luzon," *Anthropos*, Vol. 67, 1972, p. 531.

CamScanner

Access to both the Ifugao and Igorot regions is over narrow passes and thru canyon-like water gaps.[4] Because the interior valleys were easily defendable, the Spaniards never succeeded in pacifying either tribal group.

When the Ifugao and Igorot groups settled in the interior of Luzon, there were probably no agriculturists present. There they practiced the shifting cultivation (kaingin) of rice and sweet potatoes (camote). As long as there was vacant land, Ifugao tribal groups burned the forest without regard to its regeneration. When forest land was replaced by grassland they moved. The result of their intrusion is still visible in the huge expanse of vacant grasslands that cover much of the uplands in the Ifugao tribal area. The normal vegetative cover prior to its destruction by shifting cultivators was a dense hardwood forest at the lower elevations and a conifer forest at higher elevations. The Ifugao peasantry probably began to build irrigated rice terraces when increasing areas of grasslands reduced the food supply available from shifting cultivation. The smaller area of secondary forest reduced the area where Ifugao and Igorot tribal groups could practice the shading cycle and thus avoid the labor of turning the soil with a hoe each time a crop was planted. The alternative to hoe cultivation was building irrigated terraces where a continuous water cover surpresses grass and weed growth so that once the terraces are built rice cultivation can be done with minimal ground preparation (Plates 1, 2). Building irrigated terraces is less laborious than hoe cultivation. Irrigated cultivation also provides a more assured

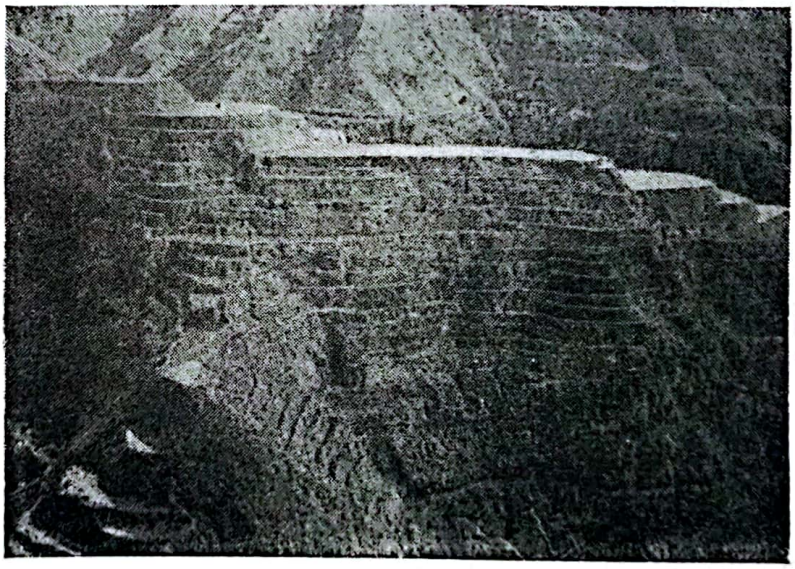


PLATE 1. Rice terraces sculptured into partially weathered rock (regolith) of the Banaue andesite volcanics. Vertical scars in terrace walls are minor washouts that occur during typhoon rains.

[4] William H. Scott, *The Discovery of the Igorots* (Quezon City: New Day Publishers, 1974), pp. 33, 87, 112, 129.

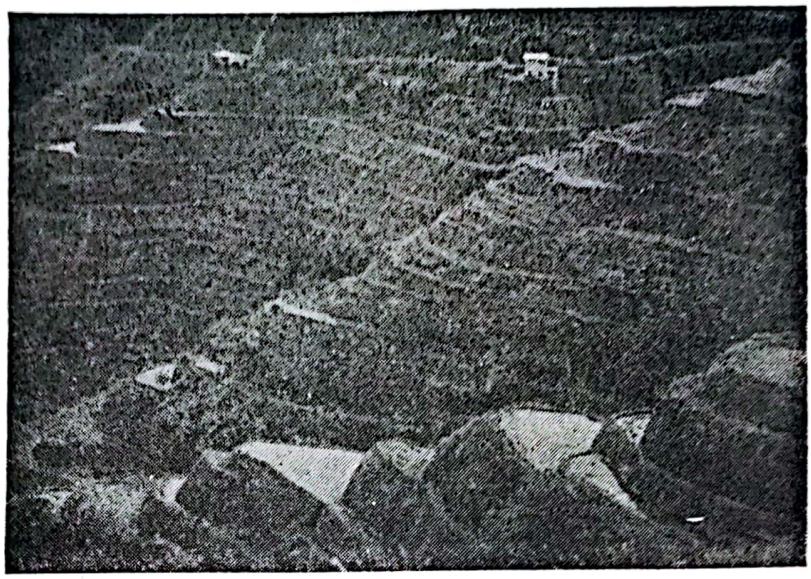


PLATE 2. Rice terraces sculptured into the regolith of andesite volcanic rocks. The light spots on the nearly vertical backslopes of the terraces are outcrops of spheroidal cores of unaltered andesite that have been exposed during terrace construction. See PLATE 6. Houses in the background are along the Banaue - Mayaoyao road.

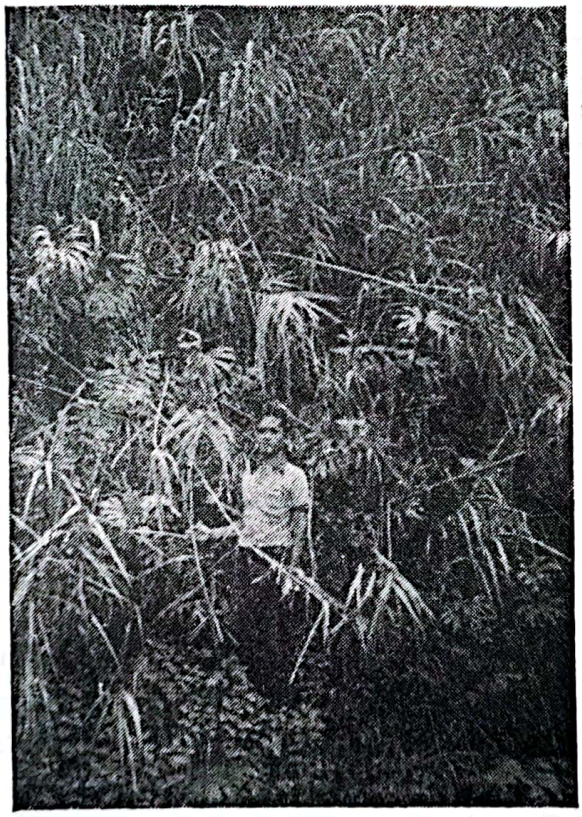


PLATE 3. A cane dominated thicket in the vegetative succession that follows kaingin cultivation of camotes (shifting cultivation of sweet potatoes) on a steep mountain slope above the uppermost wet rice terraces. The Ifugao peasantry cut and burn the cane, *Miscanthus sinensis*, to make temporary camote fields (See Plate 4), and the cane over the cane cover regenerates in five to six years if not disturbed by fire.

food supply that increases the rate of infant survival. This, in turn, produces an increased population which builds more terraces on the mountain slopes.[5]

---

[5] Ruperto Alarcon, "A Description of the Customs of the Peoples of Kiangan, Bunhian, Mayoyao, 1857," *Folklore Institute of the Hague*, Vol. 2, 1965, p. 81. Albert Bacdayan, "Securing Water for Drying Rice Terraces: Irrigation, Community Organization, and Expanding Social Relationships in a Western Bontoc Group, Philippines," *Ethnology*, Vol. 13, 1974, p. 251. Charles B. Drucker, "To Inherit the Land: Descent and Decision in Northern Luzon," *Ethnology*, Vol. 16, 1977, pp. 3-6. William H. Scott, *On the Cordillera: A Look at the Peoples and Cultures of the Mountain*

PLATE 4. Kaingin field of camotes (shifting cultivation potatoes) amid a cane dominated thicket on an upper mountain slope. A new road cut is directly below. The road cut exposes a weathering profile with a thin mantle of soil, a middle zone of regolith, and a lower zone of bedrock in process of spheroidal weathering.

As Ifugao tribal groups increased their numbers they continued to supplement their food supply by growing camotes (**Ipomoea batatas**) in kaingin fields in the remaining areas of secondary forest and cane thickets. The initial post-crop vegetative cover that establishes itself on abandoned kaingin fields is largely **Miscanthus sinensis**, a cane that grows over four meters high (Plate 3). If the cane is protected from annual burning it will develop into a nearly homogeneous stand. The peasantry of the Banaue district prefer cane thickets for camote cultivation because the cane can be cut every five to six years instead of every twelve to fifteen years for secondary forest.[6]

Although the rice grown on irrigated terraces is the most visible crop, more than one-third of the food intake of the Ifugao peasantry comes from camotes. Most camotes are grown by techniques of shifting cultivation on unterraced fields that are usually above the uppermost rice terraces. Some camotes, however, are grown by techniques of continuous cultivation on dry terraces at higher elevations where the water supply is least reliable. The attraction of camote cultivation is that they pro-

Province (Manila: MCS Enterprises, 1966); p. 28; reprinted from "A Preliminary Report on Upland Rice Cultivation in Northern Luzon," *Southwestern Journal of Anthropology*, Vol. 14, 1958. Ronald E. Seavoy, "The Shading Cycle in Shifting Cultivation," *Annals of the Association of American Geographers*, Vol. 63, pp. 526-528.

[6] Ronald E. Seavoy, "The Origin of Tropical Grasslands in Kalimantan, Indonesia," *Journal of Tropical Geography*, Vol. 40, 1975, pp. 48-50. Ronald E. Seavoy, "The Transition to Continuous Rice Cultivation in Kalimantan," *Annals of the Association of American Geographers*, Vol. 63, 1973, pp. 221-222.

PLATE 5. Kaingin field of camote (shifting cultivation of sweet potatoes) on a very steep mountain slope above the uppermost wet rice terraces.

duce more calories (but less protein) per area of cultivation than rice. The surprisingly high dependence of the Ifugao peasantry on camotes is because about one-third of the terraces are planted in cold tolerant glutinous rice that is used exclusively to make wine for ceremonial occasions and, therefore, these terraces do not contribute to the peasantry's food supply.[7]

By visual estimate, the area of kaingin fields of camote is about half of the area of the wet rice terraces. This estimate is made from an examination of Conklin's 1972 land use maps of the Ifugao tribal area. The kaingin fields of camote are usually made on the steepest mountain slopes that have the best drainage. In this very wet climate good drainage is necessary for optimum tuber growth (Plates 4, 5). The upper mountain slopes are steep enough so they are self-draining under all rainfall conditions thus it is not necessary to build mound ridges to insure drainage, as is necessary when dry terraces are used for camote

[7] N. van Breemen, L.R. Oldeman, W.J. Plantinga, W.G. Wielemaker, "The Ifugao Rice Terraces," in *Aspects of Rice Growing in Asia and the Americas* (Wageningen, Netherlands: Veenman and Zonen, 1970, Miscellaneous Papers No. 7, Landbouwhogeschool), pp. 43-44. William H. Scott, "Growing Rice in Sagada," *Philippine Economic Journal*, Vol. 2, 1963, p. 96. Albert S. Bacdayan, "Securing Water for Drying Rice Terraces: Irrigation, Community Organization, and Expanding Social Relationships in a Western Bontoc Group, Philippines," *Ethnology*, Vol. 12, 1974, p. 248. Douglas E. Yen, *The Sweet Potato and Oceania: An Essay in Ethnobotany* (Honolulu: Bishop Museum, 1974), pp. 50-51.

CamScanner

cultivation. Furthermore, the soil is shallow and camotes do well in shallow soil so that less labor is required for their planting and harvest. Local varieties of camote appear to be more cold tolerant than rice.[8]

On the lands of the hamlet of Bayninan, four kilometers east of Banaue and near the center of population density of the Banaue district, the cane-grassland vegetative succession covers thirty-four percent of the surface and secondary forest covers a further forty percent. Only fifteen percent of the hamlet's land surface is terraced and the terraces are concentrated in a contagious block at the lower elevations. In less densely populated districts the cane-grassland vegetative succession and secondary forest covers much larger areas of village lands so that in the whole Ifugao tribal area less than two percent of the land is terraced.[9]

Some of the more spectacular rice terraces are built on slopes that are as steep as forty-five degrees. The terraces on the steepest slopes have as much as ten or twelve meters of vertical relief between them and support cultivation strips only two or three meters wide that extend as sinuous contours along the mountain sides. In this region of high rainfall, terraces built on steep slopes would not survive the rains accompanying typhoons if they were constructed of clay or built on a clay base.[10] This was dramatically brought to the attention of the author when he visited Banaue immediately after a typhoon had poured torrential rains on the region. The newly rebuilt portions of the access highway, as well as portions still under construction, were frequently half-blocked by landslides made up of soil and regolith debris. The soil on the upper mountain slopes is seldom more than fifty centimeters deep. Frequently the slide originated in a kaingin field of camote or in a recently abandoned kaingin field where the roots systems of the plants were not deep nor extensive enough to stabilize the saturated soil after its stability had been undermined by a road cut.

The original highway and its rebuilt portions were constructed almost entirely above the rice terraces so as not to destroy the stability of the terrace system or impair the rice producing capabilities of the Ifugao peasantry. Because the road was built above the rice terraces, it was also built on some of the steepest slopes of the valley. The road-

---

[8] Harold C. Conklin, "Some Aspects of Ethnographic Research in Ifugao," *New York Academy of Sciences, Transactions*, Series 2, Vol. 30, 1967, pp. 106-107, 115. Albert E. Jenks, *The Bontoc Igorot* (Manila: Ethnogeological Survey Publications, Vol. 1, 1905), pp. 95-96, Plate LXII. Douglas E. Yen, *The Sweet Potato and Oceania: An Essay in Etnobotany* (Honolulu, Bishop Museum, 1974), pp. 56-57, 60-67, 71-72, 87-99.

[9] Harold C. Conklin, "Some Aspects of Ethnographic Research in Ifugao," in *New York Academy of Sciences, Transactions*, Series 2, vols. 30, pp. 112-113. Joseph E. Spencer, *Land and People in the Philippines* (Berkeley: University of California Press, 1954), pp. 5-6.

[10] N. van Breemen, L.R. Oldeman, W.J. Plantinga, W.G. Wielemaker, "The Ifugao Rice Terraces," in *Aspects of Rice Growing in Asia and the Americas* (Wageningen, Netherlands: Veenman and Zonen, 1970, Miscellaneous Papers No. 7, Landbouwhogeschool), pp. 40, 62.

CamScanner

bed had to be extremely well constructed in order to survive the torrential rains accompanying the two or more typhoons that affect the region each year. The roadbed was excavated into partially weathered but competent bedrock so that it rests on stable material that resists landslides (Plate 6). This is exactly the same technique used by the Ifugao peasantry to build stable rice terraces on the steepest mountain slopes. As a result of this construction technique the road was resistant to landslides wherever it was built on regolith, but several cemented stone embankments collapsed. The cemented stone embankments were built to retain fill material that carried the road across deep dips along the crests of mountain ridges. The fill material behind the cemented stone embankments was insufficiently drained and during the prolonged rains that accompanied the typhoon, hydrostatic pressure built up to the bursting point and part of the roadbed slid down the mountain.

Landslides are the greatest menace to wet rice cultivation in the Banaue district because the irrigation water brought to the rice terraces keep all potential slip planes constantly saturated. This becomes critical during the torrential rains accompanying typhoons when the weathering zone (soil and regolith) becomes over-saturated and greatly increased in weight while, at the same time, its structural strength is greatly reduced because the normal amount of water in fault and bedding planes has been

PLATE 6. Irregular spheroidal cores of unaltered andesite near the base of the regolith that is exposed in a road cut and washed clean by typhoon rains.

substantially increased and forced to move downward under high hydrostatic pressure. The increased weight of the over-saturated soil and regolith above fault zones and bedding planes becomes very prone to landslides if these potential surfaces of failure are parallel to the valley slope and are closely spaced.[11] Fortunately, the andesite bedrock of the

[11] Charles F.S. Sharpe, *Landslides and Related Phenomena* (New York: Cooper Square Publishers, 1968), pp. 61-63, 83-86.

Banaue district has very few zones of weakness but, nonetheless, terraces could not be built on these steep slopes unless the peasantry had developed techniques of terrace construction that are capable of deflecting or absorbing an annual rainfall in excess of 3500 millimeters (140 inches), especially when the rains frequently come in sustained torrents during typhoons. During these times terraces built of unconsolidated material on the steepest slopes would lose their cohesion and slide into the valley.

The typhoon season coincides with seasonal changes in wind systems that bring warm, humid air from the Indian and central Pacific oceans over the Philippines. Humid air originating over equatorial oceans begins its northward advance in June and usually returns to its starting latitude by December. Typhoons occur when cool air masses originating over the Asian continent converge with humid oceanic air. Typhoons usually track across the Philippines from southeast to northwest with most of the storms following a path across the central (Visayan) islands. The storms that cross central and northern Luzon usually do so in July, August, and September, and when they ascend the central mountain range, that has peaks over 2000 meters, they can produce exceptionally heavy rains. Banaue at 1050 meters elevation (3400 feet) lies near the eastern crest of the central mountain range and Baguio is within the highest portion of the western watershed at 1500 meters elevation (4900 feet). Banaue is seventy-five kilometers northeast of Baguio. The World's highest recorded rainfall during a twenty-four hour period fell on Baguio. It was 1160 millimeters (45.99 inches).[12]

At Baguio the average monthly rainfall for October is 364 millimeters but 1560 millimeters fell in 1967 and 1354 millimeters of this rain (53.6 inches) fell in two days. Of the 1354 millimeters, 979 millimeters (38.5 inches) fell in one day (October 17, 1967). Daily rainfalls in excess of 300 millimeters (13 inches) are frequent occurrences during the rainy season. Torrential rainfalls can also be prolonged. In July and early August 1972 there were thirty consecutive days of over 50 millimeters (2 inches) of rain and twenty-three of these days had over 100 millimeters. During the same month (July 1972), 4774 millimeters of rain fell for a daily average of 159 millimeters (6.25 inches).

In the twenty-seven years between 1949 and 1975, Baguio experienced the effects of sixty tropical storms. The intensity of these storms is measured by their wind velocities with typhoons having the highest velocities and tropical depressions having the least. Typhoons usually take two to four days to traverse a region while tropical depressions are usually slower moving storms. Generally speaking, typhoons drop 200 millimeters or more of rain for at least one day when they traverse a region and they usually have at least three consecutive days of 100

[12] Frederick L. Wernstedt, Joseph E. Spencer, *The Philippines Island World* (Berkeley: University of California Press, 1967), pp. 46-55.

CamScanner

TABLE 1. RAINFALL IN MILLIMETERS, 1949-1975, BAGUIO CITY, PHILIPPINES

YEAR	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1949	0	0	95	54	74	203	700+ (5)	370	616+ (3)	509	31	179
1950	13	11	114	152	304	350	1075+ (7)	1502* (10)	408	448	43	31
1951	19	3	16	59	374	490	927* (4)	958+ (8)	591	151	94	11
1952	19	24	31	200	304	347	267	668	305	208	102	56
1953	2	13	36	79	320	462	462	1190*+ (7)	274	100	706* (2)	45
1954	0	1	139	103	108	109	245	622	405	410	377+ (3)	3
1955	5	0	3	146	222	178	449	326	555	197	97	2
1956	11	24	17	149	325	208	309	627	1199*++ (6)	321	232	25
1957	6	0	32	28	101	816* (2)	280	599	810* (4)	159	105	11
1958	36	1	2	30	193	728* (2)	840+ (6)	305	558	190	10	4
1959	9	0	93	22	262	261	241	492	264	120	262	9
1960	35	113	29	289	347	249	275	1918*++ (14)	270	204	68	20
1961	0	0	119	62	190	574+ (4)	1025+ (7)	611+ (4)	565	196	72	7
1962	3	0	9	92	263	184	1249* (5)	694	832* (5)	154	29	7
1963	9	4	9	7	125	1092* (5)	489	383	1457* (7)	76	42	45
1964	3	0	18	158	233	520	299	1870** (9)	572	443	202	143
1965	2	22	118	200	459+ (4)	493	712	371	364	106	24	0
1966	19	6	45	26	764* (2)	241	374	601	956* (5)	60	175	37
1967	1	4	12	230	197	1417*+ (8)	423	1141+ (7)	440	1560* (3)	109	0
1968	4	0	6	51	275	346	1043* (5)	1672*+ (8)	1480** (7)	31	18	0
1969	8	0	7	85	354	382	1211* (4)	616+ (4)	894+ (4)	279	52	48
1970	21	2	21	68	340	417	405	676	616	174	65	50
1971	12	12	4	144	162	489	1321*+ (6)	756	385	306	66	46
1972	18	1	12	80	328	455	4774*+++(26)	1040++ (8)	331	50	46	25
1973	0	0	1	51	106	372	418	537	225	816* (4)	54	13
1974	20	0	7	97	272	549+ (5)	389	1487*+ (10)	332	2273**+(7)	636* (2)	48
1975	17	0	2	57	203	307	155	782	473	295	28	44
Monthly Average	11	9	37	100	266	453	753	816	599	364	206	32

Yearly Average, 1949-1975 - 3646

* Asterisk indicates a typhoon that passed over Baguio City.
\+ Plus sign indicates a tropical storm or depression that passed in the vicinity of Baguio City.
(4) The number in parentheses indicates the number of days per month in which 50 mm or more of rain fell.
Data supplied by Jose O. de Guzman, Chief, Documentation Section, PAGASA, Philippine Weather Bureau.

CamScanner

millimeters or more of rain. Tropical depressions usually have less intense rainfall over more days, but this is not always the case. Between 1949 and 1975, the center tracks of thirty-one typhoons passed somewhere near the city of Baguio and Baguio was substantially affected by twenty-nine other storms whose paths could have been up to 150 kilometers distant (Table 1).

The Baguio weather station is the closest mountain weather station to Banaue and, although Banaue is on the eastern watershed of the central mountains, it probably receives more torrential rains from tropical storms than Baguio because of the prevailing easterly winds. Because of their close proximity, most of the typhoons that affect Baguio also affect Banaue; and the frequency, duration, and intensity of the rainfall that accompanies these storms is a good measure of the stress that the rise terraces in the Banaue and Bontok districts undergo each year, and the structural strength they must have if they are to endure.

Visiting the Banaue region immediately after a typhoon was the optimal time to study the terrace construction techniques used by the Ifugao peasantry. The torrential rains exposed cleanly washed cross-sections of weathering profiles in newly made roadcuts. In one year's time these profiles would be concealed by a dense cover of vegetation. The opportunity to examine newly made roadcuts that were clearly exposed was the opportunity to compare modern road construction techniques with how the Ifugao peasantry constructs stable rice terraces on the steepest mountain slopes, and to understand why these terraces survive the torrential downpours associated with one or more typhoons that annually traverse the region.

The most obvious reason for building irrigated rice terraces is the availability of water. This is closely related to soil fertility. In this cool climate irrigated rice terraces would usually produce marginal crops unless the soil were fertile. The soils are fertile. The source rock for the soils of the Banaue district are andesite volcanics and related tuffs that have the same gross chemical composition as the source rocks of the very fertile soils of the North Java plain. Soil is actively being formed on the slopes of the Banaue valley but on steep slopes it is also being quickly removed by sheet erosion. Sheet erosion is especially severe on kaingin fields of camote. But the remaining soil retains a high percentage of the mineral nutrients that were in the original rock.

The second major reason for successful rice cultivation in this mountainous environment is the ability of the Ifugao peasantry to build rice terraces that can survive the potentially catastrophic erosive conditions that result from the sustained rains that accompany typhoons. There are two principal erosive forces: scour from uncontrolled channels of runoff water and landslides that result from the build-up of high hydrostatic pressure in the weathering zone. The principal reason why high

hydrostatic pressures can be controlled is the physical structure of the bedrock that underlies the Banaue district. The physical structure of the andesite volcanic rocks of the Banaue district is a very massive, competent pile. Most of the volcanics observed in the Banaue district are lava flows. They are unmetamorphosed and relatively undeformed and appear to be little faulted. Observed dips of tuff beds are forty degrees or less and the author saw no sedimentary interbeds. Thus there are few bedding planes, few fault planes and no incompetent sedimentary beds that could act as slip surfaces for landslides.

The presence of numerous zones of weakness are a detriment to terrace construction in the Lagawe district, fifteen kilometers south of Banaue. The bedrock there is very different. It consists of moderately to highly deformed sediments that have an abundance of bedding planes and they appear to be highly faulted. The exposed sediments include a thick section of fine grained sandstones and incompetent shales that contain thin coal measures and numerous beds containing coalified plant remains. The shales contain a high clay fraction and have closely spaced bedding planes. This stratigraphic sequence does not weather at a uniform rate. These rocks have an abundance of potential slip planes that could become unstable during torrential rains if terraces were built on them. The rocks of the Lagawe district present the Ifugao peasantry

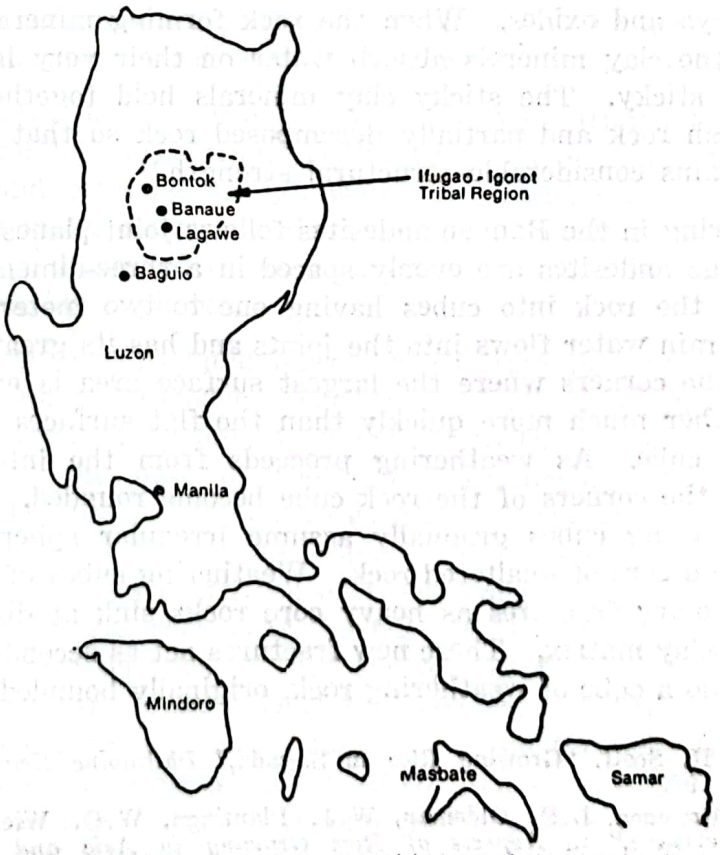


Figure 1 Map of Luzon showing the locations of rice terraces in the mountains of north central Luzon in the Igorot-Ifugao tribal region.

with a very severe problem of terrace stability on steep slopes; therefore, even though the Lagawe district has distinctly higher temperatures and a more favorable growing season because of its lower elevation, the middle and upper slopes of the mountains have not been terraced. The major reason for the lack of terracing is the high probability of landslides.

The key observation in understanding the stability of the terraces of the Banaue district is the uniform weathering of the andesite volcanic pile. The chemically homogeneous volcanics have an evenly spaced joint system and few zones of structural weakness so that weathering proceeds at a near uniform rate. The partially weathered rock of the regolith is capable of being excavated with simple tools because most of it is soft, yet it retains enough structural strength so that the rice terraces sculptured into it will not slide into the valley during periods of saturating rains (Plates 1 and 2, Figure 2). In fact, keeping the regolith wet preserves its structural strength. The regolith would disintegrate if the clay fraction in it were to dry because the clay minerals would shrink in volume and lose their binding capacity.[13]

Weathering is essentially a process of removing the most soluable elements from the rock forming minerals when these minerals decompose. Weathering changes the hard crystalline minerals of andesite into soft, hydrated clays and oxides. When the rock forming minerals decompose into clays, the clay minerals absorb water on their very large surfaces and become sticky. The sticky clay minerals hold together the mixed zones of fresh rock and partially decomposed rock so that the weathering zone retains considerable structural strength.[14]

Weathering in the Banaue andesites follows joint planes. The joints of the Banaue andesites are evenly spaced in a three-dimensional lattice that divides the rock into cubes having one to two meters on a side. Oxygenated rain water flows into the joints and has its greatest chemical activity at the corners where the largest surface area is exposed. The corners weather much more quickly than the flat surfaces on the sides of the rock cube. As weathering proceeds from the intersections of joint planes, the corners of the rock cube become rounded. The centers of the weathering cubes gradually assume irregular spheroidal shapes that preserve a core of unaltered rock. Weathering cubes of rock usually develop subsidiary fractures as heavy core rocks sink at different rates into the soft clay matrix. These new fractures act as secondary weathering surfaces so a cube of weathering rock, originally bounded by six joint

---

[13] William H. Scott, "Growing Rice in Sagada," *Philippine Economic Journal*, Vol. 2, 1963, p. 92.

[14] N. van Breemen, L.R. Oldeman, W.J. Plantinga, W.G. Wielemaker, "The Ifugao Rice Terraces," in *Aspects of Rice Growing in Asia and the Americas* (Wageningen, Netherlands: Veenman and Zonen, 1970, Miscellaneous Papers No. 7, Landbouwhogeschool), pp. 46-47.

CamScanner

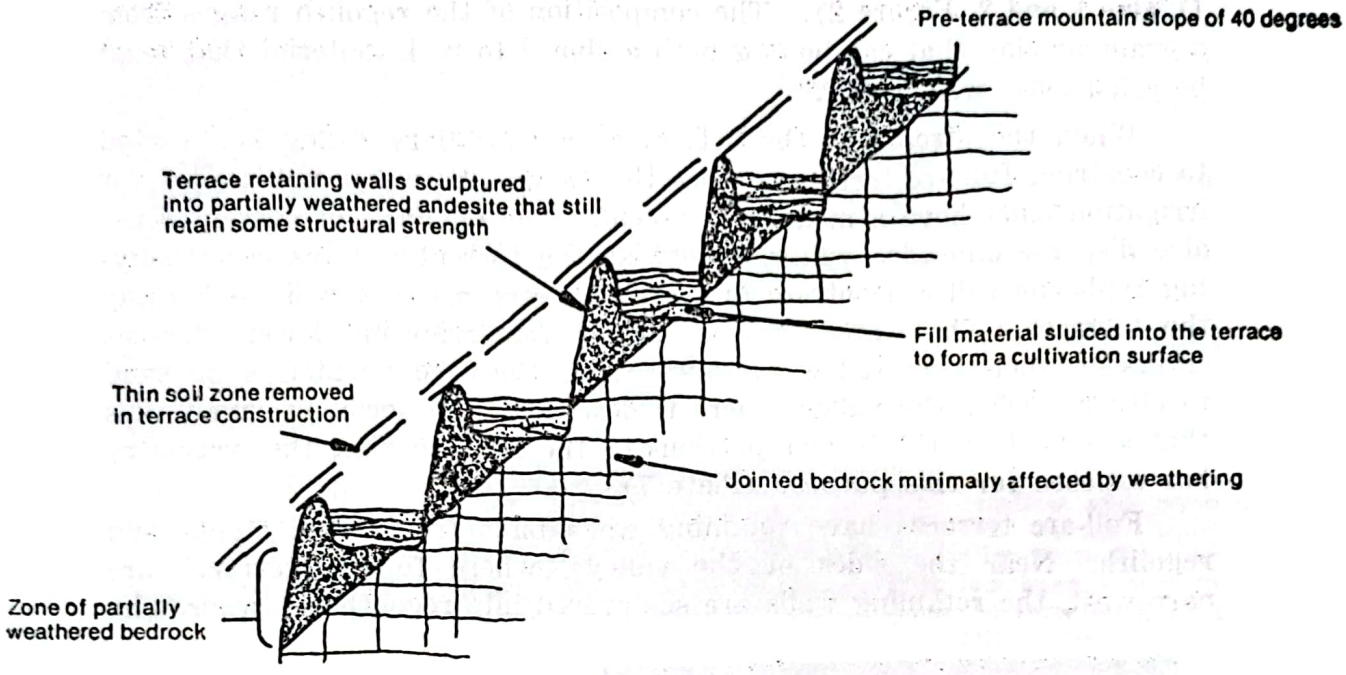


Figure 2 Cross-section of a rice terrace sculptured into a steep mountain slope composed of partially weathered bedrock.

planes, may produce many smaller spheroidal cores of unaltered rock instead of one large one. Spheroidal weathering was very well exposed in the new roadcuts washed clean by the typhoon's rain (Plate 6),[15]

Water control is the third major reason why Ifugao tribal groups successfully practice the continuous cultivation of rice. This means building terraces and bringing enough water to them so that the terraces always have a water cover, and draining excess water away from them so they are not destroyed by scour channel produced by the torrential rains accompanying typhoons.

Ifugao tribal groups build terrace walls from two materials: fitted stones and sculptured regolith. The terrace walls built on steep slopes are carved in regolith by digging notches into the mountain side along a contour until the base of the active weathering zone is reached (Figure 2). The base of the active weathering zone is usually less than six meters horizontal distance into steep slopes but the distance may be twenty or more meters on fifteen or twenty degree slopes. The strong, relatively unweathered rock near the base of the regolith forms a solid foundation for rice terraces so that the terrace floors rest on the least weathered rock in the lower part of the regolith. On the steepest slopes that have the highest vertical distances between terraces, the retaining walls are always sculptured into regolith. These regolith walls retain considerable structural strength so they can be nearly vertical if required

[15] Pierre Birot, *The Cycle of Erosion in Different Climates* (London: B.T. Batsford, 1968), pp. 23-25.

(Plates 1 and 2, Figure 2). The composition of the regolith ranges from a granular clay that can be dug with a shovel to rock material that must be pried loose with a bar.[16]

When the stream at the bottom of a subsidiary valley is diverted to construct full-arc terraces across the valley, the water not needed for irrigation must have a means of descent. The channels of descent must also disperse unneeded water, otherwise the torrential rains accompanying typhoons will concentrate into errosive streams that will wash away the terraces. The water that is needed for irrigating lower terraces enters channels that follow contours, while the excess water is diverted to either side of the valley where it descends by a series of small falls that are built on the harder portions of the regolith that the peasantry has exposed for this purpose (Plate 7).

Full-arc terraces have retaining walls built from fitted stones and regolith. Near the sides of the valleys, where full-arc terraces are narrowest, the retaining walls are sculptured into regolith but where the

PLATE 7. A deflected runoff channel in a subsidiary valley that has been terraced. (See Plate 8) The water is following over a fall that has been built into partially weathered rock near the base of the regolith. This material is competent enough to resist erosion when this channel must carry a large volume of water from the heavy rains accompanying the typhoons.

terraces are built across the center portion of the valley, where fill material has been sluiced in from higher elevations to form the cultivation surface, the retaining walls are built of fitted stones (Plate 8, Figure 3). Fitted

[16] N. van Breemen, L.R. Oldeman, W.J. Plantinga, W.G. Wielemaker, "The Ifugao Rice Terraces," in *Aspects of Rice Growing in Asia and the Americas* (Wageningen, Netherlands: Veenman and Zonen, 1970, Miscellaneous Papers No. 7, Landbouwhogeschool), pp. 49-53.

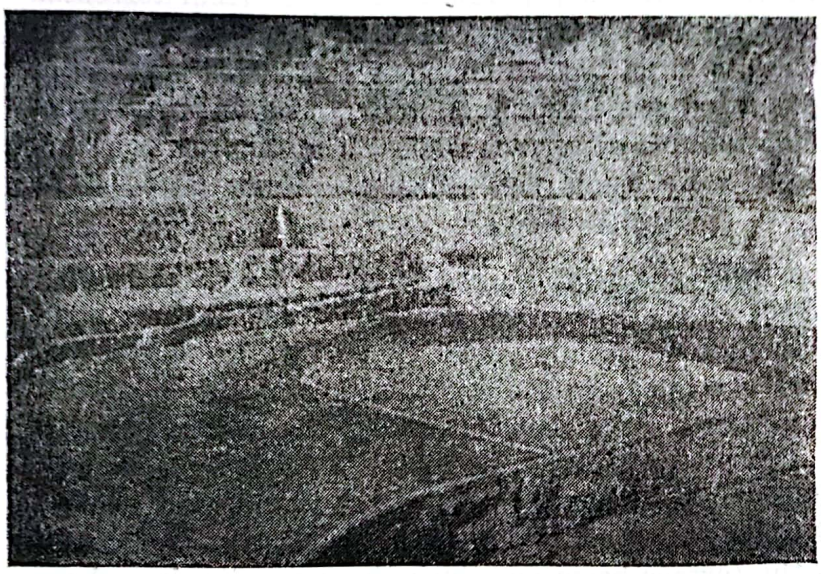


PLATE 8. Full-arc rice terraces with fitted some stone retaining walls built across an upper subsidiary valley. At far right-center the drainage of the valley has been deflected so that the water not used for irrigation, as well as the torrential rains that accompany typhoons, will drain in channels that have been sculptured into the regolith and not overflow and wash out terrace walls (See Plate 7) The low bunded loop in the foreground is a rice seedbed.

stone walls are seldom more than three meters high and usually less than two, and they generally slope backward, at about sixty degrees, toward the terrace's cultivation surface so they buttress against hydrostatic pressure. The fitted stone walls have the same drainage problem as the cemented stone embankments that support portions of the access highway's right-of-way. There must be sufficient drainage during periods of torrential rains or hydrostatic pressure in the fill material behind the retaining walls builds up to the bursting point.

The Ifugao peasantry solves this problem by building the fitted stone retaining walls with a high porosity. They have very large surfaces that constantly ooze water from between the stones. The cultivation surfaces also have gradual slopes toward the retaining walls so that excess

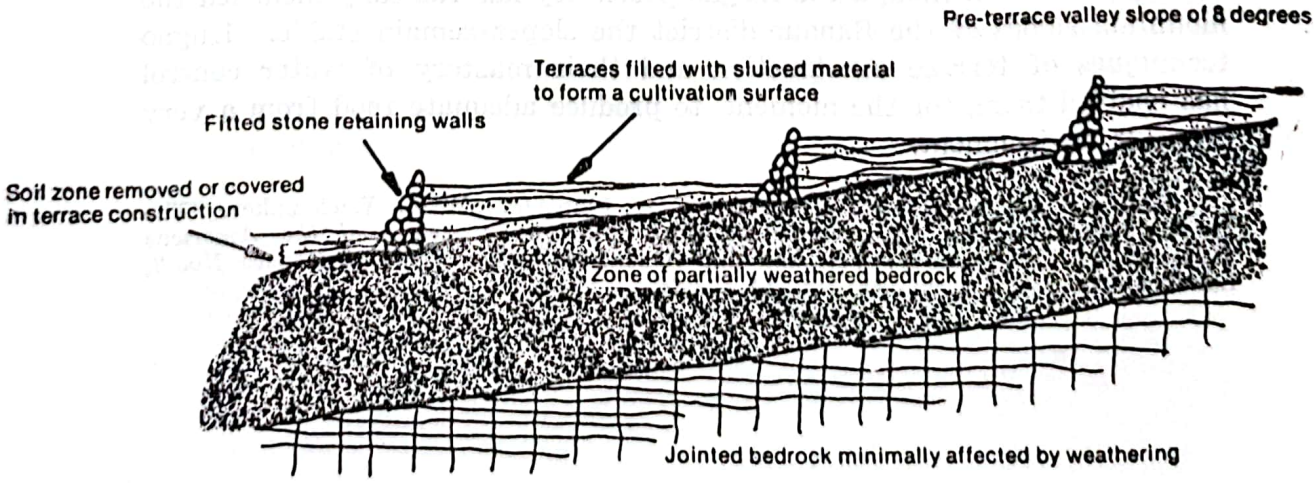


Figure 3 Cross-section of a rice terrace built with fitted stone retaining walls on a shallow valley slope.

water drains toward it. Numerous low points are left along the tops of the retaining walls so that any sudden inflow of water from torrential rains will be dispersed into many small channels. This prevents the concentration of water into large erosive channels that would weaken or carry away the fragile fitted stone retaining walls. The author did not see widespread landslide failures of terrace walls. The failures he examined, from the typhoon, were small-scale collapses of low fitted stone walls.

Most fitted stone walls are built on the lower slopes of the valley or if built on the upper slopes they form the lowest but longest walls of the full-arc terraces across subsidiary valleys (Plate 8). The stones for building terrace walls come from the immediate area. They are the spheroidal cores of unaltered rocks that have been freed from partially weathered matrices. They can be collected from adjacent stream channels or dug from the flat base of the terraces where the deepest excavation have been made into the regolith, or they are part of the coarse material sluiced into the terrace basin on which the peasantry lays down the necessary soil for cultivation. Terrace soils are always man-made.[17]

There are, therefore, three sets of factors involved in building irrigated rice terraces on the mountain slopes of the Banaue district. The first set of factors is the availability of water and high soil fertility. The most important set, however, is the uniform weathering of the andesite volcanics, the absence of zones of weakness in the volcanic pile, and the ability of the weathering zone to retain structural strength as long as it remains wet. The third set of factors is indigenous techniques of water control. The weathering zone has sufficient structural strength so that when terraces are carved into it or built on it they resist landslides. The key to resisting landslides is the ability of the Ifugao peasantry to prevent the formation of concentrated torrents of runoff water from the heavy rains that accompany the typhoons that annually traverse the region. Even though the Ifugao peasantry has radically modified the mountain slopes of the Banaue district the slopes remain stable. Ifugao techniques of terrace construction and their mastery of water control has enabled them, for the moment, to produce adequate food from a very difficult environment.

---

[17] N. van Breemen, L.R. Oldeman, W.J. Plantinga, W.G. Wielemaker, "The Ifugao Rice Terraces," in *Aspects of Rice Growing in Asia and the Americas* (Wageningen, Netherlands: Veenman and Zonen, 1970, Miscellaneous Papers No. 7, Landbouwhogeschool), pp. 46, 49, 51, 58-66.

CamScanner

THE RELEVANCE OF THE DEVELOPMENT CENTER STRATEGY TO THE PHILIPPINES
Aspects of Regional Planning III

by

DIRK BRONGER*

I. INTERIM RESULT: THE PRIMACY OF METRO MANILA — AN EMERGING PROBLEM

Let us take up our previous statement[1] that the population explosion in connection with the rapid and particularly one-sided urbanization process has caused firstly significant regional disparities. But even more important, or what is more alarming, than this is the fact that secondly the gap regarding the level of development between the capital region and almost the "rest" of the country is steadily growing. The result of this process: Metro Manila has become one of the foremost examples of urban primacy in the world. To characterize these two important features of national primacy and interregional disparity we will add a few more criteria to make this statement evident:

1. As a result of the differences in natural resources as well as of the past (and present) concentration of both public and private investment first and foremost in the capital region[2] the income disparities vary considerably among the regions: in 1971 the median income in the City of Manila was three times that in Central and Eastern Visayas combined, which at that time had four times the popuation.[3] In the same year (1971) 79% of the families in Eastern Visayas Region belong to the low-income group (<3,000 P/year) compared to the capital region with less than 20% (total Philippines: 59%).[4] All in all the Gross Regional Product per capita in 1975 was more than 3-times higher in the capital region compared to the average of all the remaining regions. In addition to this, as far as the distribution of GRP is concerned, the share of the capital region shows a steady growth:

---

* Dr. Dirk Bronger is Professor of Geography, Ruhr-University of Bochum, West-Germany; 1975-1979 Visiting Professor at the Department of Geology and Geography, University of the Philippines, Quezon City, Philippines.

[1] See more in detail: Part I, Chapter II & Part II, Chapter IV.

[2] For example, during the period 1968-1974 Metro Manila together with the Southern Tagalog Region accounted for more than 60% of all BOI approved industrial projects (NEDA-UNDP/IBRD REGIONAL PLANNING PROJECT (1976), p. 42). See also: BRONGER, D. (1979), pp. 83 f. and Part II, Chapter IV.

[3] THE WORLD BANK (1977), p. 5.

[4] TFHS/DAP (1975), Technical Report: Social Equity Study in the Philippines, Tab. 1, pp. 53 ff.

CamScanner

while Metro Manila together with Rizal contributed about 23% of total GNP in 1948; by 1966 this reached 28%,[5] and in 1975 Metro Manila alone accounted for about 35%[6], i.e., more than one-third of the total GNP!

2. As the effect not only of the increasing trend toward migration but primarily because of the change of migration into a unilateral rural-urban movement[7] the population growth in absolute terms of Metro Manila[8] in the last 15 years (1960-1975) had been more than 10-times(!) higher compared to the next ranking center, Metropolitan Cebu,[9] and it amounts to still more than twice than the remaining 17 cities[10] with a population over 100,000 combined:[11]

	Population (000)		Increase (000)	Average Annual Rate
	1960	1975	1960-1975	of Increase (%)
Metro Manila	2,695	5,456	2,761	4.81
Metro Cebu	373	645	272	3.72
other cities (with>100,000)	1,567	2,873	1,306	4.12
PHILIPPINES	27,088	42,071	14,983	2.98

3. As a result of these processes the emergence of Metro Manila to one of the most primate capitals in the developing world caused physical and socio-economic problems in general as well as internal disparities in particular. Both are serious as well as great in dimension. Such perennial problems of the capital region as a whole are traffic and transportation bottlenecks and congestion, deficient sewerage and drainage system, recurring floods, garbage disposal and environmental pollution, increasing rate of unemployment and serious housing problems, especially slum formation and squatting. Regarding the last named aspect the International Bank for Reconstruction and Development (IBRD) estimated 30-35 percent of Metro Manila's population to be residing in slum or squatter housing[12] (a number which does not compare unfavorably with other large cities in countries with a similar range of per capita income). The decisive element in

[5] SICAT, G.P. (1972), p. 370; COMMANDANTE, A.S. (1979), p. 43 and the sources cited there.
[6] NEDA-UNDP/IBRD REGIONAL PLANNING PROJECT (1976), Tab. 15.
[7] See more in detail: Part I, Chapter II. — Between 1960 and 1970, 62% of the total increase in population of Metro Manila was due to migration (NEDA-UNDP/IBRD REGIONAL PLANNING PROJECT (1976a), p. 9.
[8] Based on the CENSUS 1970 — definition; i.e., 4 cities and 23 municipalities (see: Part I, Tab. 6).
[9] i.e., Cebu City, Lapu-Lapu City, Mandawe City, Consolacion and Talisay.
[10] Davao, Zamboanga, Iloilo, Bacolod, Cagayan de Oro, Tarlac, Angeles, Olongapo, Butuan, Cadiz, Batangas, Iligan, San Pablo, Cabanatuan, Lipa, Silay and Calbayog.
[11] Sources: BCS (1972); NCSO (1978) (author's calculations).
[12] IBRD (1975), Vol. I, p. 3; see also: PPDO (1978), Fig. 2.4.

this is that all these problems must be viewed and analyzed from the point of their complex combined effects.

Particularly serious in this connection are the existing and to some extent increasing internal disparities within the capital region. An example of such contrasts is the high concentration of low-income households in certain areas, especially in the Cities of Manila, where 45% of the total slum and squatter population of Metropolitan Manila area reside[13] and Caloocan with an estimated percentage of 52% of squatter families.[14] On the other hand we have a significant concentration of high-income population together with the shift of commercial activities particularly in Makati: Whereas in Metro Manila the population density hardly exceeds 5,000 per sqkm (1970), the density of the Tondo Foreshore area, very likely the poorest area within the Metro Manila area, reaches 120,000 persons per square kilometer[15] which is even well above the Manila City average of 35.000. However Tondo's 1.26 hospital beds per 1,000 persons amounts not even to one-fifth of the city average of 6.48[16].

II. CONSEQUENCES FOR REGIONAL PLANNING AND POLICY (General Strategy)

These connected facts, the national primacy and the interregional disparity, which both show a steady growth make it necessary or, what is more essential to develop and to implement a strategy which aims two-fold: Firstly to transform the existing spatial structure from a monocentric into a polycentric one (in which of course one center remains as the first!) in order to slow down and counterbalance the rapid and one-sided development of the capital region. Secondly not only to stop but in the course of midterm regional planning to reduce the existing and still increasing regional disparities in spatial as well as in functional terms in order to overcome these dualisms in the future.

The specific need, or, what is more the pressure for an immediate beginning of such an active policy of decentralization lies in the fact that because of the limited employment opportunities in rural areas the rate of the rural-urban migration will not only continue but most likely accelerate at least during the next two decades. And just because of the present employment situation the heaviest flow of migrants, which increasingly flowed into Metro Manila area[17] will continue pouring into the

---

[13] THE WORLD BANK (1977), p. 52.
[14] IBRD (1975), Vol. I, p. 6.
[15] *Ibid.*, p. 8.
[16] *Ibid.*, p. 7.
[17] The share of the estimated number of immigrants for the period 1939-1960 (total: 3.06 Mill.) amounted to 55% for Mindanao against to only 25.7% for Manila & Rizal. During 1960-1970 this ratio (total: 1.75 Mill.) changed considerably: Manila & Rizal: 40% compared to Mindanao with only 20.5% (WERNSTEDT/SPENCER, 1976, pp. 637 f.; BCS/NCSO, 1947 ff., Vol. 23, No. 2 (1972), pp. XXV ff. — author's calculations). See in addition: Part II, Chapter V. Note 29.

CamScanner

capital region at least for the same period. The consequences of such a development will already be evident looking at the population growth projection: in case the annual growth rate of the past 15 years (4.81%/year) will pursue the population of Metro Manila will reach 17.6 million in the year 2000. Taking the medium population projection of NEDA, i.e., 83.439 million in 2000[18] as the basis this means a share increase of the total population from 13% in 1975 to 21% at the turn of the century.

Taking the presently existing difficulties of Metro Manila into consideration, briefly mentioned above, I think the necessity to prevent such "development" is indisputable. The idea of decentralization was already presented[19] in the basic report of the WORLD BANK, published in 1976: "More attention will have to be given to the geographical distribution of the population across the national territory and to the decentralization of urban development away from the MMA to a number of other centers."[20]

In terms of practical implementation of this conception this means that a major task of regional planning and policy is considered to offset the spatial and functional disparities by developing and encouraging already existing regional centers into so-called regional "growth centers" in rural or predominant rural areas respectively. In this connection we have to state that as the main aim is "development" and not only "growth",[21] these centers should be named **"development centers"** instead of "growth centers", as this is done up to the present in 999 from 1000 cases. Since 1977 this concept forms an essential part of the official development planning and policy.[22]

Before we shall discuss the possibilities of application and implementation of this strategy some general remarks regarding the on-going discussion about this strategy have to be placed in front of the following explanations.

III. ASPECTS OF DEVELOPMENT CENTER STRATEGY (Exkursus)

It cannot be the purpose of this paper to review the tremendously grown literature on development poles/centers or development center strategy respectively.[23] But we have to state that in recent years the validity of the strategy is more and more questioned. As principal objections, connected with each other, raised especially in a seminar held in the United Nations Center for Regional Development (UNCRD) in

---

[18] NEDA, (1978), p. 36.

[19] Apart from the already cited study: DPWC/IP-UP/PAC-PWCD/UNDP, (1971), Physical Planning Strategy for the Philippines, Vol. II, pp. 78 ff.; see more in detail: Chapter V.

[20] THE WORLD BANK, (1977), p. 68.

[21] See more in detail: Part I, Chapter I.

[22] NEDA, (1977), Five Year Philippine Development Plan, 1978-1982, pp. 60-61. More in detail: see Chapter V.

[23] See interalia: DARWENT (1968); LASUEN (1969) and as the most thorough review: SCHILLING-KALETSCH (1976).

Nagoya/Japan, November 4-13, 1975[24] we can name the following in brief:

Firstly, there are serious doubts whether this concept can be used to remove the existing regional disparities because in less developed (peripheral) regions several basic preconditions necessary for a center to function as a development center are lacking: the socio-economic infrastructure does not exist and, because of a low degree of urbanization the same apply to the system of urban hierarchies — in short: there is no potential for growth in such regions.[25] **Secondly**, even though the development center itself might be successful in attaining self-sustained growth, the propagated spread effect upon its hinterlands is very questionable. This is particular in respect of the forward and backward linkages between the leading industries located in such center and the economic system of the surrounding peripheral areas.[26]

Thirdly, because of the low labour absorptive capacity of the adopted (modern) industrialization strategy which benefits the urban sectors only, the employment absorption effect of the development centers, one of the most fundamental problem of Asian development planning also becomes a critical issue.[27]

To sum up: "The growth pole approach by itself, within the foreseeable future, will not be able to generate better standards of living and wider employment opportunities for the larger masses."[28]

The better alternative for the Asian countries, the "new line of thinking," lies in the mobilization of the rural sector,[29] which means "the simultaneous growth of primary and secondary food production and of rural industry and services in a mutually reinforcing, self-feeding fashion,"[30] in order to achieve "greater equality and self-reliance as immediate goals."[31]

To my opinion the **dilemma** of the development center strategy lies two basic facts which are to be seen in connection with each other. On one side we have to state that in proportion with the increasing number of articles about this strategy a whole set of theories had been developed with the result that, to a large extent, there is a lot of misunderstanding if not confusion even about basic conceptual problems. To name some of the most important

— in general the concept is discussed in three different dimensions: "The Growth Pole idea is at present performing three functions: the function of a theoretical concept; the function of a planning

---

[24] UNCRD, 1976 (reprinted: 1978).
[25] See: QUERESHI, (1976), p. 146; LO/KAMAL, (1976), pp. 212 ff.
[26] See: SUGIJANTO, (1976), p. 33; PHISIT, (1976), p. 48; ABEYARATNA, (1976), p. 174; LO/KAMAL, (1976), p. 213, *et al.*
[27] LO/KAMAL, (1976), pp. 215 ff.
[28] LO, (1976), p. XII.
[29] ILO, (1974), p. 28.
[30] *Ibid.*, pp. 28-29.
[31] LO/KAMAL, (1976), p. 228.

instrument, and the function of a hypothesis for historical studies"[32]

— although this approach is lashed as "rooted in Western economic thought"[33] (an unquestionable fact) and therefore — as they say — applicable only to a very limited extent in the agricultural and rural based Asian countries, the strategy is still primarily (and quite often solely!) understood and discussed in direct context with industrialization.[34] As accelerated "modern" industrialization is seen as the prime objective and component of this theory, the development center itself is inevitably reduced to an industrial pole. It is a fact, however, that in the "western" discussion, starting at least from the beginning of the seventies a shift can be stated from the originally sectoral defined "Growth Pole Concept" to the hierarchical system of multisectoral assigned "Development Center Concept"[35]

— otherwise, regarding the aspect of practical application in this discussion it is mostly overlooked that the conditions already in the S-, SE- and E-Asian countries in general and the degree of urbanization as well as the stage of industrialization in particular, to name only the most cited two criteria, vary considerably among these states."[36]

To sum up: a generally accepted theory, valid for each and every country is unrealizable.

On the other side it is an indisputable fact that indeed quite a number of principal open questions still continue to be unsolved. But what is specifically serious: very often they remain unconsidered in the discussions about the whole topic.

[32] KUKLINSKI, (1972) (preface), cited in: SCHILLING-KALETSCH, (1976), p. 77.
[33] PHISIT, (1976), p. 49.
[34] In almost all articles of the above mentioned seminar; see: UNCRD, (1976).
[35] See: DARWENT, (1968), pp. 8 ff.; BUTTLER, (1973), pp. 80 ff., et al.
[36] Some data may illustrate these wide differences:

Indicator	Indonesia	Malaysia	Philippines	Thailand	Taiwan	S-Korea	Nepal	Bangladesh
Urban Population (%)*)	18.2	29.3	35.0	15.0	65.0	48.5	5.0	8.8
Employment in the Manufacturing Sector (% of total)*)	8.4	10.0	10.9	6.4	32.0	22.4	1.1	5.0
Share of the Manufacturing Sector to total GDP (1978)	11.9	18.8	24.2	21.3	30.4	28.6	10.3	10.4
Per Capita GNP (1977) ($)	300	930	450	410	1.180	810	110	90

Source: ADB (Ed.), 1979, pp. 2 ff.

*) latest year

These questions can be grouped into three sets of problems. The first batch of questions[37] refer to the concept itself including definition problems and those of practical application:

— what is a development center: Is it a city or an area?
— in case we speak about places: are these places "that have grown, that are growing, that are predicted to grow, or that... we wish to see grow in the future"[38]
— what criteria do we apply to identify potential development centers? How can development centers be distinguished from non-development centers? (This question refers also to the past and the future.[39])
— how do we know whether an area has high development potential? How can we measure development potential? This question leads us directly to the practical application of this concept:
— how many development centers can be activated at the same time?

The last problem guides us to the second set of problems which is related to the assumed results along with the impact of this strategy in respect of our two major targets to reduce the regional disparities as well as the primacy of the capital region:

— what will be the kind (degree, intensity, complexity) of the expected sectoral as well as regional interlinkages between the proposed development centers and their surrounding (peripheral) areas?
— precisely because so far there was a very limited spread effect, rather there has been a backwash effect in many cases of the main development centers, i.e., the capitals (Bangkok[40] — to name the most outstanding example in SE-Asia), one major question must be: can these proposed development centers really integrate the periphery? Or will they become only Little-Bangkoks or -Manilas?

The third bulk of questions refer to the position of this approach within the total framework of regional planning and development:

— regarding the application of this development strategy: should it be a leading strategy or a supportive one?[41]
— should it be integrated with other strategies, particularly with agro-rural development?[42]
— has the development center necessarily its primary role in connection with industrial development[43] — or, in contrast to this

---

[37] For the following, see especially: FRIEDMANN, (1976), p. 177.
[38] DARWENT, (1968), p. 1.
[39] *Ibid.*
[40] See: PHISIT, (1976), p. 42; HENNINGS/KAMMEIER, (1978), p.5.
[41] PHISIT, (1976), p. 42; FRIEDMANN, in: UNCRD, (1976), p. 53 (discussion).
[42] *Ibid.*
[43] *Ibid.*; see also Note 26.

assumption: should it be developed and act purely as service center "to distribute the necessary agricultural inputs and services to the surrounding hinterland?"[44]

The main dilemma lies in the fact that because of the serious lack of empirical verification in developing countries, at present we have no answer to the majority of these basic questions yet.

IV. THE DEVELOPMENT CENTER — CONCEPT: SOME BASIC PREMISES

In view of such fundamental controversies including unsolved questions, accumulated in (and caused by) a large literature during the past three decades, the question may be allowed: why do we still adhere in this strategy?

In the following part, we will try to work out some basic statements or premises especially in respect of the possibilities of application of this strategy in developing countries with special reference to the Philippines. In doing so I am quite aware of the fact that, in view of the bulk of unsolved problems, this seems quite a hazardous enterprises. — We will summarize this attempt into the following five generalized premises/ statements:

1. The Development Center-Strategy as a decentralization strategy, or, to be more precise, as a strategy of concentrated decentralization, is based on two fundamental premises:
   1.1 Regional development takes place spatially not equably but in the form of regional concentrations, i.e., not dispersed but in urban, or, more precisely, first and foremost in major urban centers.[45] From these centers development impulses are transmitted to surrounding closer or wider peripheral areas. This statement includes simultaneously the interpretation that these centers have an integrative function for a certain "hinterland", comparable to a "central place" (more in detail, see No. 5).
   1.2 From this premise we can deduce the general recommendation or conclusion to concentrate the limited resources because of the agglomeration effects to higher productivity of the public and private investments[46] in selected regional centers, e.g., to convert them into regional **development** centers.
2. As the overall target of regional planning is based on the concept of **development** and not simply on economic growth[47] a development center per definitionem **cannot be a sectoral pole exclusive-**

[44] KHAOTHIEN, in: UNCRD, (1976), p. 55 (discussion).
[45] KLEMMER (1972), p. 104; BUTTLER (1973), pp.8 f.; HENNINGS (1977), p. 65.
[46] KLEMMER, *op. cit.*, p. 104; HENNINGS, *op. cit.*, p. 65.
[47] More in detail: see Part I, Chapter I and the literature cited there.

ly. Indisputably a more rapid industrialization of the peripheral areas, especially those with a diversified branch-structure, plays a significant role for a self-sustained growth in many of these regions. But as the degree of development varies considerably among the S-, SE- and E-Asian States[48] and in as much a generally accepted strategy remains therefore unrealizable the industrialization by no means always plays the key role; in quite a number of countries it is not even the prime objective of development planning. Precisely the definition of the development center strategy purely as strategies for industrialization and economic growth has discredited the whole strategy in the developing world!

On the other side for the same reason and because of the specific integrative development function of such center it can also never be equated with a central place, e.g., primarily a service center (more in detail: see No. 5). It is a fact that the establishment of sectoral centers in Latin-America (and certainly not only there) has resulted only "enclaves" or "poles of underdevelopment."[49] A development center must include per definitionem at least a broad spectrum of functional activities — their specific quantity as well as quality depends of course from its present and proposed size.

3. With this last statement we are on the line to answer the abovementioned fundamental problem regarding the role of this strategy within the total framework of regional planning and development. As regional planning should not be limited to isolated regional and/or sectoral programmes, this strategy also must be incorporated in the overall concept of an integrated spatial plan which must be related to a national context. In other words: real overall development can be achieved only through an integrated program in which the various sectors of economic and social life do not only participate but in which they are integrated with each other in order to reach the final target of regional planning and policy: the regional integration of all sectoral and spatial parts of the country.[50]

Therefore, the Development Center Strategies make sense in the developing world only if it is combined with parallel policies on other fronts.[51] Unquestionably in agro-based societies synchroneous rural development strategies, e.g., measurements to increase the agricultural productivity along with agrarian reform

---

[48] See also Note 36.
[49] SANDNER (1975) and the literature cited there.
[50] More in detail see: BRONGER (1977), pp. 18 f., 22 ff.
[51] For Latin America see also: RICHARDSON (1975), p. 68.

CamScanner

programs play a very significant role. Needless to say that the simultaneous development of infrastructural facilities, particular the traffic and energy system is essential.

4. To achieve all these goals it is not sufficient at all to develop only a high ranking set of development centers (regarding the Philippines just one within the 15 major regions). This strategy will work only in establishing and developing a system, e.g., a **hierarchical network** of effective high, intermediate and lower ranking centers.[52] Such a settlement hierarchy will be an efficient medium not only for organizing production but also for improved and more evenly spread distribution of the crucial functions for all, particularly the rural population.
5. In this modified, e.g., broadened sense of the development center approach we can distinguish our three central terms: "central place", "regional center" and "regional development center" as follows: The main distinction is to be seen in their different functions: A central place can be defined as settlement whose primary function is to provide the surrounding population with goods and services, whereas a regional center is (should be) equipped not only with institutions of the service but of the other sectors, too. Furthermore a regional development center is characterized by its capability to induce further economic and social development throughout its hinterland.[53]

In other words: a "regional center" as well as a "central place" and therefore the central place theory as a whole is **static**, while the development center theory is **dynamic**. In addition to this the latter is more general,[54] especially in the sense of the possibilities of its application to regional planning and policy. It has to be stated as a weak point of the central place theory in terms of its applicability that, starting with CHRISTALLER up to the present it has been limited to the service sector, which is only a part of the total economic and social sphere and therefore to the process of development. To sum up: the central place-research after CHRISTALLER has missed a great chance not to have broadened it and incorporated non-tertiary functions including the diffusion theory.

---

[52] See also (inter alia): HERMANSEN (1972a), p. 169; RICHARDSON (1972), pp. 37 *f.*

In the context of Indian conditions MISRA developed a five-stage hierarchy of development centers (he called them "growth foci"):

1. Central villages at the local level (nucleus for about 6,000 people)
2. Service centres at the micro-regional level (for about 30,000)
3. Growth points at the sub-regional level (for about 150,000)
4. Growth centres at the regional level (for abou 1.2 million)
5. Growth poles at the national level (for about 20 million)

(MISRA, et al. (1974), pp. 205 ff.).

[53] BROOKFIELD (1975), p. 106. However he limited this function to the economic aspect.

[54] Against MISRA, *op. cit.*, p. 187.

V. PROBLEMS OF DETERMINATION OF DEVELOPMENT CENTERS: THE PHILIPPINE CASE

In respect of the applicability of the development center strategy in practice the next question we are faced with will be: what are the most significant criteria to determine and identify the possible development centers?

General Objectives & Methodological Problems

Because of the very limited resources on one side and the overflow of the problems which have to be solved on the other, all developing countries are forced to use their funds to the utmost efficiency. Under these circumstances the determination and identification of the development centers in general and the number of such centers per spatial unit in particular plays a significant role for the objectives of regional planning.

The selection of just a single center for one of the 15 major regions each is not recommendable because it may be the nucleus for the emergence of new regional disparities in the form of a development gap between the new center and almost the remaining parts of the region concerned. Another reason is to be seen in the archipelagic structure of the country itself: it seems to be necessary not only to have a hierarchical set of development centers for the ten largest islands (from Luzon down to Bohol) but also to develop at least one center, of course not necessarily of a major level

— firstly, for each province/sub-province, and
— secondly, for those islands each having more than 1,000 sqkm or 100,000 inhabitants respectively.[55]

On the other hand it doesn't seem to make very much sense to develop too many centers as MISRA suggested it for India — to cite the abovementioned study (Note 52). His total number of 100,000 "central villages" and 20,000 "services centers" would correspond to almost 10,000 and 2,000 of those centers for the Philippines, respectively. It seems — already from the aspect of expenditure — quite utopian that it will be possible to realize such a plan in the next 25 years as indicated in the study.[56]

To sum up: Instead of putting up a too large number of development centers at the lowest levels, a target which cannot be achieved up to the turn of the century with the present available resources, it seems to be more realistic to concentrate the limited resources by establishing a limited number of development centers but to provide them with all basic facilities for the immediate need of the people; e.g., the development centers of the lowest levels have primarily (not only!) the function being

---

[55] e.g., Batanes (Region III), Marinduque, Romblon (V), Masbate, Catanduanes (VI), Busuanga & Calamian (VII), Guimaras (VIII), Siquijor (IX), Biliran (X), Basilan, Jolo, Tawi-Tawi (XI) and Camiguin (XII).

[56] MISRA, *op. cit.*, p. 207.

service and distribution centers. To counteract the rapid growth and overshadowing primacy of the monocentric capital region together with the prevention of the migration from the rural areas with all its following economic and social problems (slums, etc.) it is essential to establish a balanced hierarchical network of development centers. On the top of such a hierarchical system two or three main centers should be developed so that they can induce a more rapid development for a major region and, at the same time, counterbalance the monocentric structure.

To pick up our first question raised at the beginning of this chapter, three general criteria for selection of development centers should be the basic ones:

— a central location within their respective regional; e.g., accessible for the people

— in view of the limited resources optimum use of the already existing infrastructural[57] facilities should be made. In this connection

— already selected regional centers as well as existing administrative centers (provincial headquarters) should be preferred.

One particular methodological problem, however, which is of specific importance for the selection of the development centers, has to be mentioned in this context, a problem which, so far, also has mostly been unconsidered in the relevant research and which remains therefore, inevitably, unsolved: the determination of the **dynamic** aspect as the decisive difference between a regional center and a regional development center. The specific difficulties in solving this problem are to be seen at two different levels: Firstly, the non-existence, non-availability and/or non-comparability of data sets for the majority of the single sectors, showing the sectoral development during a longer period, e.g., several decades.[58] Secondly, as the development center strategy has started to be implemented, if at all, only very recently in the S-, and E-Asian countries we do not have much experience about the **process** of development especially under the viewpoint of the impact of these centers to their (surrounding) hinterland. We shall come back to these aspects later.

Under these circumstances the **precondition** for the selection of such a hierarchical network of development centers is — as the first step — the most accurate possible knowledge of the existing hierarchical system of regional centers and their spatial organization. Let us have a view on what has been done so far in this connection in the Philippines.

[57] In the sense of JOCHIMSEN (see: Part I, Note 6).
[58] In general context this is discussed in Part II, Chapter II.

CamScanner

Existing Determinations of Development Centers (Table IA-B)

Whereas attempts for regionalizations of the country have been given early attention, as we have seen the first one dates back as early as 1947,[59] the determination of regional centers, proposed to act as development centers started in the beginning of the seventies only. All these attempts can be classified into two categories: those defining just one regional center for each of the major regions and those whose target had been the identification of a hierarchy of regional or development centers, respectively. As to time partly they overlap each other.

Beginning with the former category — their results are compiled in **Tab. IA** — the first attempt was undertaken by the already mentioned solid study on "Regional Delineation of the Philippines" within the framework of the "Physical Planning Strategy for the Philippines." The determination of the 11, 12 and 10 regional centers for the three different alternatives (see column 3, 6, 9) was based on twelve different criteria grouped into three categories: 1. population 2. economy and 3. transportation[60] with 3, 4 and 5 single indicators respectively scored five points each so that the three categories are weighted in proportion to 25%: 33%: 42%. The regional delineations of the Four-Year as well as the Five-Year Philippine Development Plan also include one regional center for each of the 11 and 13[61] regions, respectively (Table IA, Column 12 & 15), regrettably, however, without giving any criteria for their selection. The latter one emphasizes the necessity to develop a three-range urban hierarchy comprising 3 metropolitan centers (Manila, Cebu, Davao) and 10 regional centers on the top, 5 sub-regional and 62 major urban centers on the medium and 163 minor urban centers on the bottom level.[62] However, names except for the first category are not given in this study.

The limitation of just one regional center per major region can be viewed as an expression that the spatial dimension of the development process was neglected for quite a long time. It was only in the midst of the seventies that the central government started through NEDA and special planning agencies like PPDO and TFHS, later the newly created HSC, to put more emphasis on the spatial aspect of development planning, e.g., in this context to work out a functional hierarchy of proposed development centers on national scale. The five most important attempts (up to the end of 1978) are listed in **Tab. IB** in the course of which only the two or three highest levels could be indicated here.

The results of these studies achieved significant differences not only in respect of the number of the centers to be developed but also in the

---

[59] See: Part I, Table 2, No. 1.

[60] For details see: DPWC/UP-IP/PAC-PWCD/UNDP (1971), Vol. II, pp. 78 ff. and pp. 134 ff.

[61] See Part I, Tab. 4, No. 8 and No. 11.

[62] NEDA (1977), Five-Year Philippine Development Plan, 1978-1982, Manila, pp. 60-61.

CamScanner

Tab. 1 A : Regionalizations and Regional Centers: Proposals 1971 - 1977

Physical Planning Strategy for the Philippines - 1971									Four-Year Development Plan 1974 - 1977			Five-Year Development Plan 1978 - 1982		
Alternative No. 1			Alternative No. 2			Alternative No. 3								
No.	Region	R.C.	No.	Region	R.C.	No.	Region	R.C.	No.	Region	R.C.	No.	Region	R.C.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
I	Ilocos	Dagupan	I	Ilocos	S.Fernando	I	Ilocos	S.Fernando	I	Ilocos	S.Fernando	I	Ilocos	S.Fernando
II	Cagayan Valley	Tuguegarao	II	Cagayan Valley	Tuguegarao	II	Cagayan Valley	Tuguegarao	II	Cagayan Valley	Tuguegarao	II	Cagayan Valley	Tuguegarao
III	Manila	Manila or Quezon C.	III	Central Plain	S.Fernando	III	Central Plain	S.Fernando	III	Central Luzon	S.Fernando	III	Central Luzon	S.Fernando
IV	Mindoro-Palawan	San Jose	IV	Manila	Manila or Quezon C.	IV	Southern Tagalog	Manila or Quezon C.	IV	Southern Tagalog	Manila	IV	Metro Manila	Manila or Quezon C.
			V	Mindoro-Palawan	San Jose							IV-A	Southern Tagalog	Metro Manila
V	Bicol	Naga	VI	Bicol	Naga	V	Bicol	Naga	V	Bicol	Legaspi	V	Bicol	Legaspi
VI	Western Visayas	Ilo Ilo	VII	Western Visayas	Ilo Ilo	VI	Western Visayas	Ilo Ilo	VI	Western Visayas	Ilo Ilo	VI	Western Visayas	Ilo Ilo
VII	Central Visayas	Cebu	VIII	Central Visayas	Cebu	VII	Central Visayas	Cebu	VII	Central Visayas	Cebu	VII	Central Visayas	Cebu
			IX	Eastern Visayas	Tacloban				VIII	Eastern Visayas	Tacloban	VIII	Eastern Visayas	Tacloban
VIII	Western Mindanao	Zamboanga	X	Western Mindanao	Zamboanga	VIII	Western Mindanao	Zamboanga	IX	Western Mindanao	Zamboanga	IX	Western Mindanao	Zamboanga Jolo
IX	Lanao	Cagayan d.O.	XI	Northern Mindanao	Cagayan d.O.	IX	Northern Mindanao	Cagayan d.O.	X	Northern Mindanao	Cagayan d.O.	X	Northern Mindanao	Cagayan d.O.
X	Cotabato	Cotabato	XII	Southern Mindanao	Davao	X	Southern Mindanao	Davao	XI	Southern Mindanao	Davao	XI	Southern Mindanao	Davao
XI	Eastern Mindanao	Davao										XII	Central Mindanao	Cotabato

SOURCES: DPWC/IP-UP/PAC-PWCD/UNDP (Ed.): Physical Planning Strategy for the Philippines, Manila 1971, Study No. II: Study on Regional Delineation of the Philippines, pp. 78 ff.

NEDA (Ed.): Four-Year Development Plan FY 1974-77, Manila 1973, pp. 20, 258, 260.

NEDA (Ed.): Five-Year Philippine Development Plan, 1978-1982, including the Ten-Year Development Plan, 1978-1987, Manila 1977, cover page.

belonging of a certain center to a hierarchical stage as well as their methodology in obtaining their results. Whereas PPDO proposed a 5-stage hierarchy of 113[63] "Urban Centers" to be developed, the TFHS set "as the first priority for the next 5 to 10 years"[64] to develop 30 centers outside Manila[65] and within "a time frame of 25 years, (the) development should be channeled to... the remaining (346 identified) urban settlements."[66] The least number of "urban places" — 56 — was named by NEDA — RDS while HSC at last proposed the development of a total of 242 "regional", "major urban" and "minor urban centers". Regarding the different membership of the centers to a certain level Bacolod city, classified in the first four proposals as a major development center, appears in the HSC — study only among the lowest category, the 176 "minor urban centers". As far as the methodology is concerned, criteria for the selection of the centers are given only in the studies of PPDO and NEDA-RDS: whereas the former is based only on population criteria (total: 7),[67] the latter additionally uses the projected population growth rate for the period 1970-2000 together with the average revenue 1971-74.[68]

Proposed Determination of Major Development Centers (Tab. 2; Map 2)

The methodological problems as well as the selection of the basic criteria, both discussed in detail in Part II, Chapter II & III, are in principle valid here, too: 1) as far as possible all vital functions should be covered by indicators, 2) because these centers should act as development centers the indicators to be used should be as diversified as possible and 3) qualitative data are to be taken wherever possible. To get a true picture of the urban hierarchy, however, the figures had to be taken here absolutely. It has to be admitted in this connection that the above-mentioned concern regarding the dynamic aspect is true in respect of the vast majority of the indicators. Data sets for a longer period, e.g., at least for 10 to 20 years are either not available or not comparable. The only exception applies to the first dimension (population).

With reference to the problem of weighting the indicators a similar solution as shown in Part II was found: Each of the 4 main complexes, divided into 2, e.g., all in all 8 dimensions, is represented with the same (6) number of indicators (FIG. 1). In order to achieve the possibility to compare the 24 development factors, the data were transformed into the same scoring system: the maximum obtainable score is 100, the lower

63 52 "Tertiary Urban Centers" in addition to the listed ones.
64 TFHS/DAP (1975), pp. 34-35.
65 However, their results differ from each other as we can see comparing the columns 6-8 with 12-13. In addition to the listed centers in col. 6-8 five MBMR "growth poles" should be developed namely: Balanga-Mariveles, Baliwag, Infanta, Lucena and Silang (*ibid.*, p. 35).
66 *Ibid.*, p. 35.
67 PPDO (1975), p. 15.
68 RDS-NEDA/IBRD (1976), p. 20, note 7.

CamScanner

Tab. 1B: Hierarchy of Regional Centers: Proposals of PPDO, TFHS & RDS (1975-1976)

	PPDO (1975)				TFHS (1975)			RDS (1976)		
Region	Metropolitan Areas	Primary Urban Center	Secondary Urban Center	Specialized Center	Metropolitan Centers	Regional Centers	Sub-Regional Centers	Type I Urban Places	Type II Urban Places	Type III Urban Places
1	2	3	4	5	6	7	8	9	10	11
I		Laoag San Fernando Dagupan	Vigan Lingayen San Carlos	Baguio-La Trinidad (Recreational)		San Fernando	Baguio		Baguio	Laoag Dagupan San Carlos
II		Tuguegarao	Aparri Ilagan Bayombong			Tuguegarao				
III		San Fernando Olongapo	Cabanatuan San Jose Tarlac	Mariveles (Industrial)		San Fernando	Angeles Olongapo Tarlac San Jose	Angeles Olongapo	Cabanatuan Palayan	San Jose
IV	Metro Manila				Metro Manila			Metro Manila		
IV-A		Batangas Lucena San Pablo Puerto Princesa	Lipa Sta. Cruz Calapan	Nasugbu (Recreational), Tagaytay (Recreational)			Batangas Lipa San Pablo		San Pablo Batangas Lipa Puerto Princesa	Lucena Cavite Tagaytay Trece Martires
V		Legaspi-Daraga Naga-Pili	Iriga Daet Sorsogon			Legaspi				Naga Legaspi Iriga
VI		Ilo Ilo Bacolod	Roxas Cadiz San Carlos			Ilo Ilo	Bacolod Cadiz		Ilo Ilo Bacolod Cadiz	Roxas, Bago Silay, San Carlos La Carlota
VII	Metro Cebu		Toledo Tagbilaran Dumaguete		Metro Cebu		Mandaue	Cebu	Tagbilaran	Toledo, Canlaon Mandaue Lapu-Lapu Dumaguete, Bais
VIII		Tacloban Catbalogan	Ormoc Calbayog			Tacloban			Calbayog	Tacloban Ormoc
IX		Zamboanga Jolo	Dipolog Pagadian			Zamboanga		Zamboanga	Dipolog Pagadian	Dapitan
X		Cagayan de Oro Butuan	Malaybalay Ozamis Surigao			Cagayan de Oro	Butuan Quezon	Butuan Cagayan de Oro	Cingoog Ozamis	Surigao Oroquieta Tangub
XI	Metro Davao	General Santos	Digos Mati		Metro Davao		Mati	Davao General Santos		
XII		Cotabato Marawi	Koronadal				Iligan	Iligan	Cotabato	Marawi
TOTAL	3	23	31	4	3	8	15	10	17	29

SOURCE: PPDO (Ed.): Hierarchy of Urban Settlements. A Strategy for Regional Development, Quezon City 1975, pp. 16-18.

SOURCE: TFHS/DAP (Ed.): Human Settlements. The Vision of a New Society. Vol. 1: Summary of Recommendations, Quezon City 1975, pp. 34-38

SOURCE: RDS-NEDA/IBRD : Urbanization and Regional Development, Quezon City Dec. 1976, pp. 29 ff. (unpublished paper).

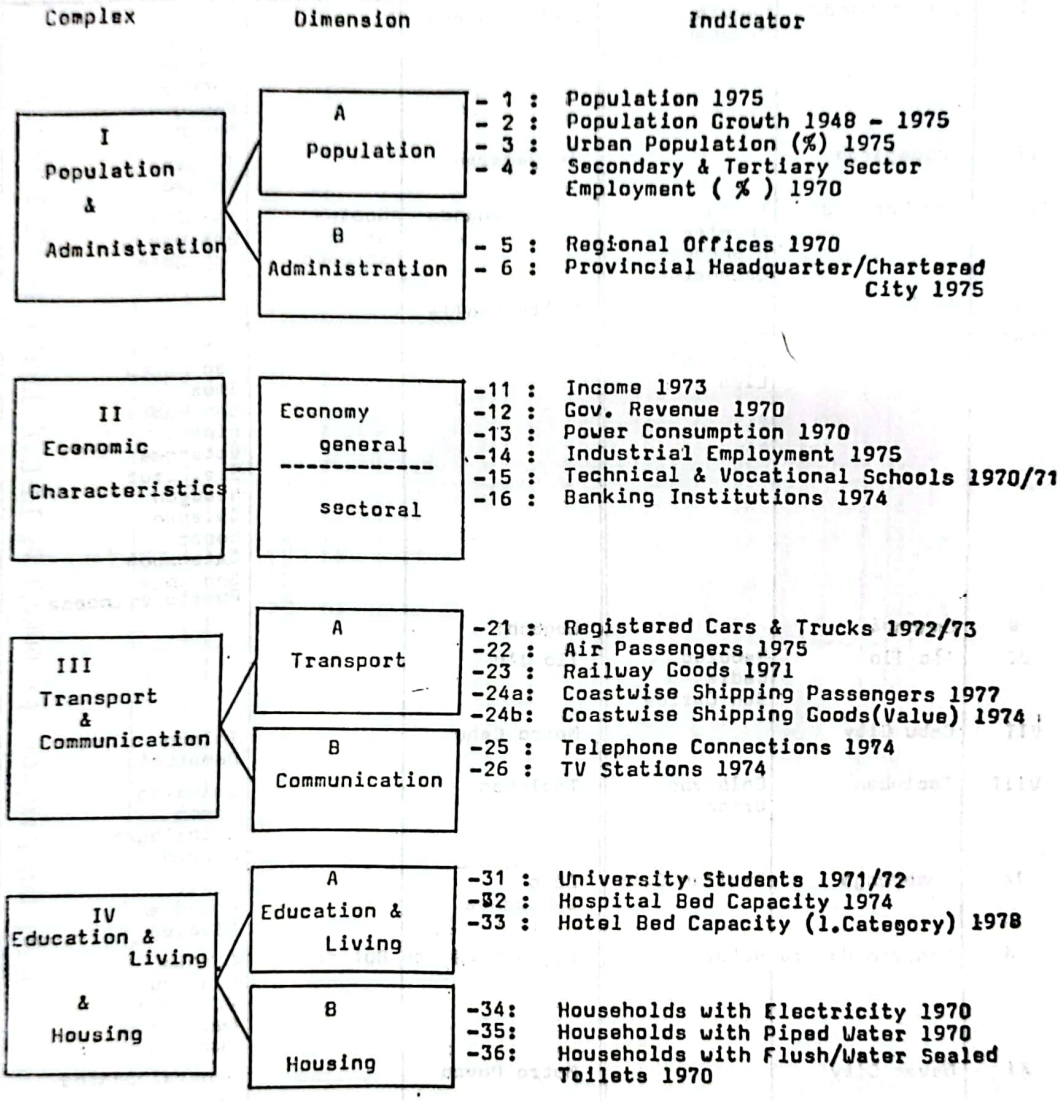
CamScanner

	TFHS (1975/76)		HSC (1978)		
Region	Metropolitan Center	Major Urban Settlement	Regional Center	Sub-Regional Center	Major Urban Center
1	12	13	14	15	16
I	San Fernando	Baguio Dagupan San Carlos	San Fernando		Dagupan Baguio Urdaneta Lingayen Laoag Manabo
II	Tuguegarao		Tuguegarao		Ilagan Baggao
III	San Fernando	Tarlac Angeles Olongapo Cabanatuan	San Fernando	Angeles Tarlac Olongapo	Malolos Baliwag San Jose
IV	Manila		Metro Manila		
IV-A		Batangas San Pablo Lipa			Lucena San Mateo Imus San Pablo Lipa Batangas Sta. Cruz Nasugbu Calapan Lopez Catanauan San Jose Puerto Princesa
V	Legaspi		Legaspi		
VI	Ilo Ilo	Bacolod Cadiz San Carlos	Ilo Ilo		
VII	Cebu City		Metro Cebu		Toledo Dumaguete
VIII	Tacloban	Calbayog Ormoc	Tacloban		Calbayog Ormoc Catbalogan Maasin
IX	Zamboanga	Basilan City	Jolo Zamboanga		Siasi Pagadian Dipolog
X	Cagayan de Oro	Butuan	Cagayan de Oro	Butuan	Ozamis Gingoog Valencia Malaybalay Surigao
XI	Davao City		Metro Davao		General Santos Tagum Digos Mati Koronadal Bislig
XII		Iligan Butuan	Cotabato	Iligan	Maraui Midsayap Maganoy Tulunan
TOTAL	11	19	13	5	48

SOURCE: TFHS/DAP (Ed.): Human Settlements, The Vision of a New Society, Vol. 2: A Framework Plan for the Nation, Q.C, 1975/76, pp. 34-35.

SOURCE: HSC (Ed.): Multi-Year Human Settlements Plan, Growth Centers 1978-2000, Manila 1978.

FIG. 1: INDICATORS DETERMINING THE HIERARCHY OF THE REGIONAL CENTERS IN THE PHILIPPINES (Draft: D. Bronger)



scores are proportionately computed (for example: Metro Cebu: 15,887 telephone connections = 100, Davao: 7,308 = 46 points). With all in all 24 indicators the maximum possible score is 2,400.

The result, my own proposal regarding the determination of the hierarchical system of the major development centers within the Philippines, are compiled in Tab. 2*** and spatially presented in Map 2. Within the frame of this study only the major development centers with a score of > 250 could be indicated here.

All in all we obtain a five-stage hierarchy of regional centers. Each of them is subdivided into three intensity levels: fully equipped — party equipped (one of the 4 complexes having less than 10% of the total score) and — underequipped (at least two of the 4 not reaching 10% of the total). The following 5 topics sum up the results:

1. A balanced hierarchical system of regional centers as well as possible development centers has not been developed so far, neither at the national scale nor at the regional level.
2. Regarding the three main parts of the country — Luzon, Visayas and Mindanao — a quite divergent picture of the hierarchical structure can be observed:

Regional Center	Region														Philippines
	Luzon							Visayas			Mindanao				
Stage	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	TOTAL
1									1						1
2								2					1		3
3		1									1				2
4	1			3		2						1			7
5	3		1	3	5	1		2	2	1	3	3	2	2	28
i.c.**				1											1
TOTAL	4	1	1	7	5	3	—	4	3	1	4	4	3	2	42

***

Sources for FIG. 1 & Tab. 2

1 : NCSO, 1978, pp. 5 ff.
2 : *Ibid.*; BCS, 1972, pp. 3 ff. (author's calculation).
3 : NCSO, 1977, Vol. 1-73 (author's calculation).
4 : NCSO, 1974a, Vol. 1-68.
5 : DPWC/IP-UP/PAC-PWCD/UNDP, 1971, Vol. II, pp. 132 ff.
6 : NCSO, 1978, pp. 5 ff.
11 : YAMBOT, 1975, p. 166 & own investigation (author's calculation).
12 : DPWC/IP-UP/PAC-PWCD/UNDP, 1971, Vol. II, pp. 132 ff.; Vol. III, pp. 73 ff. & own investigations.
13 : See: No. 12.
14 : NCSO, 1975 & own investigation (author's calculation).
15 : BCS/NCSO, 1947 ff., Vol. 24 (1973), No. 4, pp. 55 f.
16 : YAMBOT, 1976, pp. 160 ff.; CORPUZ, 1975, Vol. 1, p. 175 (author's calculation).
21 : YAMBOT, 1975, pp. 255 ff.
22 : BCS/NCSO, 1947 ff., Vol. 27, No. 2 (1976), pp. 81 f.
23 : NEDA/DPUTC/IP-UP/UNDP, 1973, Vol. VIII, pp. 65-68 & own investigations.

Tab. 2: INDICATORS DETERMINING THE HIERARCHY OF THE MAJOR REGIONAL CENTERS IN THE PHILIPPINES

Dimension	I	A			B		II						III	A			B		IV	A			B	
Indicator	1	2	3	4	5	6	11	12	13	14	15	16	21	22	23	24a 24b	25	26	31	32	33	34	35	36
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
REGION I																								
Dagupan	14	20	100	12	57	100	9	11	12		18	38	31		4		11		15	17		19	15	19
Laoag-San Nicolas	14	14	49	9		100	5	10	6		16	24	29		3		7			7	8	11	16	31
San Fernando-Bauang	15	18	20	10	7	100	6	16	4	3		18	21	1	26	2	5			5	30	11	5	19
Vigan	5	14	100	6		100	2	3	2			9	16	0			5			2		4	5	15
REGION II																								
Bagnio-La Trinidad	19	30	100	16	36	100	33	58	24	6	13	24	33	8			32	67	27	21	60	29	43	43
REGION III																								
Tuguegarao	10	20	22	8	50	100	3	4	1			7	18	2			3			5	10	4	3	16
Ilagan	11	24	17	4	29	100	2	5	0			4	29				3			3		3	4	5
REGION IV																								
Olongapo	23	100	100	23		100	29	51	3		40	18	33				0			9	10	38	49	59
Angeles	23	38	100	23		100	16	39	18	7	9	31	80		10		26		6	6	10	45	28	43
San Fernando	15	30	100	13	57	100	10	8	11	16		13	38		44		10			0		18	10	17
Tarlac	25	24	18	15	7	100	11	25	6	3		18	50		43		8			6		19	9	20
Malolos	13	21	100	12		100	4	5	3	4		11	49		3		2			6		23	14	22
Cabanatuan	19	22	28	13		100	9	20	5			11	49		3		2			6		23	14	22
Mariveles +	4	55	30	2			2			100++		2					0			2	16	3	4	2
REGION V																								
Lucena	14	27	100	11		100	7	9	5	7		20	23			2	2		8	13	14	18	31	23
San Pablo	18	22	35	15		100	7	9	5	11	18	13	32				11			10		21	32	16
Batangas	19	20	15	13		100	20	8	5	6		13	34			30	2			15		13	24	15
Santa Cruz	8	22	100	6		100	3	6	3			11	19				2			5		11	4	9
Lipa	16	22	17	12		100	4	7	5			4	23				2			11		15	12	12
REGION VI																								
Legaspi-Daraga	24	18	43	22	36	100	8	11	4	9		18	10	9	102	5	2	33	10	6	50	15	19	17
Naga	13	14	100	13	79	100	8	19	11	6		22	17	2	37		6	33	11	11		14	22	23
Iriga	12	17	18	6		100	3	8	4			9	8		03		3			6		6	1	14
Daet	8	24	55	7		100	2	3	0			9	8	1	19		4			2		1	0	2
REGION VII																								
Puerto Princesa	7	39	40	3		100	5	3	0			4	6	5		2	2			3	10	4	2	4
REGION VIII																								
Ilo-Ilo	35	20	100	39	79	100	26	37	23	9	58	40	62	21	33	22	38	33	41	52	40	37	86	72
Bacolod	35	21	100	35	29	100	22	49	28	24	52	44	100	26		13	48	100	10	29	30	31	47	43
Roxas	11	21	27	10		100	5	8	4			9	20	0	14	3	1			11		5	7	7
Silay	16	28	28	7		100	5	10	5	9		7	18				5			4		7	9	6
REGION IX																								
Metro Cebu	100	24	100	100	100	100	100	100	100	100	100	100	79	100		100	100	100	100	100	100	100	100	100
Tagbilaran	6	22	100	7		100	4	6	3			7	21	2		4	8		13	10		6	11	13
Dumaguete	8	20	30	9		100	6	8	4		17	11	27	7		6	11		12	13		10	8	17
REGION X																								
Tacloban	13	17	79	13	29	100	8	15	7	4	6	13	10	12		11	6	33	11	15		13	30	24
Ormoc	14	15	14	7		100	7	8	4	4		9	13	0		5	3			3		6	18	15
REGION XI																								
Zamboanga	41	25	20	21	43	100	34	43	12	13		18	20	27	39		44	33		75	60	20	48	26
Jolo	6	20	100	5		100	2	4	2			7	6	5	4		2			5		10	20	4
Ozamis	11	19	24	8		100	6	10	2		15	7	10	2	2		3			9		8	11	9
Pagadian	10	38	43	6		100	4	5	3		1	7	7	3	2		2			2		4	11	6
Dipolog	8	20	42	6		100	3	4	2			7	14	3	1		3			2		1	9	18
REGION XII																								
Cagayan de Oro	27	30	23	20	86	100	15	23	14	26	25	27	35	21	17		3	33	6	18	24	22	41	29
Butuan	21	42	30	15	14	100	4	23	3	24		13	22	9	9		8			10		12	6	16
Iligan	18	41	9	14		100	12	16	0	18		16	21	3	11		3			10		16	26	35
Surigao	10	20	39	7		100	4	8	2			7	9	3	8		3			6		5	18	0
REGION XIII																								
Davao	75	42	40	47	93	100	49	74	81	79	88	64	85	42	20		46	33	26	31	34	75	12	55
General Santos	14	69	55	9		100	7	11	0	3	8	20	27	3	7		2			4		9	2	10
Tagum	10	40	39	5		100	3	4	1			11	20				1			1		6	0	13
Mati	11	75	25	4		100	2	4	1			7	9		0		2			1		2	3	2
REGION XIV																								
Cotabato	10	44	73	9	7	100	9	15	1	3		18	25	12			6		5	19		13	17	13
Marawi	10	30	100	8		100	3	3	0	5		4	4				2		3	3		5	15	4

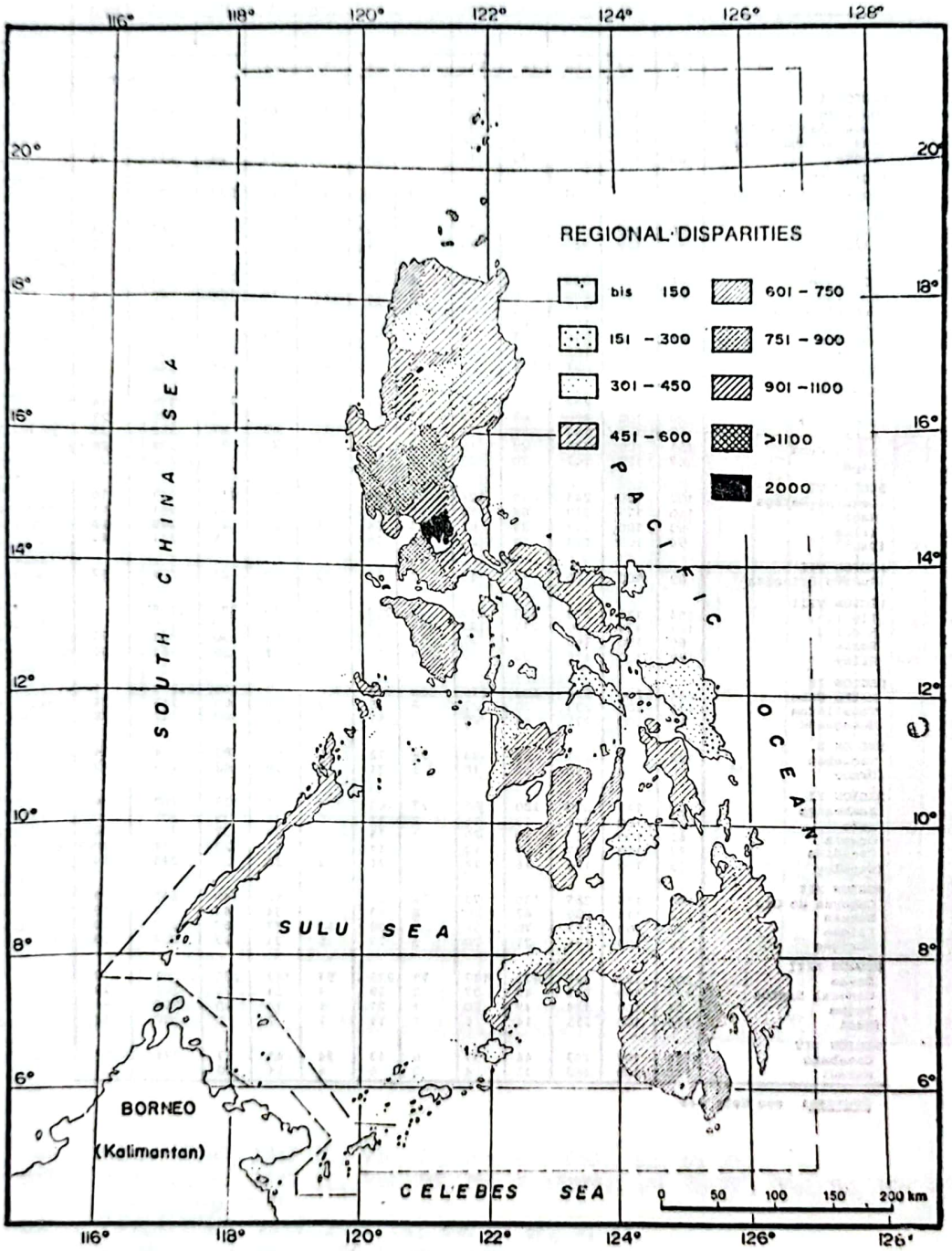
+ industrial center ++ 1978

24a : BCS/NCSO, 1947 ff., Vol. 29, No. 4 (1978), pp. 53 ff.
24b : BCS/NCSO, 1947 ff., Vol. 27, No. 3 (1976), pp. 68 ff.; Vol. 26, No. 4, (1975), pp. 7 ff.
25 : TFHS/DAP, 1975, Part IV, pp. 62 ff., 91 ff.
26 : YAMBOT, 1975, p. 257 & own investigations.
31 : YAMBOT, 1975, pp. 291 ff. (author's calculations).
32 : BCS/NCSO, 1947 ff., Vol. 26, No. 2 (1975), pp. 44 f.; Vol. 24, No. 4, (1973), pp. 60 f. & own investigations (author's calculation).
33 : Own investigations.
34 : NCSO, 1974a, Vol. I, 1-68.
35 : *Ibid.*
36 : *Ibid.*
** industrial center (Mariveles)

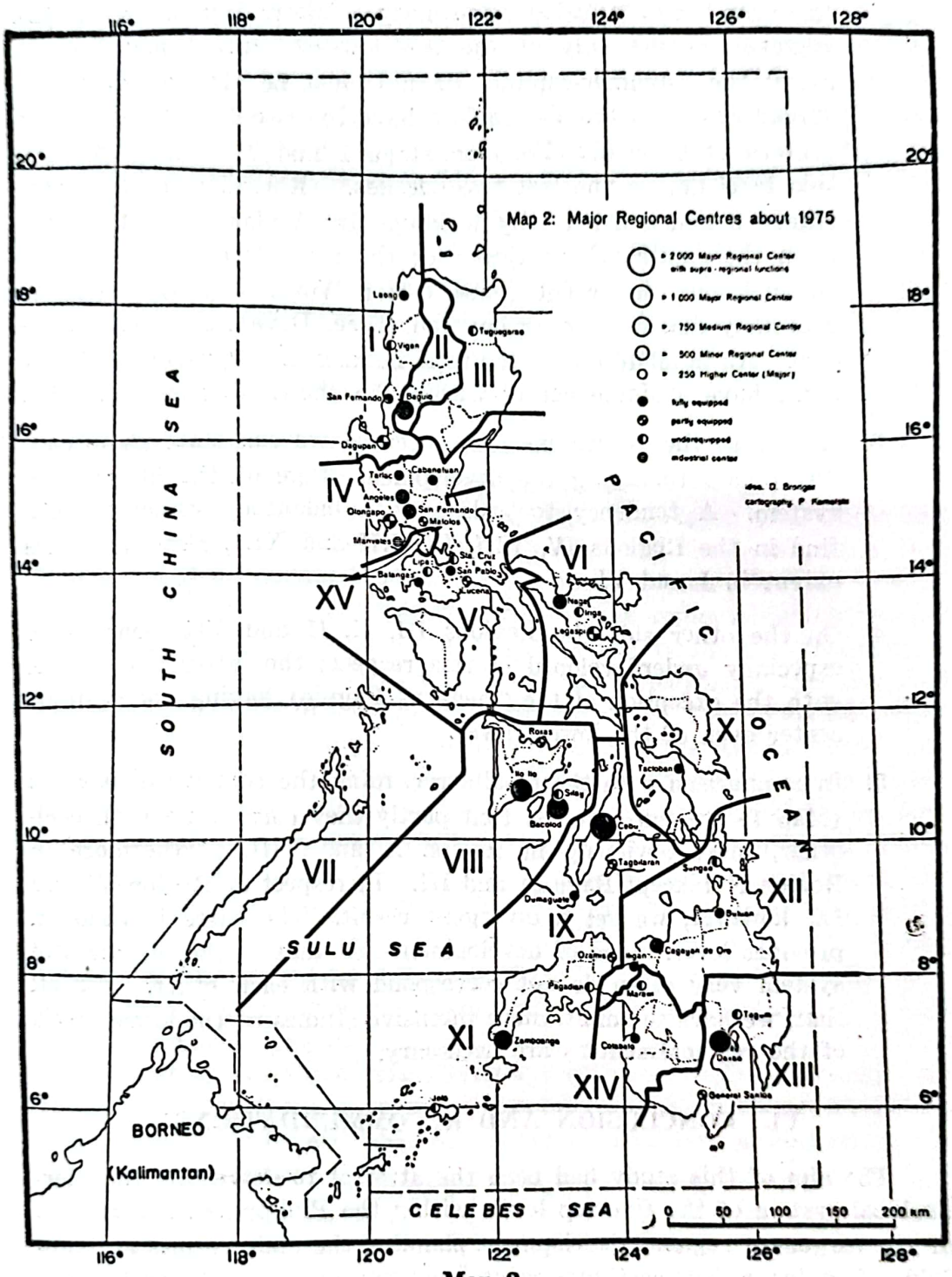
Table 2 (cont'd.)

	IA	IB	I	II	IIIA	IIIB	III	IVA	IVB	IV	TOTAL	Rank
	26	27	28	29	30	31	32	33	34	35	36	37
REGION I												
Dagupan	146	157	303	88	35	11	46	32	53	85	522	12
Laoag-San Nicolas	86	100	186	61	32	7	39	15	58	73	359	23
San Fernando-Bauang	63	107	170	47	50	5	55	35	35	70	342	27
Vigan	125	100	225	16	16	5	21	2	24	26	288	33
REGION II												
Baguio-La Trinidad	165	136	301	157	41	99	140	108	115	223	821	5
REGION III												
Tuguegarao	60	150	210	15	20	3	23	15	23	38	286	34
(Ilagan	56	129	185	11	29	3	32	3	12	15	243	45
REGION IV												
Olongapo	246	100	346	141	33	8	41	19	146	165	693	7
Angeles	184	100	284	120	98	26	124	22	116	138	666	8
San Fernando	158	157	315	58	82	10	92	8	45	53	518	13
Tarlac	82	107	189	63	93	8	101	6	48	54	407	16
Malolos	146	100	246	27	52	2	54	6	59	65	392	18
Cabanatuan	82	100	182	54	32	10	42	25	54	79	357	24
Mariveles +	91	-	91	104	0	0	0	18	9	27	222	
REGION V												
Lucena	152	100	252	48	25	2	27	35	72	107	434	15
San Pablo	90	100	190	63	32	11	43	10	69	79	375	21
Batangas	67	100	167	52	64	2	66	15	52	67	352	25
Santa Cruz	136	100	236	23	19	2	21	5	24	29	309	29
Lipa	67	100	167	20	23	2	25	11	39	50	262	37
REGION VI												
Legaspi-Daraga	107	136	243	50	124	35	159	66	51	117	569	10
Naga	140	179	319	66	56	39	95	22	59	81	561	11
Iriga	53	100	153	24	91	3	94	6	21	27	298	32
(Daet	94	100	194	14	24	4	28	2	3	5	241	46
REGION VII												
(Puerto Princesa	89	100	189	12	13	2	15	13	10	23	239	47
REGION VIII												
Ilo Ilo	194	179	373	193	143	71	214	133	195	328	1.108	3
Bacolod	191	129	320	219	139	148	287	69	121	190	1.016	4
Roxas	69	100	169	26	37	1	38	11	19	30	263	35
Silay	79	100	179	36	18	5	23	4	21	25	263	36
REGION IX												
Metro Cebu	324	200	524	600	279	200	479	300	300	600	2.203	1
Tagbilaran	135	100	235	20	27	8	35	23	30	53	343	26
Dumaguete	75	100	175	46	40	11	51	25	35	60	332	28
REGION X												
Tacloban	122	129	251	58	33	39	72	26	67	93	474	14
(Ormoc	50	100	150	32	18	3	21	3	39	42	245	43
REGION XI												
Zamboanga	107	143	250	120	86	77	163	135	94	229	762	6
Jolo	131	100	231	15	15	2	17	5	34	39	302	30
Ozamis	62	100	162	40	20	3	23	9	28	37	262	38
Pagadian	97	100	197	20	12	2	14	2	21	23	254	40
(Dipolog	76	100	176	16	18	3	21	2	28	30	243	44
REGION XII												
Cagayan de Oro	100	186	286	130	73	36	109	48	92	140	665	9
Butuan	116	114	230	67	40	8	48	10	34	44	389	19
Iligan	82	100	182	70	35	3	38	10	77	87	377	20
Surigao	76	100	176	21	20	3	23	6	31	37	257	39
REGION XIII												
Davao	204	193	397	435	147	79	226	91	142	233	1.291	2
General Santos	147	100	247	49	37	2	39	4	21	25	360	22
Tagum	94	100	194	19	20	1	21	1	19	20	254	41
(Mati	115	100	215	14	9	2	11	1	7	8	248	42
REGION XIV												
Cotabato	136	107	243	46	37	6	43	24	43	67	399	17
Marawi	148	100	248	15	4	2	6	6	24	30	299	31

Sources: see Note +++



Map 1 Population Density: (persons/sq.km.) 1975


Map 2: Major Regional Centres about 1975
SOUTH CHINA SEA
PACIFIC OCEAN
SULU SEA
CELEBES SEA
BORNEO
(Kalimantan)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
116°
118°
120°
122°
124°
126°
128°
20°
18°
16°
14°
12°
10°
8°
6°
0 50 100 150 200 km

Map 2

In Luzon the overshadowing primacy of Metro Manila caused that regional centers only of the two lowest levels 4 and 5 could arise; the "summer-capital" Baguio must be viewed as quite a special case. In the Visayas we have the two historically grown centers of Cebu and Iloilo on stage 1 and 2; Bacolod reached this level during the last two decades. Otherwise the next two stages 3 and 4 are totally lacking. In Mindanao, most distant from the capital, the majority of the regional centers, emerged as such only in recent times (after World War II). This is especially due to number one and three, Davao and Cagayan de Oro. All in all 40 out of the total number of 73 provinces (55%) don't have a single center within the shown 5-stage hierarchy.

3. As far as the 15 regions are concerned we can state significant differences regarding the development stage of the hierarchical system. A tendency towards such a balanced system we can find in the Regions IV, VIII, IX, XII and XIII, already to less extent in I and VI.

4. On the other side the Regions III, X, II and VII seem to be especially underdeveloped in this respect; the latter two (again with the exception of the "enclave" Baguio) having not a single center even of the lowest level!

5. In comparison with the results regarding the regional disparities (**Map 1**) we can conclude that partly they correspond with each other, most obviously in Region X and VIII, furthermore in Region II (except Baguio) and III. In respect of Region VI and IX, however, we get a divergent result. The same is valid on province level: stage of development and that of the hierarchical system very often do not correspond with each other. For all that, we have to admit, more intensive studies of the lower levels of the regional centers are necessary.

VI. CONCLUSION AND RECOMMENDATIONS

The aim of this study had been the attempt to determine the hierarchical system of the five top levels within the Philippines. In respect of the targets of regional development planning the main results are twofold. Firstly: a balanced hierarchical system of regional development centers has not been developed on national scale yet. The overwhelming primacy of the capital region does not only still exist, but it is rather aggravating. Secondly: within the regions as well as the provinces significant differences regarding the development stage of the hierarchical system have to be stated. These differences partly correspond with the development stage of the regions concerned (compare: **Map 1:2**).

CamScanner

As far as the above discussed targets of regional development planning are concerned we can deduce from these statements the following recommendations:

With regard to the threatening dimension of the primacy of Metro Manila regional planning and policy should really start with the implementation to develop a balanced hierarchical set of regional centers into regional development centers. It is a regrettable fact that to cite the WORLD BANK REPORT "to date the intermediate-size cities have been neglected in the Philippines as a focus of policy. The national government and even municipal officials have in most instances given only scant attention to local development planning because of limited fiscal resources."[69] Even in the case of Metro Cebu, the by far most important regional center (see: Tab., col. 36), it does not correspond with the reality that it is "rapidly" growing as stated in the same report.[70] At least its urban growth and relatively diversified industrial structure[71] have not prevented a heavy outmigration not only from the region as a whole, but also from the island of Cebu.[72] On the other hand the in-migration into the City of Cebu during 1960-1970 was almost stagnant.[73]

The neglecting of the vast majority of the regional centers so far can be indirectly deduced also from Tab. 3 where two major development indicators, population growth and industrial employment, are compiled and compared with Metro Manila: Only 6 out of the 43 listed major regional centers had a higher growth rate during the last 15 years than the capital region (col. 6), whereas in 16 cases (37%) it amounts even below the country's average (col. 7). As far as the industrial employment is concerned only 6 centers hardly exceed 50% of the Metro Manila rate (col. 9) but in 31(!) cases (72%) this figure does not reach the average of the country (col. 10). Between 1948-1960 nearly 50% of the main regional centers showed a negative migration balance,[74] during 1960-1970 this applied to still more than 25% of them.[75] To sum up: under these circumstances the development of the regional centers seems to be increasingly urgent.

Combining our three general criteria with our findings presented in Tab. 2 and Map 2 we recommend the following hierarchical set of regional centers to be activated as development centers according to our 15 regions in brief:[76]

---

[69] THE WORLD BANK (1977), p. 69.
[70] *Ibid.*, p. 69.
[71] BRONGER (1979), p. 94 (Tab. 25).
[72] Between 1960-1970 the estimated out-migration from Region IX (Central Visayas) amounted to 239.817 and from the island of Cebu solely 97.243 persons (BCS, 1972, p. 7); 1939-60: Region IX: 785.843; Cebu: 475.356 (WERNSTEDT/SPENCER, 1967, pp. 637 f.).
[73] See: DPWC/UP-IP/PAC-PWCD/UNDP (1971), Vol. III, p. 62.
[74] *Ibid.*, pp. 57 f.
[75] *Ibid.*, pp. 61 f.
[76] During his stay in 1974 (March/April) as well as between 1975 and 1979 the author has himself studied empirically almost all regional centers mentioned in the following (except those in Samar and a few in Mindanao).

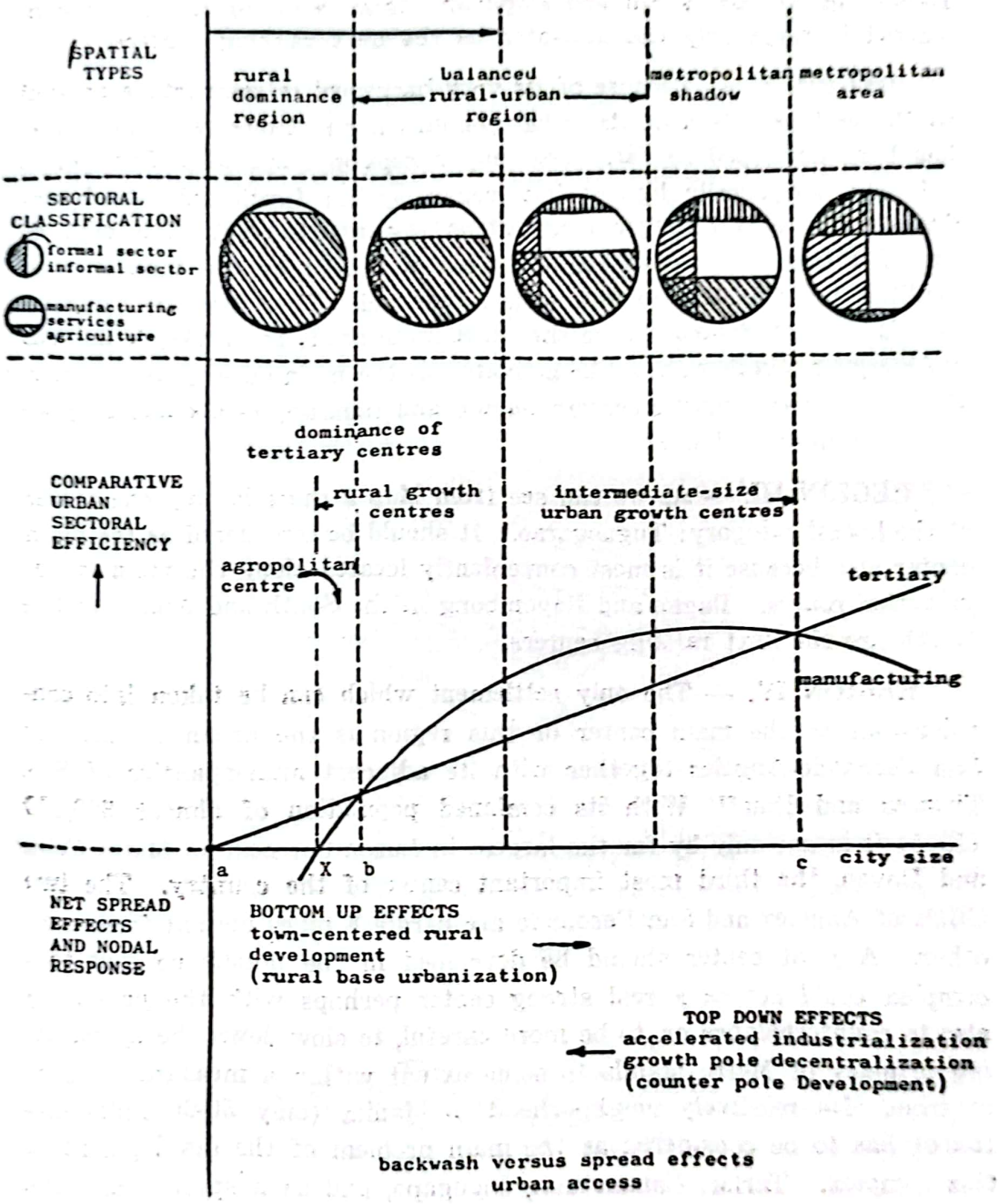
Tab. 3: Population Development and Industrial Employment
Comparison: Major Regional Centers - Metro Manila - Philippines.

City+ Major Reg. C.++	Region off.	Region pro	Pop. 1975 (000)	Average Annual Rate of Pop. Increase 1960-1975 %	% of M.M.A.	% of Philipp.	Industrial Employment+++ per 1000 Inhabitants 1975	% of M.M.A.	% of Philipp.
1	2	3	4	5	6	7	8	9	10
Metro Manila	IV	XV	5.456	4.81	+	161.6	57.7	+	473.0
Metro Cebu	VII	IX	645	3.72	77.3	124.8	30.1	52.2	246.7
Davao C.	XI	XIII	485	5.22	108.5	175.2	31.7	54.9	259.8
Zamboanga C.	IX	XI	265	4.81	99.9	161.3	9.4	16.3	77.0
Ilo Ilo C.	VI	VIII	227	2.76	57.4	92.6	7.3	12.7	59.8
Bacolod C.	VI	VIII	223	4.28	89.0	143.6	21.3	36.9	174.6
Cagayan de Oro C.	X	XII	165	6.09	126.6	204.4	30.9	53.6	253.3
Tarlac C.	III	IV	161	3.36	69.9	112.8	3.2	5.5	26.2
Legaspi-Daraga C.	V	VI	152	2.63	54.7	88.3	11.8	20.5	96.7
Angeles C.	III	IV	151	4.68	97.3	157.0	9.5	16.5	77.9
Olongapo C.	III	IV	147	8.21	170.7	275.5	-	-	-
Butuan C.	X	XII	133	3.45	71.7	115.8	35.4	61.4	290.2
Cadiz C.	VI	VIII	127	2.40	49.9	80.5	2.0	3.5	16.4
Batangas C.	IV-A	V	125	2.77	57.6	93.0	9.4	16.3	77.0
Baguio-La Trinidad	I	II	120	4.39	91.3	147.3	10.7	18.5	87.7
Iligan C.	XII	XII	119	4.91	101.9	164.7	29.1	50.4	238.5
San Pablo C.	IV-A	V	117	3.39	70.5	113.8	17.6	32.8	144.3
Cabanatuan C.	III	IV	115	3.36	69.9	112.8	3.8	6.6	31.1
Lipa C.	IV-A	V	106	3.42	71.1	114.8	3.0	5.2	24.6
Silay C.	VI	VIII	104	3.74	77.8	125.5	17.2	29.8	141.0
Calbayog C.	VII	I X	103	0.98	20.4	32.9	-	-	-
Naga C.	V	VI	83	2.75	57.2	92.3	14.2	24.6	116.4
Dagupan C.	I	I	90	2.39	49.7	80.2	8.8	15.3	72.1
San Fernando	III	IV	98	3.72	77.3	124.8	31.4	54.4	257.4
Tacloban C.	VII	I X	81	2.77	57.6	93.0	9.0	15.6	73.8
Lucena C.	IV-A	V	92	4.28	89.0	143.6	14.0	24.3	114.8
Cotabato C.	XII	XIV	67	3.96	82.3	132.9	8.3	14.4	68.0
Malolos	III	IV	83	3.62	75.3	121.5	8.8	15.3	72.1
General Santos C.	XI	XIII	91	3.70	76.9	124.2	6.8	11.8	55.7
Laoag-San Nicolas	I	I	88	1.78	37.0	59.7	4.9	8.5	40.2
Tagbilaran C.	VII	IX	37	4.16	86.5	139.6	6.0	10.4	49.2
San Fernando-Bauang	I	I	99	2.96	61.5	99.3	10.8	18.7	88.5
Dumaguete C.	VII	IX	53	2.72	56.5	91.3	8.0	13.9	65.6
Santa Cruz	IV-A	V	53	3.20	66.5	107.4	4.0	6.9	32.8
Jolo	IX	XI	38	1.09	22.7	36.6	4.0	6.9	32.8
Maraui C.	XII	XIV	63	5.84	121.4	196.0	16.1	27.9	132.0
Iriga C.	V	VI	76	0.04	0.8	1.3	5.0	8.7	41.0
Vigan	I	I	32	1.39	28.9	46.6	3.5	6.1	28.7
Tuguegarao	II	III	63	2.51	52.2	84.2	3.2	5.5	26.2
Roxas C.	VI	VIII	71	2.49	51.8	83.6	6.5	11.3	53.3
Ozamis C.	X	XI	72	3.28	68.2	110.1	7.5	13.0	61.5
Surigao C.	X	XII	66	3.85	80.0	129.2	8.0	13.9	65.6
Pagadian C.	IX	XI	66	3.18	66.1	106.7	4.5	7.8	36.9
Tagum	XI	XIII	64	6.26	130.1	210.1	-	-	-
PHILIPPINES				2.98	62.0	+	12.2	21.1	+

\+ : in sucession to population size - 1975
++ : in sucession to rank (tab. 2, col. 37)
+++ : employment size - 10 & more
\- : negligible

Sources : see Tab. 2

FIG. 2 TYPOLOGY OF REGIONAL STRUCTURES AND PROCESSES



REGION I. — Although ranking only as No. 3, the centrally located complex of San Fernando-Bauang should be developed as the main center. Laoag-San Nicolas, Vigan and Dagupan (from N to S) are to be considered hierarchically and activated as the next ranking centers.

REGION II. — Because of its very backward infrastructure as well as the setting habits of its tribal population no strong regional center has been developed so far. The only exception Baguio-La Trinidad is not only peripherally located but, regarding its functional interdependencies, has also stronger orientations towards the southern part of Region I than to its own region. This is caused by the meager road facilities to its eastern mountainous hinterland. Therefore the centrally located town of Bontoc, where the three main roads from SW, N and SE are merging together should be activated as the main development center. Besides the two touristic centers Baguio and Banawe, Tabuk and Lagawe are to be developed next.

REGION III. — As we can see from Map 2 there is only one center of the lowest category: Tuguegarao. It should be considered as the main center also because it is most conveniently located along the main transportation routes. Ilagan and Bayombong in the South and Aparri in the North are the next ranking centers.

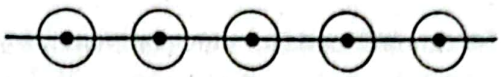
REGION IV. — The only settlement which can be taken into consideration as the main center of this region is the urban complex of San Fernando-Angeles together with its adjacent municipalities of Sto. Thomas and Dau.[77] With its combined population of almost 300,000 (1975) it is not only by far the largest in Luzon but next to Metro Cebu and Davao, the third most important center of the country. The two CBDs of Angeles and San Fernando are hardly 8 miles distant from each other. A joint center should be developed in the middle so that this complex could act as a real strong center perhaps with the possibility also to counterbalance or, to be more careful, to slow down the aggravating primacy of Metro Manila to some extent within a measurable space of time. Its relatively neighborhood to Manila (only 50-60 miles distance) has to be considered as the main problem of the development of this complex. Tarlac, Cabanatuan, Olongapo, and as a special case, the industrial complex of Mariveles, should be activated as next ranking set of centers.[78]

REGION V. — Because of its adjacent location to the capital region several regional centers only of the lowest category could arise. The

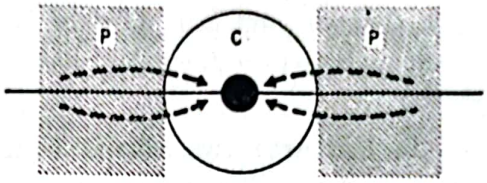
---

[77] I.e., the southern part of Mabalacat municipality.

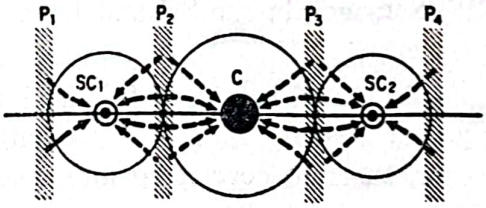
[78] Malolos and Baliwag just 15/25 miles distant from the outskirts of Metro Manila most probably will become more or less the character of sattelite towns. The same will apply to the fast growing municipality of Calamba in the South (Region V).



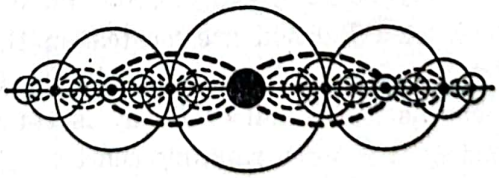
1. *Independent local centers, no hierarchy.* Typical preindustrial structure; each city lies at the center of a small regional enclave; growth possibilities are soon exhausted; the economy tends to stagnate.



2. *A single strong center.* Structure is typical for the period of incipient industrialization; a periphery (P) emerges; local economies are undermined in consequence of a mass movement of would-be entrepreneurs, intellectuals, and labor to the center (C); the national economy is virtually reduced to a single metropolitan region, with only limited growth possibilities; continued stagnation of the periphery may lead to social and political unrest.



3. *A single national center, strong peripheral subcenters.* The first stage toward a solution during the period of industrial maturation; strategic subcenters (SC_n) are developed, thereby reducing the periphery on a national scale to smaller, more manageable intermetropolitan peripheries (P_n); hypertrophy of national center is avoided while important resources from the periphery are brought into the productive cycle of the national economy; growth potential for the nation is enhanced, but problems of poverty and cultural backwardness persist in intermetropolitan peripheries.



4. *A functionally interdependent system of cities.* Organized complexity is the final solution to be aimed for during the period of industrial maturation, but it will subsequently give place to other configurations; major goals of spatial organization are fulfilled: national integration, efficiency in location, maximum growth potential, minimum essential interregional balances.

FIG. 3 *A sequence of stages in spatial organization.*

best possibilities for an independent development seems to have Lucena, partly because of its greatest distance to the capital (85 miles). Because also of its strategic location within the agriculturally very fertile southern part of Quezon as well as to Marinduque and Romblon it should be improved as the main development center of the entire region.[79] Other municipalities to be developed as next ranking centers are, besides the listed ones in Tab. 2, Calapan and San Jose in the island of Mindoro, which regarding its infrastructural facilities, has been very much neglected so far.

REGION VI. — In this area two almost equally ranking regional centers have been developed: Naga and Legaspi-Daraga. Only 65 miles distant from each other both cities have the facilities to act as the major center for the entire region (good road, railway and air connections, universities, hotels, etc.). While Naga[80] has its main function as a center of a wide and very fertile hinterland, the future of Legaspi seems to be intended for a center of tourism as well as of cottage industry. Other centers to be activated on a lower scale in the main island of Luzon are Daet in the NW, Sorsogon in the SE and Iriga as well as Tabaco in between.

REGION VII. — As stated before, in this island group where development started only very recently, no center presently exists even at the lowest level. However, the fast developing municipality of Puerto Princesa, caused mainly by its centrally location, has emerged undoubtedly as the main center. On the next stage Roxas and/or Taytay in the N and Brooks Point in the S with possibly Narra in between should be activated as development centers. As a precondition, however, a lot of infrastructural development is necessary because the hierarchical level is very low.

REGION VIII. — A similar situation to Region IV can be found here: two almost equally ranking centers, but on a much higher functional level. As Iloilo and Bacolod are located on the two main islands of this region, without doubt both cities should act as a major development centers. As far as the island of Panay is concerned Roxas in the N is to be developed as the next ranking center. Kalibo and San Jose are considered to be regional centers on a lower level. Although our findings have proved Silay City as the next ranking to Bacolod, its close neighborhood to the capital (distance hardly more than 10 miles) seems unfavorable for it to act as a major center. In this context either the City of Cadiz or of San Carlos should be selected.

---

[79] This statement is based on detailed studies by the author of all the centers of the region concerned listed in Tab.2.

[80] Together with the adjacent municipalities of Camaligan, Canaman and Magarao its population also amounts to about 120.000 (1975).

REGION IX. — Metro Cebu is the absolutely dominating center of this region as well as the entire Visayan area. Regarding the other two major islands, SE-Negros and Bohol, unquestionably Dumaguete and Tagbilaran are the main centers next to be developed.

REGION X. — Similar to Region III just one settlement — Tacloban — is included in our 5-stage hierarchy. Although ranking only as No. 3 in population size,[81] it should be considered as the main center because of its infrastructural facilities as well as its central location within the area as a whole. Ormoc in the western and Maasin in the southern part of Leyte are to be developed next. As far as the other main part, Samar, next to Luzon and Mindanao the largest island of the country, however, one of its least developed parts is concerned, Calbayog and Catarman on the western and possibly Borongan on its eastern part are to be activated as development centers.

REGION XI. — The only possible solution as the main center is the former capital of Mindanao during the Spanish period, Zamboanga City. Whereas Jolo still is to be viewed as the center of the Sulu archipelago, Pagadian, Dipolog and Ozamis should have the precedency for development on the peninsula side.

REGION XII. — The fast developing city of Cagayan de Oro should be given the first priority. Iligan and Butuan are ranking almost equally next in hierarchy. Gingoog, Surigao and Tandag along the coast and Malaybalay in the interior should be developed as minor centers in this extended region.

REGION XIII. — No justification is needed for Davao as the main center of this region. In its southern part the city of General Santos has developed as an independent major center. Next to it, Digos, Mati and the fast growing Tagum (from S to N) should be proposed as minor development centers.

REGION XIV. — In this largely Muslim dominated area (about 55% of its population) the centrally located city of Cotabato is to be considered as main center. The next priority should be given to the heart of the Muslim culture, Marawi. However, simultaneous infrastructural development, especially in respect of the transportation network, is essential to improve the living conditions of this area has been neglected for a long time.

With regard to and as successful as possible implementation of the development center strategy, three integral remarks seem to be additionally necessary:

1. To reach the main target, e.g., slowing down and in the sense of long-term development planning to stop the overwhelming

---

[81] According to its urban population, however, Tacloban is the largest settlement in Region X.

primacy of Metro Manila together with the rural-urban migration mainly towards the capital region, we should realize a spatially triple-ring strategy of activating major development centers around Metro Manila simultaneously:

— an inner ring of 50-100 miles distant from the capital with San Fernando-Angeles and Lucena as the main development centers

— a middle ring of 300-350 miles distance with Metro Cebu as the top together with Iloilo and Bacolod (in the future perhaps Tacloban) as major development centers and

— an outer ring of around 600 miles distance from Manila with Davao as the main and Zamboanga as well as Cagayan de Oro as major development centers.

2. These two main targets have to be seen in combination with our third task to reduce the pronounced regional disparities. This means: the implementation of the development center strategy should be started first and foremost in the "action regions" VI (Bicol), X (Eastern Visayas), XI (Western Mindanao) and XIV (Central Mindanao).

3. Finally, it has to be emphasized that this strategy will be a success only if it is combined with the above mentioned rural development programs to be simultaneously implemented.

BIBLIOGRAPHY

Note: Titles mentioned already in Parts I & II are not cited here again.

ABBREVIATIONS

ILO : International Labour Organization, Geneva
RDS : Regional Development Staff (NEDA)
UNCRD : United Nations Center for Regional Development, Nagoya/Japan

BOOKS, ARTICLES

ABEYARATNA, B.K. (1976), Industrialization Strategies and the Growth Pole Approach to Regional Planning and Development, in: UNCRD (Ed.), Growth Pole Strategy and Regional Development Planning in Asia, pp. 165-174.

BRONGER, D. (1980), Problems of Regionalization in the Philippines. Aspects of Regional Planning in Developing Countries I, in: Philippine Geographical Journal, Vol. XXIV, No. 2, pp. 65-82.

BRONGER, D. (1980a), Regional Disparities in the Philippines. Aspects of Regional Planning in Developing Countries II, in: Philippine Geographical Journal, Vol. XXIV, No. 3, pp.

BUTTLER, F. (1973), Entwicklungspole und raumliches Wirtschaftswachstum. Untersuchungen zur Identifikation und Inzidenz von Entwicklungspolen. Das spanische Beispiel 1964-1971, Tubingen 376 pp.

CamScanner

BUTTLER, F. (1975), Growth Pole Theory and Economic Development, Farnborough Lexington/Mass., XII, 228 pp.

CANT, G. (1979), Spatial patterns and spatial planning, the Philippines, in: Migration and development in South-East Asia, A demographic perspective, Kuala Lumpur, Oxford 1979, pp. 259-271.

COMMANDANTE, A.S. (1979), The Impact of the Physical Constraints on Metropolitan Manila's Urbanization, Quezon City (unpubl. Diss.).

DARWENT, D.F. (1968), Growth Poles and Growth Center Concepts: A Review, Evaluation and Bibliography, Berkeley, 32 pp. (mimeo.).

FRIEDMANN, J. (1966), Regional Development Policy — A Case Study of Venezuela, Cambridge/Mass. and London, 279 pp.

FRIEDMANN, J. (1976), Summary of Asian Experience, in: UNCRD (Ed.), Growth Pole Strategy and Regional Development Planning in Asia, pp. 175-178.

HENNINGS, G./KUNZMANN, K. (1977), Regionalplanung in Thailand, in: Internationales Asienforum (International Quarterly for Asian Studies), vol. 8, pp. 54-80.

HENNINGS, G./KAMMEIER, D. (1978), Zur Entwicklung von Sekundarzentren in Thailand, Bangkok-Dortmund, 149 pp. (mimeo.).

HERMANSEN, T. (1972), Development Poles and Development Centres in National and Regional Development. Elements of a Theoretical Framework, in: KUKLINSKI, A.R. (Ed.), Growth Poles and Growth Centres in Regional Planning, pp. 1-68.

HERMANSEN, T. (1972a), Summary Record of Discussion, in: KUKLINSKI, A.R./PETRELLA, R. (Ed.), Growth Poles and Regional Policies, pp. 157-174.

KLEMMER, P. (1972), Die Theorie der Entwicklungspole — strategisches Konzept fur die regionale Wirtschaftspolitik?, in: Raumforschung und Raumordnung, 30. Jg., pp. 102-107.

LASUEN, J.R. (1969), On Growth Poles, in: Urban Studies, Vol. 6, No. 2, pp. 137-161.

LO, FU-CHEN/KAMAL, S. (1976), Growth Poles and Regional Policy in open Dualistic Economies. Western Theory and Asian Reality, in: UNCRD (Ed.), Growth Pole Strategy and Regional Development Planning in Asia, pp. 191-234.

LO, FU-CHEN/KAMAL, S. (Ed.) (1978), Growth Pole Strategy and Regional Development Policy. Asian Experience and Alternative Approaches, Oxford, 274 pp.

MIJARES, T.A./NAZARET, F.V. (1970), The Growth of Urban Population in the Philippines and its Perspective (BCS Technical Paper No. 5).

MISRA, R.P./SUNDARAM, K.V./PRAKASA RAO, V.L.S. (1974), Regional Development in India, Delhi, Bombay, Bangalore, Kanpur, 398 pp.

PHISIT, P. (1976), Industrialization Strategies and the Growth Pole Approach to South Thailand Regional Planning, in: UNCRD (Ed.), Growth Pole Strategy and Regional Development Planning in Asia, pp. 41-53.

PRANTILLA, Ed. B. (1976), Regional Development and Planning. The Philippine Experience, in: UNCRD (Ed.), Growth Pole Strategy and Regional Development Planning in Asia, pp. 83-102.

QUERESHI, A. (1976), Regional Development and Planning in Pakistan, in: UNCRD (Ed.), Growth Pole Strategy and Regional Development Planning in Asia, pp. 144-151.

RICHARDSON, H.W. (1972), Optimality in city size, system of cities, and urban policy: a sceptic's view, in: Urban Studies 9, pp. 29-48.

RICHARDSON, H.W./RICHARDSON, M. (1975), The relevance of growth center strategies to Latin America, in: Economic Geography, Vol. 51, pp. 163-178.

CamScanner

SANDNER, G. (1975), Wachstumspole und Regionale Polarisierung der Entwicklung im Wirtschaftsraum. Ein Bericht uber lateinamerikanische Erfahrungen, in: Der Wirtschaftsraum. Festschrift fur E. Otremba, Wiesbaden. (Erdkundliches Wissen. H. 41), pp. 78-90.

SCHILLING-KALETSCH, I. (1976), Wachstumspole und Wachstumszentren. Untersuchungen zu einer Theorie sektoral und regional polarisierter Entwicklung, Hamburg (Arbeitsberichte und Ergebnisse zur wirtschafts- und sozialgeographischen Regionalforschung 1), 206 pp.

SUGIJANTO, S. (1976), Growth Centered Development within the Framework of Prevailing Development Policies in Indonesia, in: UNCRD (Ed.), Growth Pole Strategy and Regional Development Planning in Asia, pp. 17-34.

UNCRD (Ed.) (1976), Growth Pole Strategy and Regional Development Planning in Asia, Proceedings of the Seminar on Industrialization Strategies and the Growth Pole Approach to Regional Planning and Development: The Asian Experience, Nagoya, Japan 4-13 November 1975, Nagoya 455 pp.

UNCRD (Ed.) (1977), Role of Governments in the regional development process A review of experience in Japan and the Philippines, Nagoya/Japan 1977. IX, 89 S.

YUN KIM (1972), Net internal migration in the Philippines: 1960-1970, Manila, 27 pp. (BCS Technical Paper No. 2).

PUBLICATIONS: GOVERNMENT INSTITUTIONS, UNPUBLISHED RECORDS

ADB (Ed.) (1979), Key Indicators of Developing Member Countries of ADB, Manila.

HSC (Ed.) (1978), Multi-Year Human Settlements Plan. Growth Centers 1978-2000, Manila.

NCSO (Ed.) (1974a), 1970 Census of Population and Housing, Final Report, Vol. I (68 provinces), Manila.

PPDO-DPWTC (Ed.) (1975), National Transportation System, Quezon City, 176 pp.

YAMBOT, E. (1976), Philippine Agriculture Fact Book & Buyers' Guide, Quezon City, 239 pp.

"Remember, you can't all be first," the high school teacher told her class.

"Even great men have to be second sometimes."

"What about George Washington?" challenge a smart-alec student. "He was the first President, first in war, first in peace, and first in the hearts of his countrymen."

"True," replied the quick thinking teacher. "But don't forget — he married a widow."

P.F.G. Kerman in the
Wall Street Journal

BOOK REVIEW

THE IMPACT OF URBANIZATION ON LAND USE IN THE RURAL URBAN FRINGE

A Case Study of Patna. By Murli Manohar Prasad Sinha. New Delhi: Concept Publishing Company, 1980. 258 pages, with illustrations, diagrams, maps, tables, appendices, bibliography, glossary, and index; hard cover bound.

The author teaches geography at the Patna University, State of Bihar, India. Urban geography is his field of specialization.

In the first chapter, Introduction, the author discussed the concept of rural-urban fringe. He cited various authors' claims describing the subject matter and then adopted his own definition. Patna City and its fringe were carefully described, stating the regional and cultural locations, the fringe initial rise and development.

In the second chapter, methodology, problems of delimitation of the fringe areas were pointed out and avenue of possible solutions presented. One of these was the selection of sample villages. Dwellers in these villages were interviewed and given relevant qustionnaires for gathering necessary information. Data gathered were weighted with numerial values, statistically analyzed to arrive at certain indices and other figures to indicate the geographical limits or boundaries of rural or urban fringes, also called outer fringe and inner fringe, respectively.

Factors influencing the demarcation of the fringe belt were further examined such as time and distance from Patna, state of urbanity, public utility service, land value, population density, and many others, all in the third chapter.

The physical features of the fringe were presented in the fourth chapter. These are the physiography and drainage of the land, the soil characteristics and the climate.

In the next chapter, urban influences were noted down. Locational influence of the city, according to the author, has been visualized in the form of: (a) intensive landuse and small land farm, (b) high priced land, (c) dense population, (d) non-agricultural workers, and (e) trend of landuse changes.

Other important urban influences are the means of transportation connecting the fringe areas to the city proper, the recreational facilities, the institutions of learning in all levels, the medical services available in the city, and the influence of urban living on dweller's housing, dress and food habits.

In order to study in detail the landuse pattern of the fringe area composed of 138 villages, the author divided it into two sub-zones — the outer fringe zone or rural suburban fringe zone covering 112 villages and the inner fringe zone covering 37 villages. This is in Chapter 6. Nine sample villages were selected by means of geagraphical stratification. Each sample village was subjected to careful scrutiny as to landuse pattern evaluation according to a set of criteria. Landuse study was based on existing conditions during three periods, namely, 1908-09 when the cadastral map was prepared, 1950-51 soon after independence, and 1973-1974 when the study was made. Items evaluated during these three periods included settlement areas, industrial areas, gardens and orchards, water bodies, areas under cultivation — whether single, double or multicropped lands, and follow or waste lands.

CamScanner

Landuse changes in each of the nine sample villages, four in the inner fringe and five in the outer fringe, were scored, tabulated, and plotted to show the differences (Chapter 7). It was concluded that there was a definite pattern of landuse change in the fringe belt. But the change was not uniform in all directions from the urban center, nor was it dependent entirely on the physical distance. Accessibility, transportation facilities, and land physiography are important factors affecting such change.

In the case of cropping patterns (Chapter 8), changes were also evident due to the urban impact of Patna. Where agronomic factors proved favorable, farmers tended to shift to the cultivation of seasonal cash crops that brought in more profit. More intensive, that is, double or multi-cropping, were evident in the inner fringe areas than in the outer fringe.

In the last chapter, Conclusion, the author not only made a summary but also offered recommendations of zoning and planning for the Patna fringe. The objective of course is to produce a well-balanced community thru proper planning, organization, and implementation. As an urban geographer the author is apparently conscious of the necessity for optimum utilization of natural resources at hand in consonance with man's struggle for a better life, including the maintenance for a viable environment.

A further improvement is suggested. Many illustrations of Patna fringe area are poorly printed or can not be easily read. Examples are Figures 2, 6, 10, 11, 12, 13, 14 and 21. Making these clearer and readable in future reprints would solve this deficiency.

Nevertheless, the book may serve as a good reading material or guide to those interested in urban or rural development, human settlement and landuse planning.

FELICIANO M. LAPID
Life Member
Philippine Geographical Society

——oOo——

ERRATA

(P.G.J., Volume XXIV, July-Sept., 1980, No. 3)

Page	
103	3rd par., line 5: often; also line 7: recently
148	under Book Review, line 2: 222 pages
150	9th par., line 2: Plants

CamScanner

ETHNOGRAPHIC ATLAS OF IFUGAO

by

HAROLD C. CONKLIN

To be published on 22 January 1981

Editor's note: The Yale University Press 13 Bedford Square London, WC1B 3JF will publish on 22 January 1981 the above atlas. The Philippine Geographical Society thru this issue of the Philippine Geographical Journal presents this information to the reader here and abroad. — D. Z. Rosell

Ifugao is known to most people only from travel pictures that show bright green hills stepped with scores of irregular, flooded terraces. Yet this area of northern Luzon holds great interest for anthropologists, ecologists, agronomists, and students of several other disciplines. The tropics are the last frontier for the world's food supply. But data on production rates and crop yields, so important to the future of developing nations, mean little if they do not take into account culture and environment. In words, pictures, and extraordinarily detailed maps Harold C. Conklin provides a wealth of crucial information that has never before been available in one place for any comparable area of the planet.

The Ifugao have long interested students of complex ecosystems, "primitive" agriculture, law, religion, and social structure. This atlas for the first time relates the Ifugao pattern of land-use to the natural and physical environment. It provides valuable information on flexible methods of rice and root-crop production — staples of much of the world's population — in relation to climate and altitude, soil condition and irrigation, labor and technology.

Harold C. Conklin, professor of anthropology at Yale University and curator of anthropology at Yale's Peabody Museum of Natural History, spent nearly two decades in the research for the atlas, with substantial support from the National Science Foundation. The maps were produced under the direction of Miklos Pinther. The atlas is published with the cooperation of the American Geographical Society of New York.

"This atlas will make a forceful impact not only on the anthropological milieu but also in geography, agronomy, etc., and on the scientific community in general." — George Condominas

"The atlas will clearly be a landmark in anthropology. Nothing like it has even been produced. It is document of immense values."

— Charles O. Frake

"Besides the mere beauty of the maps, which I consider true masterpieces of graphic art, one cannot fail admiring their precision, the richness of the details, the prodigious amount of information which they convey at a glance. Professor Conklin's Atlas will undoubtedly stand as a major source for Southeastern Asiatic Studies." — Claude Levi-Strauss

December, 124 pp. 153 maps + 170 black-and-white, photographs 48.5 X 40.5 cms. ISBN O 300 025297 £47.00.

You want to promote.... Trade, Commerce and Industry
Welcome to our

PHILIPPINE GEOGRAPHICAL JOURNAL

Advertisement is Open

Widely circulated throughout the Philippines and Abroad

Full Page: Size 5" x 8" ..... ₱500.00

Half Page: Size 5" x 4" ..... ₱300.00

Please inquire: PHILIPPINE GEOGRAPHICAL JOURNAL

P. O. Box 2116, Manila
Philippines
Tel. No. 50-30-41 Local 55

ACKNOWLEDGMENT

The Philippine Geographical Society gratefully acknowledges a grant from the National Science Development Board in support of this issue of the Philippine Geographical Journal. Arrangements for this subsidy were made by the Philippine Social Science Council.

Republic of the Philippines
Department of Public Works, Transportation and Communications
BUREAU OF POSTS
Manila

SWORN STATEMENT
(Required by Act 2580)

The undersigned, DOMINADOR Z. ROSELL, editor of PHILIPPINE GEOGRAPHICAL JOURNAL, published Quarterly in English, at NSDB Planetarium cor. Taft Ave.-P. Gil St., Manila, after having been duly sworn in accordance with law, hereby submits the following statement of ownership, management, circulation, etc., which is required by Act 2580, as amended by Commonwealth Act No. 201.

NAME	ADDRESS
Editor: DOMINADOR Z. ROSELL	P.O. Box 2116, Manila
Managing Editor: LYDIA P. ORDOÑEZ	P.O. Box 2116, Manila
Business Manager: DOMINADOR Z. ROSELL	P.O. Box 2116, Manila
Owner: PHILIPPINE GEOGRAPHICAL SOCIETY	P.O. Box 2116, Manila
Publisher: PHILIPPINE GEOGRAPHICAL SOCIETY	P.O. Box 2116, Manila
Printer: BOOKMAN PRINTING HOUSE	373 Quezon Ave., Q.C.

Office of Publication: NSDB Planetarium cor. Taft Ave.-P. Gil St., Manila

In case of publication other than daily, total number of copies printed and circulated of the last issue dated July-August-September, 1980.

1. Sent to paid subscribers	512
2. Sent to others than paid subscribers	488
Total	1,000

(Sgd.) DOMINADOR Z. ROSELL
Editor-in-Chief & Business Manager

SUBSCRIBED AND SWORN to before me this 2nd day of October, 1980, at Manila, the affiant exhibiting his/her Residence Certificate No. 1171642P issued at Cavite City, on March 5, 1980.

(Sgd.) F. AGUSTIN
Notary Public
Until Dec. 31, 1980

NOTE: This form is exempt from the payment of documentary stamp tax.

CamScanner

NASIPIT LUMBER COMPANY, INC.
ANAKAN LUMBER COMPANY
NASANAK WOODLAND COMPANY, INC.

PRODUCERS • MANUFACTURERS • EXPORTERS

Philippine Mahogany, Logs & Lumber, Creosoted Poles & Piling • Kiln-Dried & Boliden-treated Lumber • Veneer • WAIDWOOD • NALKO Flooring, NALKO Placarol Doors, and NALKO Tile-Wood • Gangnail Trusses • PANELETTE (hardboard)
NALKO-PLY & NALKO Wood Mouldings

PHILIPPINE WALLBOARD CORPORATION
MANUFACTURER & EXPORTER
LAWANIT - LAWANEX

MARKETING DEPT.
2217 Embarcadero Cor. P. Gil
Sta. Ana, Manila — 2802
Tels. 50-00-76 to 79
59-41-34, 50-05-54

MAIN OFFICES:
5th Floor, Maritima Building
117 Dasmariñas, Manila — 2804
Tels. 40-99-31 to 35, 49-43 31