ISSN 0031-7551

PHILIPPINE GEOGRAPHICAL JOURNAL

VOLUME XXII October-November-December, 1978 NO. 4

ARTICLES

PUBLISHED QUARTERLY BY
The PHILIPPINE GEOGRAPHICAL SOCIETY
And The NATIONAL COMMITTEE
ON GEOGRAPHICAL SCIENCES, NSDB
MANILA, PHILIPPINES

The PHILIPPINE GEOGRAPHICAL JOURNAL

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The *Philippine Geographical Journal* is published quarterly by the Philippine Geographical Society and the National Committee on Geographical Sciences 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.

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VOL. XXII OCTOBER-NOVEMBER-DECEMBER, 1978 NUMBER 4

GEOGRAPHICAL VIEWPOINT

ENVIRONMENT IS NOT AN ILLUSORY DREAM

"Environment" is not an idea whose time has just come. It has been around for a long time, particularly among countries in Asia, Africa and Latin America.

Problems involving living with nature are nothing new to people in these lands. However, systematic attempts to arrive at an understanding of environmental concerns and their consequences for development strategies are of relatively recent origin.

The current environmental debate entered the international arena in the late 1960's. By then, the more highly-industrialized countries were increasingly being confronted with the undesirable environmental impacts of technology and economic activity such as polluted air and water, degraded urban and rural conditions, noise and congestion. Their citizens were becoming more and more concerned about environmental deterioration and the consequent threats to their health and well being. Realizing that man's interference with nature was creating real and immediate dangers — nationally and globally — these nations brought the issue before the United Nations and called for a United Nations Conference on the Environment.

It is, therefore, hardly surprising, that the early perceptions of environmental problems were tinted with the experience of the industrialized countries. Concern with conservation of nature and wildlife air, water and noise pollution, solid waste disposal, took precedence over soil erosion, water-borne diseases and sanitation.

At the same time with solutions proposed for these problems were seldom targeted to their underlying causes. Cure rather than prevention was the usual approach.

During the early 1970's, several studies were published on the physical limits to economic growth. Based on over-simplified assumptions

of exponential growth in population and consumption patterns, they warned of early shortages and rapid exhaustion of the earth's non-renewable resources.

One of the key features of these studies was the runaway consumption of mineral, energy and other resources in the developed world. Another was the "population explosion" in the Third World. As a solution to the first feature several economists advocated a halt to growth, as a main requirement for society. Although these ideas have not been implemented on any scale, they did evoke sympathy in some quarters, and served to counteract some of the earlier optimists about limitless economic growth.

Developing countries, who were attempting to develop their societies rapidly, regarded attempts to conserve nature and protect its species as a luxury beyond their means. Pollution control was another note that did not strike well among developing countries. Convinced that rapid industrialized and technological innovations were the only answers to poverty, they were prepared to suffer considerable industrial pollution as the price for industrial progress.

Thus, environmental concern was often dismissed as the exclusive concern of the rich countries. Moreover, it was the rich countries which were responsible for most of the world's pollution and which made the heaviest demands on the world's natural resources. Developing countries argued that it was surely not their own responsibility to find and pay for the solutions.

It was difficult to understand how the growing numbers of poor in the Third World could remotely compete with the consumers of the industrialized countries in depleting the world's finite resources. The threat of resource exhaustion looked particularly unconvincing to some developing countries, whose immense mineral and other resources were still developed and even unexplored.

Thus there existed a deep and wide gulf between the conceptions of environment held by the industrialized and developing countries in the period preceding the 1972 United Nations Conference on the Human Environment. However, once the issues were brought forth for a wider debate and subjected to more global scrutiny, a broader and more widely acceptable concept began to emerge.

Reprinted from the UNITERRA Volume 3, No. 9, October 1978, p. 2.

URBAN GROWTH IN MINDANAO, 1960-1970[1]

by

RICHARD ULACK[2]

A problem that geographers often encounter when conducting research on (or in) developing nations is in finding accurate information on the portion of a population that is urban. Urban definitions vary considerably from country-to-country and, within nations, the definition given is often difficult to apply. This is certainly true in the Philippines where "cities" are granted charters and usually include large expanses of land that are very rural.[3] The National Census and Statistics Office (NCSO) does have an urban definition but it is clear that in 1970 some inaccurate urban estimates were presented, especially for the Mindanao (and Sulu) region. Furthermore intercensal comparisons are almost impossible to make as a specific urban definition did not exist until 1963.[4] Another agency, the Mindanao Development Authority (MDA), has also estimated 1970 urban populations for cities in the Mindanao region based on its own urban definition.[5] These estimates appear closer to actual urban populations although some of the MDA estimates seem too low. This paper is a preliminary attempt to delimit the urban portion of the population residing in those chartered cities and/or provincial capitals as they existed in the Mindanao region at the time of the 1970 census. It should be made clear that the figures presented do not reflect the total urban population of the Mindanao region. Other cities, that are not chartered or provincial capitals, are not included. All of the largest cities of the region, however, are included in that all such cities are chartered or are capitals (or both). The method used to delimit the 1970 urban populations is then applied to the same cities for 1960 so that the urban growth between 1960 and 1970 can be estimated. Finally, the actual urban growth between 1960

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[1] Paper presented at the 74th annual meeting of the Association of American Geographers, New Orleans, April 9-20, 1978.

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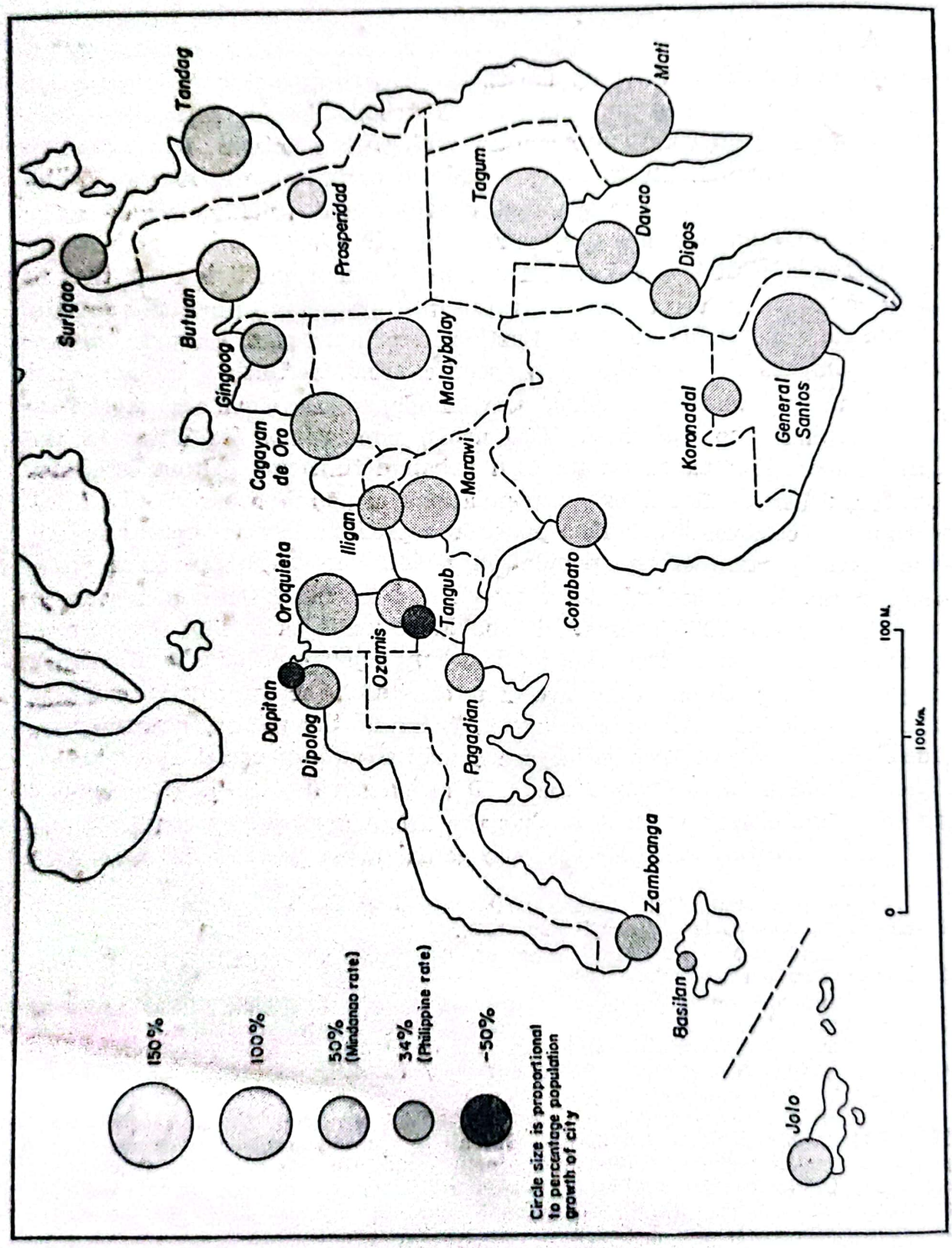
[3] For information on chartered cities see Joseph E. Spencer, "The Cities of the Philippines," *The Journal of Geography*, Vol. 57 (Sept., 1958), pp. 288-94; and Frederick L. Wernstedt and J.E. Spencer, *The Philippine Island World: A Physical, Cultural, and Regional Geography* (Berkeley, Calif.: Univ. of California Press, 1967, pp. 635-6 and 677-8.

[4] The 1960 national census did not include any specific definition of "urban." The 1963 definition developed by the Bureau of Census and Statistics was based principally upon population size and density. In 1970 the National Census and Statistics Office employed a more precise definition based upon population size, density, and selected urban institutional features (street patterns, commercial establishments, etc.).

[5] Mindanao Development Authority, *The Urban Pattern in Mindanao and Sulu: A Proposed Regional Strategy* (Davao City: Mindanao Development Authority, 1974). See especially Annex 1, "The Level of Urbanization in Mindanao and Sulu, 1970—An Alternative Approach", by E. Pajarellano.


Tandag
Mati
Prosperidad
Tagum
Davao
Digos
Surigao
Butuan
Gingoog
Malaybalay
Cagayan de Oro
Iligan
Marawi
Koronadal
General Santos
Oroquieta
Tangub
Cotabato
Ozamis
Dapitan
Dipolog
Pagadian
Zamboanga
Basilan
Jolo
0
100 M.
100 Km.
150%
100%
50% (Mindanao rate)
34% (Philippine rate)
-50%
Circle size is proportional to percentage population growth of city

and 1970 is compared to the population growth of the entire city administrative areas, the Mindanao region, and the nation. The method and data utilized are based upon various NCSO Population and Housing census reports, an unpublished report of the MDA,[6] census bureau maps of the cities, and personal observations in 1970-71 and 1975. The latter research was based in the cities of Iligan and Cagayan de Oro, respectively. Other Mindanao cities were visited for brief periods during the fifteen months in the field.

TABLE 1. URBAN POPULATIONS OF ALL CHARTERED CITIES AND PROVINCIAL CAPITALS, MINDANAO REGION, 1960 AND 1970

1970 Rank (Col. 1)	City (Col. 2)	1960 Urban Population (Col. 3)	1970 Urban Population (Col. 4)	1960-1970 % Urban Pop Change (Col. 5)	1970 % Of Total City Pop. Urban (Col. 6)	NCSO 1970 Urban Population (Col. 7)	MDA 1970 Urban Population (Col. 8)
1	Davao	98,177	178,162	81.5%	45 4%	178,471	222,531
2	Cagayan De Oro	48,960	101,594	107.5	79.2	26,784	89,670
3	Zamboanga	57,958	83,252	43.6	41.6	42,001	59,929
4	Butuan	42,461	81,540	92.0	62.2	53,948	69,556
5	General Santos	25,100	60,533	141.7	70 5	45,874	34,364
6	Cotabato	35,210	56,422	60.2	92.2	51,328	59,279
7	Iligan	35,767	55,823	56.1	53.4	8,939	13,658
8	Marawi	25,049	49,991	99.6	89.7	55,708	28,499
9	Jolo	33,259	46,586	40.1	100.0	46,586	41,908
10	Ozamis	26,789	41,991	56.7	65.0	18,772	17,700
11	Pagadian	26,132	35,363	35.3	61.4	27,784	32,917
12	Koronadal	20,846	29,444	41 2	54.1	17,043	29,601
13	Dipolog	18,995	28,029	47.6	60.4	19,364	40,665
14	Digos	16,543	26,292	58.9	55.2	17,891	24,658
15	Gingoog	17,903	26,264	46.7	40.1	15,687	33,717
16	Surigao	18,278	26,192	43.3	50.9	23,556	29,826
17	Tagum	10,799	23,083	113.8	48 8	17,301	26,867
18	Oroquieta	11,243	21,977	95.5	57 0	4,101	6,616
19	Bas lan	21,075	21,340	1.3	14.8	14,358	30,780
20	Mati	7,870	19,706	150.4	37.0	14,201	17,071
21	Malaybalay	7,624	13,668	79.3	29.0	10,101	15,953
22	Tandag	4,892	9,930	103.1	50.0	4,902	11,516
23	Dapitan	9,600	8,704	-9.3	23.0	5,738	13,003
24	Tangub	6,755	5,287	-21.7	17.1	3,739	6,696
25	Prosperidad	3,478	4,386	36.6	18.8	3,240	7,921
	TOTALS	630,763	1,055,559	67.3	51.9	727,467	964,991
	TOTAL POPULATION OF 25 CITIES ACC. TO ADMIN. BOUNDARIES	1,333,622	2,035,182	52.6	100.0		

[6] Mindanao Development Authority, op. cit., Footnote

TOTAL MINDANAO AND SULU	5,384	7,963,962	47.9
TOTAL PHILIPPINES	27,087,685	36,384,500	34.3

METHODOLOGY AND FINDINGS

There are a number of variables that could be used to determine whether or not an area is urban. Minimum total population, density of population, street patterns, number or range of commercial establishments, whether or not certain features exist (for example, a town hall, market place, hospital, or high school), and occupation of the residents are some of the more commonly-used criteria. All of these variables are included in at least one of the urban definitions referred to above. Although arguments could be made against the use of any variable, this paper does not issue with the selection of variables. However, since the paper does not agree with some of the NCSO and MDA urban populations given for cities in the Mindanao region, then the variables selected, or their measurement, must be questioned. Columns 7 and 8

TABLE 2. CITIES OF THE MINDANAO REGION, BY CLASS, ACCORDING TO MINIMUM TOTAL POPULATION (1970) AND RANGE OF COMMERCIAL ESTABLISHMENTS (1970), WITH KILOMETER RADII

Cities	Class	For inclusion in class, city must have:		The poblacion, and all barrios within the following radii are included as urban (Km.):
		A total population of at least (1970):	At least the following number of types of Comm. establishments (1970):	
Davao, Cagayan de Oro	I	100,000	64	5.0
Iligan, Zamboanga, Basilan, General Santos, Butuan	II	75,000	44	4.0
Ozamis, Pagadian, Cotabato, Koronadal, Surigao	III	50,000	44	3.0
Gingoog, Marawi, Mati	IV	50,000	31	2.5
Oroquieta, Dipolog, Jolo, Digos, Tagum	V	25,000	44	2.0
Tangub, Dapitan, Malaybalay	VI	25,000	31	1.5
Prosperidad, Tandag	VII	no minimum[1]	no minimum[1]	1.0

[1] But must be a chartered city or a provincial capital.

of Table 1 show the 1970 urban populations of the twenty-five chartered cities and/or provincial capitals in Mindanao and Sulu as delimited by the NCSO and MDA, respectively. It is clear there are differences between the two sets of estimates and although the populations given by the MDA (which includes the urban and "urbanizing" portion of each city administrative area) more closely approximate my own estimates (Col. 4), there are also significant differences. Perhaps most obvious, and what initially caused me to take notice of the urban population figures, are the gross under-estimates for the cities of Zamboanga, Iligan, and Ozamis. In addition, the census bureau estimates seem much too low for a number of other cities, notably Cagayan de Oro. Thus, it seems appropriate to reexamine the cities of the Mindanao region in an attempt to determine more realistic urban population estimates.

In order to determine the urban populations, the twenty-five cities were placed into one of seven classes based upon the population for their total (urban and non-urban) administrative areas combined with a second variable, the number of types of commercial establishments (Table 2). Although total city population, as explained above, usually includes large numbers who are not urban (see Col. 6, Table 1), inclusion of the number of types of commercial establishments (range of establishments) mitigates the importance of using only total city population. After the cities were so classified, then census maps of each city were examined to determine those barrios in each city which were to be included as "urban." The urban areas were determined through calculating a kilometer radius from the Poblacion (that area roughly equivalent to the "CBD") for each class of city. Those barrios included in the radius were considered urban and added to the Poblacion's population to arrive at the final urban population. The higher the class of a city, of course, the greater the kilometer radius (Table 2). A similar procedure is employed by the MDA, though the kilometer radii used herein are slightly different and were based, in part, upon observations made in the field.[7] Table 2 divides the twenty-five cities into seven classes, includes the minimum population and minimum number of types of commercial establishments needed for a city's inclusion into that class, and the kilometer radius for each class of city. It should be noted that final urban population figures given in Table 1 for 1960 and 1970 (Cols. 3 and 4) are subject to the degree of accuracy of the base maps. Furthermore, since barrio boundaries are not included on the maps, the total population of barrios whose centers fall within the kilometer radius are included as urban. Thus, the urban populations are slightly higher than they would be if more accurate base maps had been available.

Based upon the foregoing analysis, it is clear that only slightly more than one-half of the population in the twenty-five cities can be con-

[7] Mindanao Development Authority, op. cit., Footnote 3.

sidered urban (Col. 6, Table 1). Many of the cities are extensive in area and therefore include large populations that are rural. Indeed, only 45 percent of Davao City's population (the world's largest city in area) is urban. This method, though conclusions can only be preliminary, appears to be useful in calculating urban percentages of cities which include large expanses of rural lands. Certainly, it could be applied in other areas of the Philippines and perhaps in other areas where similar conditions exist. Although constrained by the limitations of the data and maps, estimates based upon this, or similar methods would certainly be useful in demonstrating that oftentimes the total city populations reported, especially in a developing country like the Philippines, are at best misleading. Kingsley Davis, for example, in his well-known World Urbanization, 1950-1970 lists Basilan as the fourth largest city in the entire Philippines in 1970 with a population of 225,000[8] Basilan actually ranks nineteenth on the list of cities for the Mindanao region (Table 1).

URBAN GROWTH: 1960 TO 1970

It is now possible to give some indication of how the urban portions of these twenty-five cities have grown between 1960 and 1970. Some researchers suggest the smaller, non-primate cities in developing nations are not growing very rapidly. Findings herein suggest otherwise, at least with regards to the Mindanao region. Actual urban growth in the twenty-five cities between 1960 and 1970 was over 67 percent (see Table 1, Col. 5), significantly higher than the 53 percent growth of the total city administrative areas, or the 48 percent growth of the entire Mindanao and Sulu region, or, of course, much higher than the 34 percent growth of the entire nation. And this high urban growth rate was not limited only to the largest cities of the region. If the three most populous cities, Davao, Cagayan de Oro, and Zamboanga, are not included, then the urban growth rate (63 percent) is still significantly in excess of the rates for either total city, Mindanao, or the Philippines.

Some urban areas did not grow rapidly, however. Figure 1 (and Col. 5, Table 1) illustrates that a number of smaller cities had growth rates well below even the national average. Thus, Dapitan, Tangub, and Basilan had rates of growth that were negative or nearly so, implying there was considerable net out-migration. Two other smaller cities, Pagadian and Prosperidad, had growth rates of under 40 percent. Most of the cities with lower rates of growth are located either in or near Moslem areas where recent conflict may in part explain the lower growth rates, or they are located along the north coast of the island, a region of early settlement and limited agricultural hinterland. In the north, only Cagayan de Oro, Butuan, and Iligan have grown rapidly, principally because of the industrialization that has occurred, and be-

[8] Kingsley Davis, *World Urbanization 1950-1970, Volume I: Basic Data for Cities, Countries and Regions* (Berkeley, California: Institute of International Studies, Univ. of California, 1969), p. 198.

cause they (especially Cagayan de Oro) are important regional trade and transportation centers.

Most of the urban areas that have grown most rapidly, including Davao, General Santos, Digos, Tagum, Mati, Malaybalay, and Tandag, are located in the south or east. These are relatively "new" cities, having become important during the twentieth century as a result of the tremendous growth of their agricultural hinterlands. Much of Mindanao, and especially the provinces of Davao and Cotabato (and Bukidnon more recently), has been characterized as a "pioneer frontier" during most of this century and it is in these areas that thousands of migrants from the Visayas and Luzon have settled.[9] As the choicest agricultural areas have become too densely-populated, many migrants from the Visayas and elsewhere have opted for life in the cities. In addition, sons and daughters of migrants to Mindanao who were born in the rural areas of Mindanao are increasingly moving to the cities; thus, much of the recent urban growth in the Mindanao region has been a result of migration from the rural areas of Mindanao. Other reasons for the high growth rates include the establishment of new provinces and therefore new provincial capitals (Mati, Digos, Tagum, and Koronadal during the 1960s) thereby creating new jobs in the tertiary economic sector; migration of Christians from areas where the Moslem-Christian conflict has been most severe; and in-migration attributable to expansion in the secondary economic sector. Industries that have been particularly noteworthy in providing economic opportunities include lumber, cement, steel, and food processing.

CONCLUSION

This paper has demonstrated that population growth in the actual "urban" portions of Mindanao's chartered cities between 1960 and 1970 is higher than the population growth of the total city or of Mindanao; thus, urbanization is occurring. This rapid urban growth, of course, has implications for city planners and administrators. Adequate housing and other facilities, for example, need be provided. Presently, this is not the case in most Mindanao cities and, in part, this may be due to the lack of accurate information about real urban growth. Furthermore, the population growth of such cities is almost certain to continue in the future as less land is available for the agricultural settler both on Mindanao and in other parts of the Islands. The presence of large and growing squatter communities in Mindanao's largest cities is only one indication of this rapid population growth. More detailed studies than the present paper, which examine both urban and rural areas need be completed so that realistic population growth information is available.

[9] For discussions of the characteristics of Mindanao's population growth in the twentieth century see Frederick L. Wernstedt and P.D. Simkins, "Migrations and the Settlement of Mindanao," *The Journal of Asian Studies*, Vol. 25, No. 1 (Nov., 1965), pp. 83-103; and Richard Ulack, "Migration to Mindanao: Population Growth in the Final Stage of a Pioneer Frontier," *Tijdschrift voor economische en sociale geografie*, Vol. 68, No. 3 (1977), pp. 133-44.

PROBLEMS OF SLOPE INSTABILITY: THE HONG KONG EXPERIENCE

by

C. L. So[1]

ABSTRACT

Problems of slope instability in Hong Kong are reviewed in respect of the slope environment and the circumstances surrounding the development of landslides. Preponderance of anthropogenic forms associated with acute population pressure on limited space is examined. Bitter experience derived from hazardous slope processes provides guidance to areas of comparable environments involving rainstorm or typhoon activity.

INTRODUCTION

Stability of slopes has been the common concern of the people in Hong Kong. This arises partly from bitter experience of disastrous landslides in recent years (So, 1971; Hong Kong Government, 1972a, 1972b; Lumb, 1975; So, 1976, 1978), and partly from the threat of similar disasters in the future. Increasing realization that imprudent interference with the land with more intensive development may increase the probability of man-induced movements of the subsoil while the increased density of development and population may render the consequences of the landslides extremely grave further strengthens the need to give thought to problems of slope instability.

SLOPE ENVIRONMENT

Physical Setting. — Hong Kong, covering an area of 1,030 sq. km., is a partially submerged, dissected upland terrain where steep slopes with plunging or convexo-concave forms abound. Lowland is restricted to the alluvial plain in the extreme north and northwest, and to the contracted valley flats representing partial infilling of drowned valleys (Fig. 1). Morphometric analysis of slopes reveals that most of the land reaches gradients between 1 in 5 and 1 in 3. Slopes with gradients up to 1 in 2 are not infrequent while those with gradients less than 1 in 5 are relatively limited in extent.

Fluvial erosion of the area following uplift removed part of the cover of sedimentary rocks and volcanics, exposing widespread outcrops of granite (Allen and Stephens, 1971). As a result, two types of acidig-

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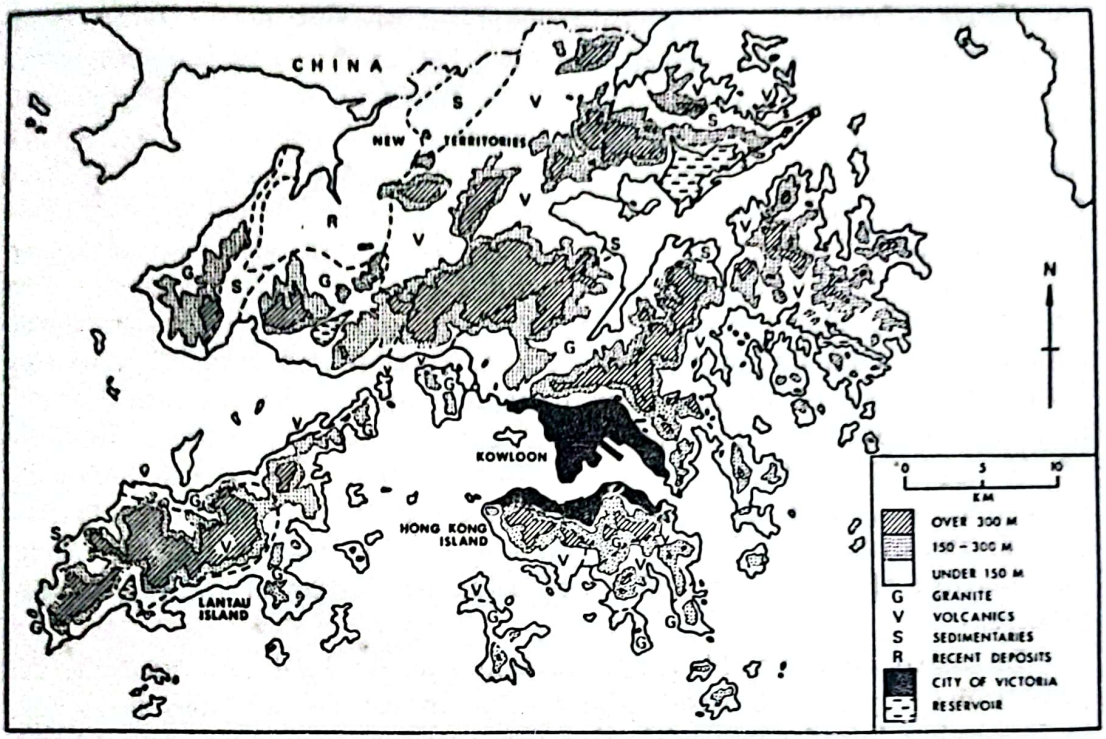

FIGURE 1. PHYSIQUE AND GEOLOGY, HONG KONG.

neous rocks, medium-grained granite and volcanics mainly of rhyolitic nature, make up the bulk of the present-day slopes (Fig. 1).

These rock formations have been subjected to widespread and intense weathering, made possible by the hot (mean 28°C), wet summers and cool (mean 15°C), dry winters. Decomposition of granite is especially marked; weathering profiles to a depth of more than 60 metres have been reported (Ruxton and Berry, 1957). Subsurface weathering of the volcanics, though to a more variable depth, occurs where joint planes allow a good balance in the downward and the lateral movements of ground water. Weathered debris coming downhill modifies the primary slope forms and often spreads out as fans of colluvium.

In such circumstances, the subsoil of natural slopes in Hong Kong falls into residual and colluvial groups, each associated with granite, volcanics or one of the minority rock types. The nature of the residual subsoil is determined by the chemical reactivity of the mineral constituents of the parent rock with the acidified ground water made available. In granite, the residual subsoil is governed by the extent of zonation developed in the weathering profile with its uppermost zone dominated by structureless sandy clay or clayey sand, and with decreasing residual debris with increasing size and amount of corestones from the underlying Zone II to Zone IV. The colluvial subsoil differs from the residual in that its debris is mixed as its structure and texture have been affected by downslope movement.

Human Impact. — The acute shortage of flat or lowlying land underlies Hong Kong's spatial problem. Much by physical necessity, the growing population perches on and in front of the steep slopes, especially round the harbour. The nature of the subsoil, by reason of deep weathering in a humid tropical environment, enhances levelling and platforming of the slopes for housing projects. Much of the material excavated from the hillsides in the course of site formation is used as fill, partly for reclaiming land from the sea, and partly for valley infilling and the construction of embankments. Thus housing development, road building, reservoir construction and associated works have given rise to numerous man-made slopes which fall into 'cut' and 'fill' categories. The subsoil of cut slopes may belong to any of the types for natural slopes mentioned above; that of fill slopes is mainly subsoil, more often residual than colluvial, that has been transported, and even worked over, by man. For this reason, the structure and texture of any fill would be affected or destroyed by the filling process.

Intensive development and redevelopment on land and packing of precipitous slopes with residential blocks, in course of time, have led to increasing interference with the slopes and their constituent subsoil in some cases, and extension or creation of built slopes in others, bringing about substantial modification of the initial slope environment.

SLOPE HAZARDS

As the weathering profiles develop on the hillsides, they are subjected to various mass movements. The residual soil in Hong Kong is so porous that its degree of saturation is markedly affected by rainfall which, with a mean annual total of 2,169 mm, may vary between 900 mm and 3,000 mm (Starbuck, 1950; Peterson, 1957; Bell and Chin, 1968). Tropical cyclones which bring spells of bad weather with strong winds and heavy rain several times a year may account for 20% of the annual rainfall (Starbuck, 1950). The rainfall associated with typhoons is frequently heavy and prolonged but never quite reaches record intensities (Peterson, 1957). The most intense rainfall that occurs in Hong Kong is associated with thunderstorm cloud of great vertical extent. It is most prolonged when a trough of low pressure extends along the South China coast in June and August. The wet years of 1951, 1952, 1955, 1957, 1959, 1966 and 1972 with pronounced cumulative rainfall up to these summer months are associated with increased landslide activity.

The mass movements which take place in Hong Kong range from slow imperceptible creeps of subsoil to rapid earth flows and mud flows, from isolated boulder falls associated with upset of equilibrium of individual corestones in the weathering profile to widespread debris avalanche on the hillsides, and from shallow washouts to relatively deep-

seated landslips involving rotational shearing and slumping. Analysis of the spatial distribution of the mass movements reveals that they tend to be more numerous on Hong Kong Island, especially on the colluvial slopes forming a sizable residential zone at the Mid-levels (Fig. 2), in the northern and north-western parts of Lantau Island, and in the higher parts of the New Territories. Areas of granite tend to be associated with more surface washouts, while those of volcanics are associated with more landslips. Preferred location of diverse movements in relation to various governing factors confirms their non-random spatial distribution and reveals that the presence of vegetation imparts to the slope it covers only a temporary measure of stability (So, 1971).

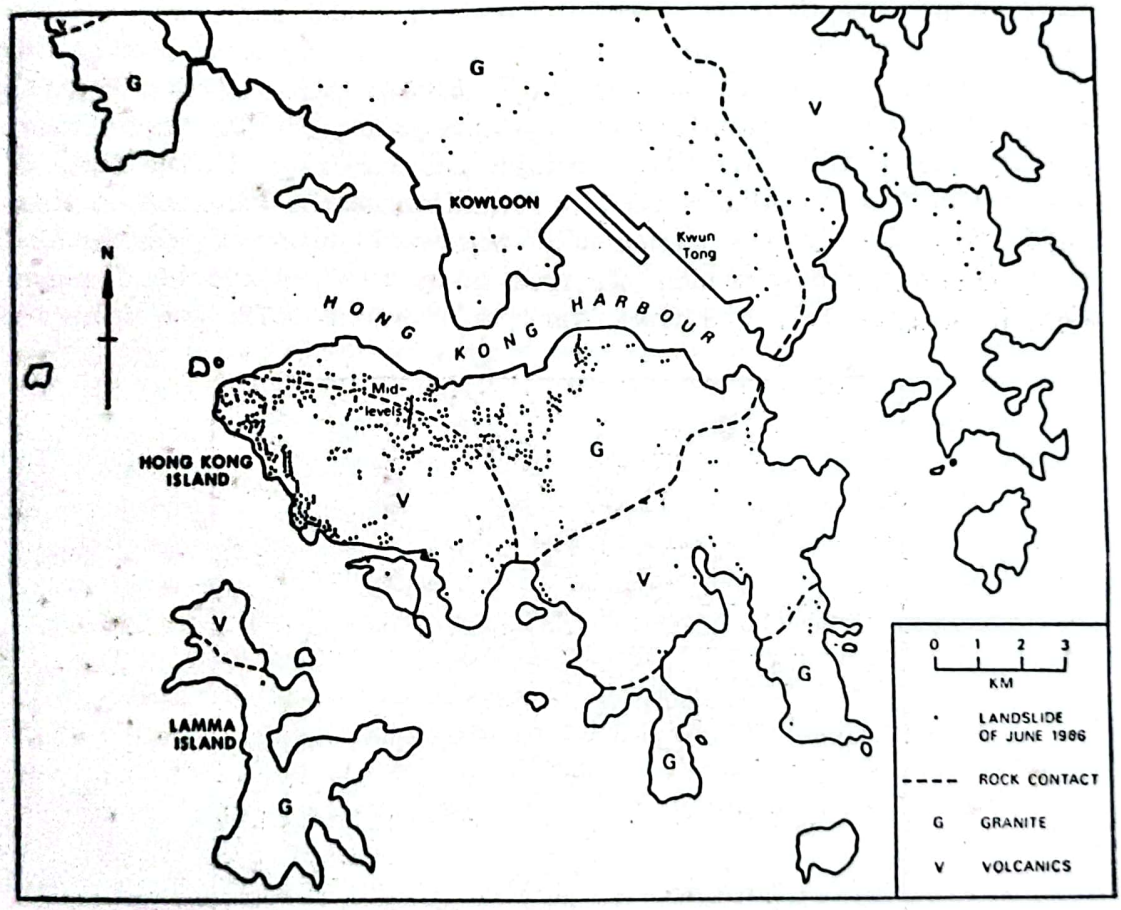

FIGURE 2. DISTRIBUTION OF LANDSLIDES OF JUNE 1966 ON HONG KONG ISLAND AND IN KOWLOON.

ANTHROPOGENE

While some of the landslides take place on slopes which have been little disturbed by man, many others are anthropogenic forms associated with cuttings and fillings. These include 489 out of 702 mass movements which left sixty-four dead, 2,500 homeless and over 8,000 evacuated in June 1966. The impact of heavy rain on slope stability,

felt in June 1972 with tragic loss of life and property, further bears witness to the hazards involved on some developed slopes. The six landslips resulting from excessive hillside cutting at a building site at Shiu Fai Terrace, the rockfalls leading to landslips in a series in Belcher Street, the landslip arising from cutting into a slope for unauthorized extension of property in Bullock Lane, and the landslips that destroyed huts developed on abandoned quarry faces and initiated boulder falls in Shaukiwan, all involving casualties, are but some of the minor movements compared with what took place in Po Shan Road at the Mid-levels and in Sau Mau Ping at Kwun Tong (Fig. 2).

Po Shan Case. — Within the slide-prone Mid-levels which on record have been susceptible to subsoil movements since 1925, and not far from where several serious landslips already took place in 1966, a 36° slope composed of colluvium across the contact zone between the volcanics above and the granite below was in a state of limiting equilibrium. Disturbance of this potentially unstable colluvial slope in the form of excavations into the hillside for site formation nearby has been on since 1962. The cutting has periodically witnessed numerous small-scaled slips, including those which occurred after the passage of Typhoon Rose in August 1971 and from April to mid-June 1972. On June 18,

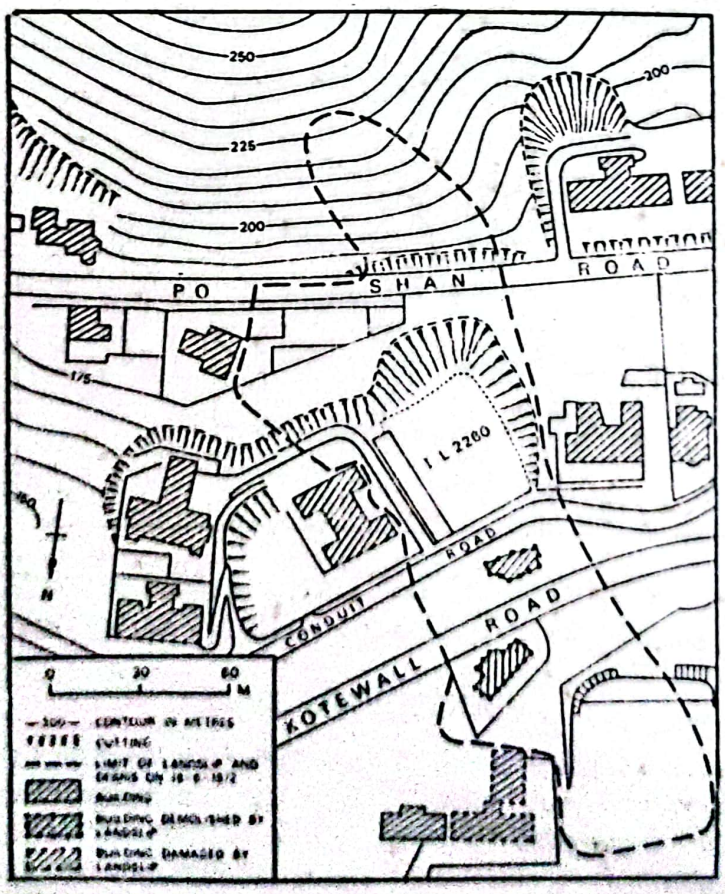

FIGURE 3. LANDSLIP IN PO SHAN ROAD, JUNE 1972.

1972, a landslip affecting this slope initiated on and just above Po Shan Road, extended downslope over an area measuring 275 m by 60 m, and toppled a high rise, killing sixty-seven people (Fig. 3). While the slope and nature of its constituent materials, and the almost unprecedented rainfall that occurred in May and June, would have contributed to the combination of circumstances leading to the event, one of the observations made in post-mortem investigations (Hong Kong Government, 1972b) was that the excavation into the hillside nearby effectively removed its toe and was to be held responsible for the location and magnitude of the landslip and for its catastrophic mode of failure.

Sau Mau Ping Case. — A few hours before the landslip occurred in Po Shan Road, disastrous movements already took place in a housing estate at Sau Mau Ping, affecting a 'fill' rather than a 'cut' slope. An embankment filled with decomposed granite at a slope of 1 in 1.5 and to a height of 40 metres in 1966, despite its protective measures, has proved inadequate to cope with the unusually heavy rainstorms so that considerable erosion of the slope face occurred, and remedial works were undertaken, between November 1965 and May 1968. One June 18, 1972, a landslip initiated on the embankment and developed into a mud slide and then a mud flow, destroying numerous huts and killing seventy-one persons in a resite area nearby (Fig. 4). The event only heralded a similar slope failure which took place on another embankment not far away on August 25 four years later, following a two-day record rainfall of 511.6 mm for August in the wake of Tropical Storm Ellen, and taking a death toll of eighteen. Both slope failures were subsequently attributed by a panel to infiltration during intense rainfall, in end-tipped, loose fill, followed by loss of strength and subsequent conversion of the upper few metres of the fill into a destructive mud avalanche (Hong Kong Government, 1977). The specifications set down for the slopes' compaction, although of a standard widely accepted and used at the time of construction in the early 1960s, were not considered vigorous enough to withstand the severe rainfall conditions of June 1972 and August 1976.

CONCLUSION

Landslides of unlike calibre and diverse origin have thus affected developed slopes in Hong Kong. The frequency of anthropogenic forms associated with the mass movements confirms that while much slope instability owes its origin to long-term, cumulative effects of weathering and subsoil development, the final process triggering off slope failure could be trivial and might have been accelerated inadvertently by man. In a situation where slope equilibrium has reached a critical state, insignificant interference may lead to significant changes in slope processes. In Hong Kong, with its mounting spatial problem, the proba-

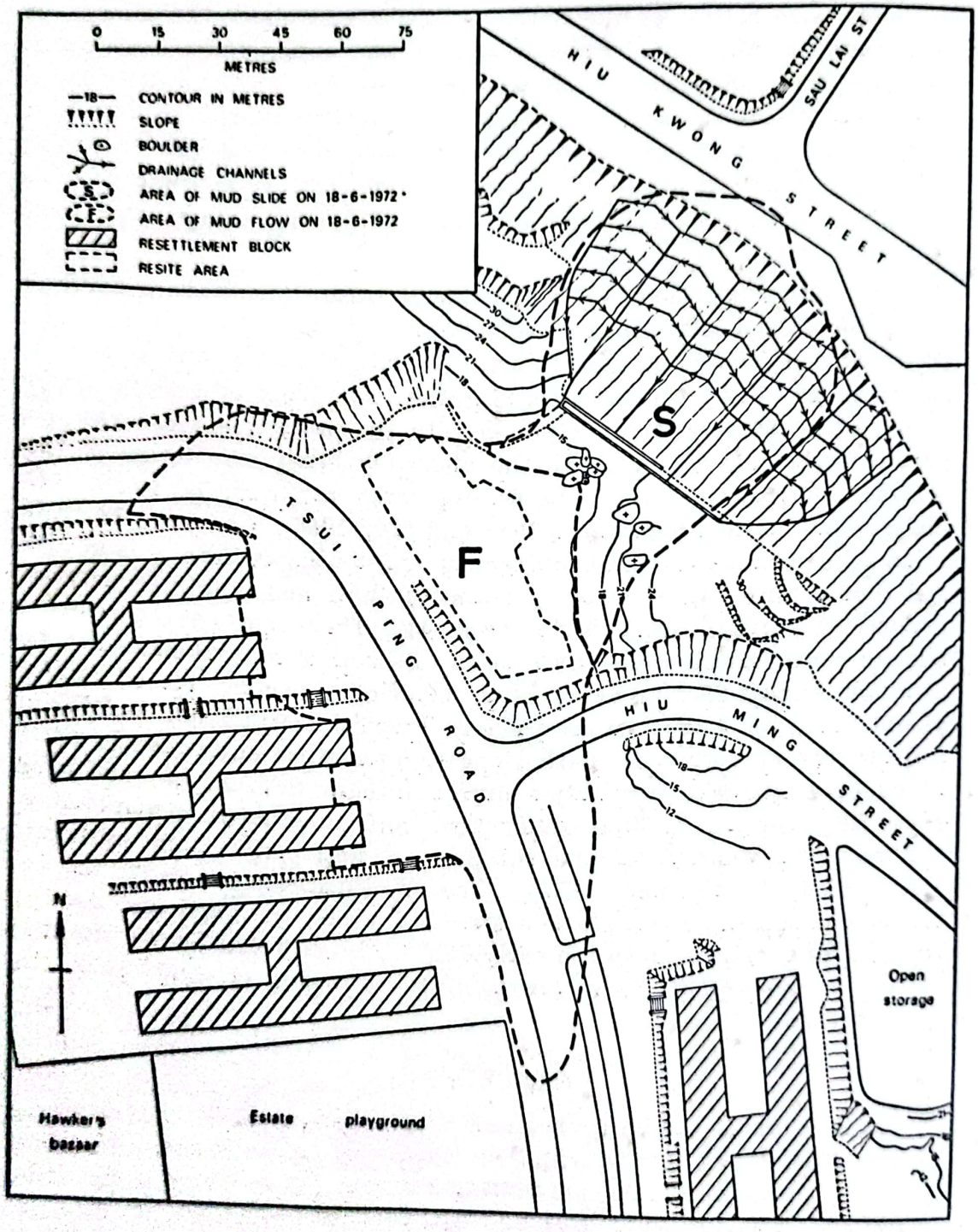

FIGURE 4. MUD SLIDE AND MUD FLOW AT SAU MAU PING, JUNE 1972.

bility of anthropogenic forms is likely to increase, and their impact to multiply, with increasing intensity in slope use. To areas with comparable slope environments and with prospects of substantial land development for various uses in the future, the lessons painfully learned in Hong Kong are significantly relevant as slope instability involved may become problems of wider applications.

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ACKNOWLEDGEMENT

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

SOME THOUGHTS ON THE TEACHING OF URBAN-ECONOMIC GEOGRAPHY IN DEVELOPING COUNTRIES[1]

by

WANG, LIANG-HUEW, Ph.D.[2]

INTRODUCTION

Geography has long been a standard discipline in most higher institutions in Southeast Asia. Most of the geography departments are with either the faculty of arts or social sciences, although some of the courses these departments offer are basically natural science in character. Like development in most sciences, geography had also gone through a basic methodological change since the late fifties, involving, in virtually every instance, the utilization of quantitative approaches, for a fully fledged search for order, regularity and general principles in geographic phenomena. The period is known as the 'quantitative revolution' era, which one geographer describes as "one of the greatest periods of intellectual ferment in the whole history of geography" (Gould, 1969). The revolution was successfully completed in the early sixties (Burton, 1963).

May be a reflection of the distance decay function, the effects of this methodological change was first felt in teaching in this part of the world only at the beginning of this decade. Courses in quantitative techniques and locational analysis were first introduced into the geography curriculum, for example, in 1970 at Nanyang University, Singapore, which was then one of the first adoptors in Southeast Asia. Nevertheless, judging by the local publications, changes do appear to have come about with unusual swiftness in recent years.

In a joint report of the National Academy of Sciences and National Research Council of the United States (Ackerman, 1963), the traditional fields of urban, economic, and transportation geography are seen as an integrated entity which emphasizes the locational interaction in regional systems. The cluster of these studies is here defined as urban-economic geography. Urbanization and national development are two genuine goals for most developing countries today. The teaching of urban-economic geography in higher institutions plays a significant role in helping to achieve these aims of national building. This is because the acquisitions of proper knowledge of urban growth and economic

[1] The first draft of this paper was presented at the *Conference on Southeast Asian Studies*, organized by the University of Malaya and held at Kota Kinabalu, Malaysia on 22-26 November 1977.

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processes will provide students with (i) a critical but accurate world outlook, and (ii) the necessary analytical ability to assist in development policy recommendation and implementation when they are required.

The purpose of this paper is to evaluate the teaching of urban-economic geography in Southeast Asian countries with special reference to the era since the introduction of methodological changes. Research workers in urban-economic geography are usually with a quantitative bias. It is hoped that an appraisal can be made on the contribution to national building of the teaching of this subject, which is normally regarded as the foremost subdiscipline in human geography after the revolution. Before the discussion, a brief examination of the development of urban-economic geography seems appropriate.

DEVELOPMENT OF URBAN-ECONOMIC GEOGRAPHY

Generally speaking, three approaches exist in urban-economic geography since the quantitative revolution. These are the logic positivistic approach, the phenomenological approach, and the 'radical' approach. The simple classification is neither exhaustive nor mutually exclusive. However, it serves our discussion purpose.

The quantitative revolution was in fact a revolution in research techniques in geography. Statistics, mathematics and other pertinent tools have been introduced into the discipline since the movement. Together with these techniques is the adoption of the methodological procedure in natural science, particularly in urban-economic geography. Geographic phenomena are treated in the same ways as objects in natural science. The introduction of positivistic approach suggests that the goals of urban-economic geographic investigations are to derive laws and theories as have been formulated in natural science.

In fact, the examination of geographic phenomena through the use of models, hypotheses and explanations was often suggested as the central feature throughout the revolution (e.g. Harvey, 1969). Statistics and mathematics are just two of the convenient means towards theory building (e.g. King, 1969; Wilson and Kirby, 1975). One of the contributions of the positivistic approach is the building of elegant quantitative-theoretic structures, although one of the active researchers argues that the approach adopted has yet to give birth to substantial trusts of intellectual inquiry in urban-economic geography (Wilson, 1972).

Under the positivistic approach, it is usually claimed that scientific analysis of any sort should be totally value-free. Values should be separated from facts. Urban-economic geographers with a quantitative bias thus assume that their findings are remote from any involvement in personal value judgment. Hence, they avoid any policy recommendation. Criticisms of this approach in social sciences emphasize the inappropriateness and inconsistencies of the alleged 'value-free' posi-

tions, which are criticized to be means to reinforce and even legitimize the status quo in society. In economics, such criticism is represented by, for example, Johnson (1971) and Ward (1972); in sociology by Giddens (1974); and in geography by Hurst (1972) and Harvey (1973), among others.

The emergence of phenomenological approach is claimed to be an answer to the problems incurred in the positivistic approach in urban-economic geography. The approach is based on the argument that fact should not be separated from value. And peoples' value, especially those relevant to social change, should be highly appreciated. Further, this approach argues that no statement is and can be value-free. A voice is thus raised for value geography (Chisholm, 1971; Sister Buttimer, 1974; Watson, 1977).

The two extreme approaches between the positivist and phenomenologist are irreconcilable. On the one hand, quantitative urban-economic geography is being criticized as anti-human, in spite of the impressive content of humanist literature of much writing in this subdiscipline. It is correctly argued by Bunge (1973) that 'it is true that some mathematical and theoretical work obfuscates the human condition, but this is a matter of misapplication rather than of the intrinsic inhuman quality of the work' (p. 332). On the other, the value-loaded researchers have yet to come out with explanations and theories as at least elegant as those they choose to discard. An important fact is that the dilemma between the two 'schools' are not so much of pure intellectual search of universal truth than of the safeguard of one's ideological standpoint. One may wonder if they are not both equally guilty of epistemological self-righteousness. Some thoughtful discussions of this philosophical issue can be found in, for example, MacIntyre (1973) and Walmsley (1974).

To some who find in the writings of Marx an appealing blueprint for social change, urban-economic geography should be embedded on the 'revolutionary' theory of spatial analysis. Anything that does not fall within this set of thought is considered 'counter-revolutionary'.[3]

The debate is still on and it is beyond the scope of this paper to deal with it in depth. Let us now examine how the teaching of urban-economic geography in Southeast Asia is affected by the contradiction, or more correctly, how do urban-economic geographers response to such a dilemma in their teaching and research.

HOW DO WE RESPOND

When the innovation of quantitative revolution was introduced to the various geography departments in Southeast Asian universities, it was, like the days when it emerged in North America and Northern Europe, not overwhelmingly accepted by the community. The story of

[3] The terms 'revolutionary' and 'counter-revolutionary' are taken from Harvey (1973).

qualitative-quantitative dilemma repeated itself once again, this time in this vast region of ours. However, it was quickly realized that there was no reward to steam the tide, the anti-change attitudes among some geographers gradually submerged. Although it is still difficult to get a new and useful course accepted into the geography curriculum, progress in this direction seems encouraging.

This does not imply that since then the teaching of urban-economic geography in Southeast Asia has been one with no obstacles. It is indeed unfortunate to note that at the beginning of the methodological change in the teaching of the subject in Southeast Asia, many of the enthusiasts in the quantitative movement, including this author, were not different from a group of deluded followers. They often failed to distinguish, for example, the means from the ends in quantification and methodological change in the discipline.

This phenomenon still prevails. For example, models and theories of urban-economic geography are introduced in lecture halls. Hypotheses of all kinds are 'tested' using rather sophisticated techniques and instruments in research. Students are spoon-fed with all kinds of jargons. All these are carried out without sufficient explanation of the philosophy and ideology behind them.

Most positivistic theories and explanations in today's urban-economic geography are established on the foundation of the principles of marketing economics. These principles are developed and flourished in the Western World to 'explain' a certain type of economic system. Many urban-economic geographers may have noticed this fact. Unfortunately, due to reasons to which we may later return, many urban-economic geography instructors in the developing countries tend to neglect the two related and fundamental issues in teaching and research. First, the basic philosophical and methodological problems of the various economic theories, on which the urban-economic geographic models and explanations are embedded, are usually of remote interest to these instructors. Students in the geography departments thus find it difficult to appreciate the theoretical contradictions among different geographic models. This makes learning a less stimulating process than otherwise. Second, course instructors usually fail to inquire the theoretical and operational validity of these models in explaining geographic phenomena of the developing countries, whose socio-economic system may not be identical to those where the models were initially established for. If these models are to be used to derive policy recommendation, the potential danger is obvious.

Hence, it is of immense importance to have an appraisal made on the applicability of each of these models and theories of urban-economic geography before they are utilized to explain our local geographical phenomena, or before they are introduced to our simple and unaffected students.

Examples of the carelessness in the part of the instructors are not hard to find. The teaching of central place theory and regional growth theory are just two cases in hand. The general equilibrium framework of Losch's central place theory demands a series of assumptions corresponding to a series of unknowns. Under this framework, the system is determinate, because the number of fulfilling equations equals the number of unknowns. The unknowns can then be elegantly derived. The end result is, understandably, not in an economic world. This metaphysics behind the theoretical equilibrium of the central place type space economy was even acknowledged by Losch himself.[4] It is true one should not base his criticism of a theory on its assumptions. It is equally true one should question the validity of that theory if it is far from reality and rationality.

The immediate issue here is not whether the central place theory should be taught. All geographers will agree it should. The question is whether the urban-economic geography instructor has honestly examined the theoretical implications of equilibrium versus disequilibrium frameworks in spatial economic system. The effects of central place theory on spatial development strategy implementation may not be adequately discussed in class. Besides, to my knowledge, not many urban-economic geographers in this part of the world show any interest in examining the how and why in utilizing dynamic central place theory to solve spatial problems. The theoretical issues in urban-economic geography are not well received by most of us. A lack of interest in theoretical investigation hinders, on the one hand, the shaping of an accurate world outlook, and on the other, a contribution in model and theory building in urban-economic geography. Consequences of such neglect are rather obvious.

The second example is the teaching of regional growth. Theories on regional growth and development have drawn a great deal of attentions in recent years, both in regional economics and in urban-economic geography. Again, when the topic is discussed in class, the urban-economic geography instructors, more often than not, tend to ignore the fundamental philosophical conflicts between the orthodox neoclassical growth economics and those of the Richardian economics, not to mention the differences between the two Cambridge Schools. As a result, contradictions that emerge from the convergence and divergence theories of regional growth cannot be systematically explained. The Cobb-Douglas production function equation is introduced without the necessary clarification, and the CES production function may not be discussed at all. Myrdal's circular cumulative causation model may be overwhelmingly emphasized, but its relationship with the convergence theory is usually not mentioned. The relationship is explained by Mura-

[4] See Losch (1954), pp. 355-6.

yama (1960, 1963) through an analogy to the mutual feedback cybernatic system.[5]

One may argue that geographers have little to do with economics. It is not fair to impose such constraint that every urban-economic geographer should have a good knowledge in economic theory. However, this argument may not hold in today's situation. Economic Geography is a knowledge dealing with the arrangement and control of the spatial allocation of the earth's scarce resources. The economic geography of today is evidently different from that twenty years ago, which concerned mainly on the distribution pattern of economic activities in defined areas. Economic geography today is analyzed utilizing a systems approach and is considered to be an introduction to geocybernetics. Hence, a knowledge in economic theory has become a fundamental necessity.

An urban-economic geographer should not only know how to tackle problems, but also to recognize and to frame his or her problems. In other words, the geographer is expected to have some knowledge in other related subjects, such as mathematics, operations research, statistics, and human behaviour, in addition to economics. This condition also applies to other social scientists who show an interest in understanding and solving problems related to human activities. The combination of knowledge required may differ from person to person. Interdisciplinary study should be carried out first within the individual scientist concerned, and then among the related disciplines, but not the other way round. Otherwise, everyone will still be doing his own things, even if they are put together. Without knowing the other scientists' language, you cannot communicate, let alone any interdisciplinary studies. If this preposition holds, urban-economic geographers in Southeast Asia have a bit of home works to do. In case anyone misinterprets this remark as pointing a finger at anyone particular group, let me assure that all of us were careless about the issue, and there was and is no way that we could or can escape from such obligation to improve ourselves.

Many urban-economic geographers in Southeast Asia are aware of the importance of policy recommendation in the context of national building. Many have also taken an active part in shaping development policies. It is beyond doubt that social sciences, including urban-economic geography, must contribute to social policy and the shaping of social change. However, here is where a contradiction may occur between pure scientific pursuit and individual value judgment. The personal value judgment of an individual will effectively affect his or

[5] Murayama (1960, 1963) argues that the divergence theory of regional growth resembles a deviation-amplifying effect in the feedback system. The feedback system for the convergence theory is deviation-counteracting in character. In other words, the mutual feedback between elements are negative. It is positive in the deviation-amplifying system.

her choice of research problem, and path of analysis and policy recommendation. No decision making of any sort can be made without moral judgments creeping in. The judgments that we make arise from the ethical preconceptions that have soaked in our view of life. In the course of teaching urban-economic geography, the instructors have an obligation to induce discussions of relevant policy recommendations. How to adequately investigate the issue at hand, using a positivistic approach and at the same time introduce to the students a set of correct value judgment remains a problem that deserves further careful thinkings. King's (1976) argument for a 'middle course' in urban-economic geography may be just one of the many alternatives.

CONCLUSION

This paper began with a brief introduction of the development of urban-economic geography since the quantitative revolution. A comment was then made on the teaching of the subject in the developing countries, with reference to Southeast Asia. It is not the intention of this author to examine the urban-economic geography curriculum of each of the geography departments in this area. Nor is there an intention to demonstrate how the subject ought to be taught, although an emphasis on the understanding of the subject matter and its relation to other subjects has been implicitly made.

In conclusion, at least three general observations can be made. First, it is assumed that the need for quantitative analysis and the teaching of it in urban-economic geography will increase rather than decrease in the future. Models and theories resemble those in natural sciences will be utilized more often than before in solving geographic problems. Hence, urban-economic geography instructors are facing with an obligation to ensure that only appropriate models and theories are used. A careful introduction of the ideological and philosophical foundation of these models and theories seems a necessity in class. This is to avoid introducing to our students a wrong world outlook.

Second, few will deny that our students have to be provided with the ability to frame and solve their own urban-economic geographic problems, and to make the necessary policy recommendation whenever required. Urban-economic geography has an important role to play in national building. How to optimize our knowledge about the subject in the context of policy recommendation deserves our careful thinking. Value judgments, particularly those related to social change, have to be introduced at the appropriate occasion, for no statement in social sciences can be absolutely value-free. How to say and what to say are of immense importance, for he the urban-economic geographer is both a teacher and a citizen. The two functions may not have to be identical.

Third, existing models and theories in urban-economic geography are inadequate in explaining some of the geographic phenomena of the developing countries. As researchers, we are obliged to contribute our efforts in model and theory building towards the explanation of these phenomena. More attentions have to be made than before in the field of theoretical investigation. The whole academic community will also be enriched by such an effort.

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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 April-May-June, 1978.

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2. Sent to others than paid subscribers	540
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