

PHILIPPINE GEOGRAPHICAL JOURNAL

VOLUME XXVI

January-February-March, 1982

NO. 1

ARTICLES

	<i>Page</i>
Tadlak (Alligator) Lake, Laguna Philippines <i>by Ramon L. Samaniego</i>	1
East Asian Urbanization in a Worldwide Context <i>by Jacques Denis</i>	16
Tropical Cyclone in the Western North Pacific <i>by Sheng-I Hsu</i>	25
Residential Segregation Among Occupational Groups in Cagayan de Oro <i>by Michael A. Costello and Marilou Palabrica-Costello</i>	37
Origin and Distribution of Mango <i>by N. D. Bondad</i>	44

PUBLISHED QUARTERLY BY

**The PHILIPPINE GEOGRAPHICAL SOCIETY
And The NATIONAL COMMITTEE
ON GEOGRAPHICAL SCIENCES, NRCP
MANILA, PHILIPPINES**

The Council of the Philippine Geographical Society

Officers for 1981-1983

DOMINADOR Z. ROSELL, *President*
DOMINGO C. SALITA, *Vice-President*
DOROTEA M. CORPUZ, *Secretary*
AURORA S. TOLENTINO, *Treasurer*
ARTEMIO E. GESMUNDO, *Director*
FELICIANO M. LAPID, *Director*
RAMON L. SAMANIEGO, *Director*

Fellows, Philippine Geographical Society (FPGS, 1980)

PROF. ARTURO P. ALCARAZ
PROF. DOMINADOR Z. ROSELL
DR. DOMINGO C. SALITA
DR. RAMON L. SAMANIEGO
No. of Life Members (Feb. '82) — 43

Honorary Members

BRIG. GEN. GUILLERMO PECACHE (1979)
DR. CELSO R. ROQUE (1979)
DR. ONOFRE D. CORPUZ (1980)

Geography Awardees

DEAN EMERITUS FLORENCIO TAMESIS (1975)
DR. FILEMON C. RODRIGUEZ (1980)
DR. GERARDO P. SICAT (1980)

The Philippine Geographical Journal

DOMINADOR Z. ROSELL, *Editor-in-Chief and Business Manager*
FELICIANO M. LAPID, *Assistant Business Manager and Editorial Consultant*
LYDIA PARAISO-ORDOÑEZ, *Managing Editor*
AURORA S. TOLENTINO, *Assistant Editor*
DOROTEA M. CORPUZ, *Assistant Editor*
SHIRLEY CONDE-ESTRELLON, *Secretary*
MANUEL P. POLIQUIT, *Circulation Assistant*

Contributing Editors

REV. MIGUEL M. VARELA, S.J.
Representing Div. I, NRCP
DR. DOMINADOR CANLAS
Representing Div. II, NRCP
DR. ANDRES L. REYES, JR.
Representing Div. III, NRCP
PROF. BIENVENIDO T. MIRANDA
Representing Div. IV, NRCP
DR. JOSE VERA SANTOS
Representing Div. V, NRCP
DR. MELITON U. ORDILLAS
Chairman, Div. VII, NRCP
DR. TEODORO M. SANTOS
Representing Div. VIII, NRCP

—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 the National Committee on Geographical Sciences (NCGS), National Research Council of the Philippines (NRCP) and is sent to all members of the Society.

Subscription Rates: Philippines per year — — — P8.50
Foreign countries, per year — US\$8.50

Single copy, regular issue, local — P2.15; foreign — US\$2.15
special issue, local — P4.25; foreign — US\$4.25

All remittances should be 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.

5

The
PHILIPPINE GEOGRAPHICAL JOURNAL

VOL. XXVI

JANUARY-FEBRUARY-MARCH, 1982

NUMBER 1

**TADLAK (ALLIGATOR) LAKE
LAGUNA, PHILIPPINES**

by

RAMON L. SAMANIEGO*

Enchanted Lake is called locally by the inhabitants as "Dagat-dagatan" meaning "small sea". Some maps record the lake as "Alligator Lake", "Lawang buwaya", "Laguna des Laymames". The name was perhaps explained by early accounts of the presence of alligators in the lake. There are, however, present inhabitants who accept the explanation that the profile of the low lying hills resemble that of an alligator and they point to the head, body and tail of the profile.

Gironiere called the lake "Sucolme" after the Barrio Sucol. Hilbero reports that the place mentioned by Jose Rizal in his "El Filibusterismo" as Tiyani must be the same lake. This is supported by the fact that a school near Masili and Sucol is named Mababang Paaralan ng Tiyani.

General Description

Barangay Tادلak has 92 households and 542 inhabitants (as of October 1977). The means of livelihood is generally fishing. There are a few masons, carpenters, and employees at UPLB, PCARR, etc.

There is a primary school which offers classes up to Grade III. There is a small hollow-block barangay hall; a hollow-block chapel has been started and a Sweepstakes Health Center, constructed in 1963, has been repaired and repainted by a Rural Service Team assigned to Tادلak on April 16-30, 1978.

There had been thriving communities in Tادلak since Spanish, American, and Japanese occupations. In 1945 most of the females were massacred by the retreating Japanese Army. At present many of the inhabitants are immigrants to the place. About 1958 the Pacific Pulp and Paper Company was established, and this provided employment for some of the people. Sometime in 1968 a boiler exploded and since then

* Director — Philippine Geographical Society and Professor Agricultural Chemistry, University of the Philippines at Los Baños (UPLB).

operations have not been resumed. This is due to an erratic and undependable supply of power.

TADLAK

Part I

Location

Barangay Tadalak, one of the 13 barangays of the municipality of Los Baños, is located in the northwestern portion of Los Baños. It is bounded on the west by Sucol and Masili of Calamba, on the south by Lalakay, on the east by Bambang, and on the north by Laguna lake.

The area is uncertain. The definite boundaries are hazy since the results of the cadastral survey of Los Baños are still unavailable.

It is generally hilly with a very narrow lakeshore line which varies with the tide and on which are spread out most of the houses. In the center of the barangay is the Enchanted Lake which is separated from Laguna lake only by a thin mountain wall (Fig. 1).

Names

There is no known record of the origin of the name Tadalak. A Gironiere map of 1854 indicates the place as Tarlac. A 1910 Bureau of Lands map labels the place as Tarlac. This may have been a typographical error, but the "error" has appeared in the many subsequent official maps. A 1963 Coast and Geodetic Survey Hydrographic map still records it as Tarlac.

According to Hilbero, the official name Enchanted Lake was proposed by historian Carlos Quirino, former Director of the National Library. This proposal was endorsed by the National Historical Committee and on June 22, 1969 was approved by then Assistant Executive Secretary Jose J. Leido, Jr. The name, however, is not new. As early as 1830, two Spaniards, Pedro Martinez and General Lava who visited Sucol and Masili referred to it as La Laguna Encantada.

Enchanted Lake has an area of 25 hectares which is about half that of Sampaloc Lake (40 ha). The narrowest portion of the mountain wall is about 20 meters. The water level is 6 feet higher than that of Laguna de Bay. Many towns people believe that the lake is bottomless. A more conservative statement would be that Enchanted Lake is one of the deepest fresh water bodies in the Philippines. Gironiere in 1853 reported that the lake is 2 km. long and 1 km. wide; the deepest part is 300 ft.; a few fathoms from the shore, the depth is invariably 180 ft. More recent soundings by navy frogmen indicate a depth of 192 ft.

The Bureau of Fisheries has stocked the lake with *bangus* and *tilapia* fingerlings. Other fishes such as *bangayngay*, *ayungin*, *biya*, *dalag*, *palos*, *carpa*, *rojo* are also caught in the lake. Closed fishing season,



FIG. I. ENCHANTED LAKE IN THE NEAR FOREGROUND SURROUNDED BY BARANGAY TADLAK HOUSES. TO THE RIGHT IS A PORTION OF LAGUNA DE BAY.

however, is strictly enforced from January to November. On December 22, 23, 24, and 25 the Barangay Council allows fishing in the lake. During this period the concentration of sulfur dioxide in the water increases, so the fishes congregate near the surface in an attempt to breath in more oxygen. The Barangay Council limits the number of *pante* (gills nets) that can be used to 4 per family, and the *pante* shall be only 5½, 6, 6½ ft. wide. During this open season, the catch shall be weighed and a fee of ₱0.50 per kg. shall be paid. On the eastern shore of the lake, fish pens have been established (Fig. 2).

The lake has beautiful scenic areas, and is used for swimming, water skiing, and picnics. Roger Olivares, in his "Do-it-yourself Tours to Philippine major attractions" (1973) and in a brochure of the Tourist Association of Laguna "Glimpses of Laguna" (1973), reports that there are plans of converting the lake and the surrounding area of about 40 hectares into a Resort Complex.

How to go to Tadlak

Tadlak is accessible by road, railroad, and by water.

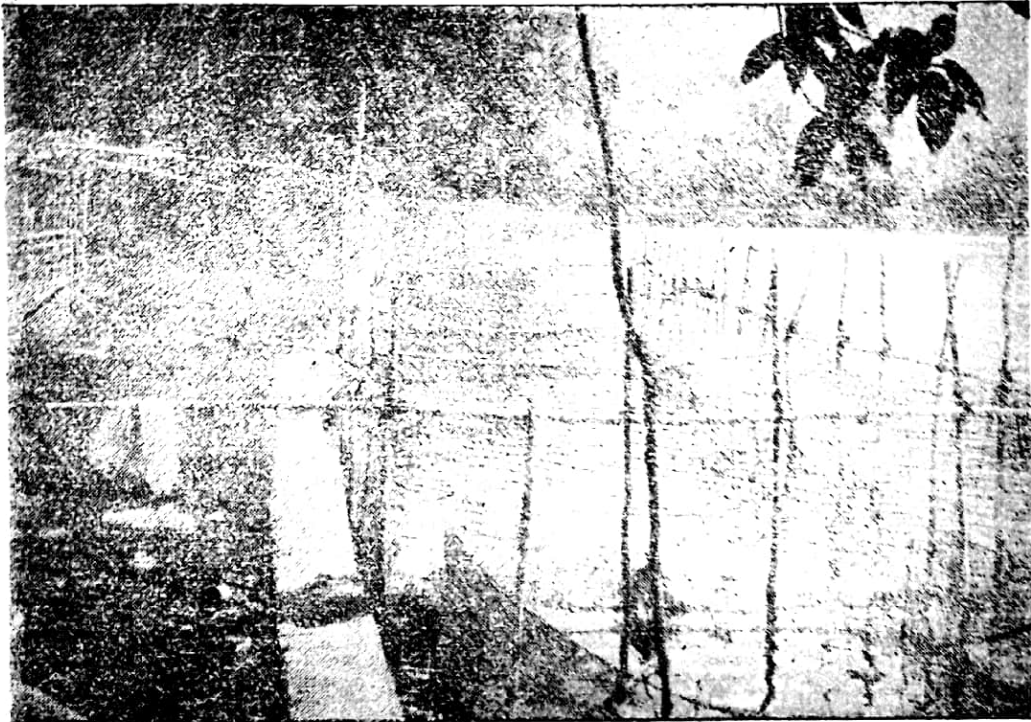


FIG. 2. FISH PENS IN TADLAK LAKE



FIG. 3. BARRIO ROAD TO TADLAK

Coming from Manila, along the National Highway at km 60, turn left at Bagong Karsada until just beyond the railroad, turn right on the barrio road which is on National Railway property. Follow the road turning to the heart of Tadalak. There are no regular jeepney lines. Tricycles are available at the National Highway Crossing — P1.00/person/trip to Tadalak (Fig. 3).

It is also accessible by "trolley" car from Camp Eldridge or Bambang. This car is a small light framed 4-wheeled vehicle designed to travel on the railroad track. It is propelled by foot pushing against the track. It can conveniently seat 4 and can be lifted off and away by the small boy operator when there is an oncoming train (which has the right of way). A trolley can be constructed for P60.00-P100.00. Fare costs P.30 from Camp Eldridge and P.50 from Bambang. These trolleys are operated by "tolerance" of the Philippine National Railways.

Tadalak can also be reached by bancas — plain or motorized from Dalang Pasigan, Rizal Park near the Municipal Hall of Los Baños. There are no commercial scheduled lines, but it is easy to "hitch hike" a ride from boat owners (Fig. 4).

Early Visitors

A number of foreigners who visited Enchanted Lake wrote about their experiences, observations, and impressions.

Paul P. dela Gironiere, a Frenchman, wrote in 1853 the popular "Vingt Anées Aux Philippines". The following year an expanded version was published also in French. The English translation "Twenty years in the Philippines" was published in London in 1854. In 1962 the Filipiniana Book guild started to publish books of history and travel on the Philippines which have been out of print for many years. This valuable public service was limited by the size of the edition (1,000 copies and later, 1,500). In 1972 Burke Mialhe Publications came out with a cheap paper back 9th revised edition.

Gironiere exaggerates often and there are doubts about the veracity of each and every incident recounted in his book, but this may have been an exercise in literacy license. His writing, however, has a certain freshness and vividness that is significant for today's readers.

An excerpt about Enchanted Lake, which he referred to as Socolme is as follows:

"When it was in my power, I would accompany my guests in their excursions, and when the chase was abundant and full of interest, because I ever took care to guide them towards places abounding in game and very picturesque. Sometimes I would take them to the isle of Socolme, a still more curious place indeed than the bat islands. Socolme is a circular lake — being one league (about 3 miles) in circumference — in the midst of



FIG. 4. BOAT TRANSPORTATION TO TADLAK

the great lake of Bay, from which it is separated by a cordon or ribbon of land; or, to express myself better, by a mountain which rises to an elevation of from twelve to fifteen hundred feet; the centre of the mountain at the summit is occupied by the lake of Socolme, and is evidently the crater of an extinct volcano. Both sides are completely covered with large trees of luxuriant growth. It is on the border of the small lake — where the Indians never go, through fear of the caymans — that almost all the aquatic birds of the grand lake resort to lay their eggs. Every tree, white with the guano which they deposit there, is covered with birds' nests, full of eggs and birds of every size and age.

One day, in company of my brother and Mr. Hamilton Lindsay, an Englishman who was as fearless an explorer as ourselves, I started from the plantation, with the intention of having some light canoes carried across the high ground which separates the Socolme lake from the lake of Bay, and of using them on the lake and after overcoming many difficulties, we, by the assistance of our Indians, carried out this project."

"We were the first tourists that ever ventured to expose our lives on this Socolme lake. The Indians who had come with us refused most decidedly to enter the boats, and exerted all their eloquence to prevent us from going on the water. They spoke to us thus:

"You are going for no good purpose to expose yourselves to very great dangers, against which you have no means of defense, for before you have gone far you will see thousands of caymans rising out of the deep water; they will come to

attack you, and what can you oppose to those ferocious and invulnerable monsters? Your guns and bullets cannot wound them. And as for escape by rowing quickly, that is not possible. In their own element they swim much faster than your canoes, and when they come up to you they will turn your boats upside down with far more ease than you can drive it along; and then the frightful scene will begin, from which you cannot escape."

But we were never deterred by dangers or difficulties; so, taking no account of the prognostics of my prudent Indians, we, while they were delivering their long speeches, had lashed together two canoes for greater security.

We had not proceeded many yards from the bank when we all experienced feelings of alarm, attributable, no doubt, to the expectation of danger being immediate, as well as to the aspect of the place which presented itself to our view.

We were down in the deepest part of a gulf, surrounded by lofty and precipitous mountains, which were externally covered with very thick vegetation. They, on all sides, presented a barrier through which it was impossible to pass. The shadows which they cast over the water, at the extreme point of the lake, produced the effect of half darkness which, in conjunction with the silence prevailing in that dismal solitude, gave it an aspect so dreary and saddening, as to produce in us most painful feelings; each of us as it were, struck with terror, kept his thought to himself and no one spoke.

Our canoes went on, moving farther and farther from the brink from which we had embarked; and it glided easily over the glassy sheet of water, which is never agitated by even the roughest gales, and does not receive the rays of the sun except when that luminary is at the zenith.

The silence in which we were absorbed was suddenly broken by the appearance of a cayman, which raised its hideous head, and opened its enormous jaws, as if about to swallow the canoes, as it darted after us.

The moment was come; the grand drama announced by the Indians was about to be realized, or all our fears would be dissipated without any delay. There was not one instant to be spared and we had no choice but to try and escape as fast as we could, for the enemy was gaining on us, and it would be madness to await his attack. I was steering and I exerted myself to the utmost to get away from the danger and to escape to the shore. But the amphibious beast was approaching so fast that he could almost seize us when Lindsay, running all risks, fired his gun direct at the brute.

The effect produced by the detonation was prodigious for, as it were by enchantment, it dispelled all our apprehension. The awful silence was broken in the most striking manner, the cayman was frightened, and sank abruptly to the bottom of the lake, hundred of echoes resounded from all sides, like the discharges of a rifle corps, and these were repeated to the tops of the mountains, while clouds of cormorants, starting from all the trees around, uttered their screaming and piercing cries, in which they were joined by the Indians, who shouted with joy

on seeing from the bank the flight of the hostile beast, of which they are always so much afraid.

All then became tranquil, and we proceeded at our leisure. From time to time a cayman made his appearance, but the explosions caused by our firing soon drove the monsters down into the deepest parts of the lake, more frightened than hurt, for even when we struck them our balls rebounded from their scales without piercing them.

We went to the large trees, the branches of which were spreading over the water, they were thickly covered with nests, filled with eggs, and so great a quantity of young birds, that we not only captured as many as we wished, but could have filled several boats with them.

The cormorants, alarmed by the explosions we made, whirled over us continually like an immense cloud during the time we troubled their gloomy abode, and seemed to "disturb their solitary reign", but they did not wish to go far from their nests, in which their young broods were crying out for parental care.

After we had rowed round the lake, we came to the spot from which we started, having ended our expedition happily without any accident, and even without having incurred all the dangers that our Indians, who were awaiting our return in order to take our boats once more across the mountain, had wished to make us believe.

Resolved not to finish the excursion without producing some beneficial results for the sake of scientific knowledge, we measured the circumference of the lake, which we found to be about two miles and a half. We were able to take soundings in the deepest parts towards the middle, where we found the depth about three hundred feet; while in another part, one hundred and eighty feet. And here the remark may be made, that in no part of the great lake of Bay has the depth been found to exceed seventy-five feet; from which it may be concluded, as we have previously stated, that the lake of Socolme is formed within the crater of an extinct volcano, its waters having percolated or filtered through from the outer lake of Bay."

In 1856 the Austrian government dispatched the frigate "Novara" under the command of Commodore Wullerstroff-Urbarr on a three year cruise to remote quarters of the globe. Dr. Karl Scherzer, member of the expedition, wrote the "Narrative of the Circumnavigation of the globe by the Austrian frigate Novara" in the years 1857, 1858, 1859, an English translation was printed in 1862. In 1974, the Filipiniana Book Guild published in Vol. XXII "Travel Accounts of the Islands" the whole English translation. His visit to Enchanted Lake was described as follows:

The main object and ever-memorable result of our excursion was Laguna Encantada (or Enchanted Lake, — the Socol of the Tagalese), distance not much more than a mile from Los Baños. Volcanic agency and tropical beauty have combined to prepare here one of the most singular and mysterious phenomena that the eye of man may ever behold. Although this small lake is only

separated by a low hill from the larger basin, yet the approach to it is extremely troublesome and arduous. It is necessary here and there to use one's hands, in order to creep through the brushwood along the steep wall of rock, till the shore of the lake is at last reached. Even the very "dug-outs", in which the lake is to be navigated, have to be transported over this lonely inhospitable hill. As enjoys the unenviable reputation of being the haunt of numbers of ravenous crocodiles, which have on several occasions overturned the light canoes navigating it at the time, and without further ceremony devoured their crews, the natives had learned to take the precaution of binding two or three canoes close together with bamboos and cords, in order to diminish the risk of being overturned while boating on this dreary haunt of "caymano."

While the natives were getting ready this handsome specimen of a craft, we stood on the shore, every one absorbed in gazing at this singular natural picture. Calm and mysterious—looking in the lake lay before us, a circular basin, of a deep green from innumerable almost microscopic water plants, unfathomable, if we may trust common report, and enclosed by a crater-like wall of lava-blocks. All along the shore grew the tropical forest; gigantic primeval trunks, wildly festooned with wondrously luxuriant creepers, raised their towering crests, their splendid coronets of leaves reflected in the calm mirror below, and casting the lake in every corner into a dusky, shadowy obscurity of outline. From the topmost branches of the trees were suspended huge brown, indistinct-looking fruits. There was death-like silence all around. Only at fitful intervals might be distinguished the note of a bird, or the muttered growl of distant thunder. We now got into our canoes and rowed silently over the waters of the lake. As though to add to the interest of the adventure, there came on the rain pretty heavily. Some of the party followed the very practical custom of the natives, who forthwith divested themselves of their clothing, and left the rain to beat upon their naked bodies, while they put their dresses under the seats of the boat to prevent their being soaked. Fortunately, the alligators at no time made their appearance in such numbers as the tales of the natives had led us to anticipate. We saw but one of these monsters, apparently about 15 feet long, who however speedily dived out of our sight. Our guides maintained it would be advisable to take a dog with us, whose howl would have aroused the alligators and brought them up to the surface in hope as of prey. Indeed people frequently sacrifice dogs in order to entice these rapacious monsters from their haunts for the purpose of hunting them.

If however disappointed in this spectacle, we were recompensed by another not less peculiar. For hardly had a shot been fired at one of water-fowls which were skimming to and fro over the lake, than at once tree and thicket seemed filled with life. Birds of all kinds, screaming and whirring, fluttered about or dashed wildly against each other on every side. Thousands that had been sitting on the beach concealed in the deep shade, wood-pigeons and legions of gigantic bats, which had been suddenly frightened out of their listless repose, now flew about

directly before the murderous fowling-pieces. The singular-looking fruits which seemed to be so strangely dependent from the trees, were transformed into Kaiong bats (*Pteropus edulis*), and flew about in immense flocks that obscure the light of day, directly over our heads, hastily seeking a shelter in the forest, which should hide them from the gaze of the sportsmen. Probably we should have brought down some of these singular animals, had not our fowling-pieces, owing to the incessant pour of rain, got so thoroughly out of order that we had to content ourselves with getting a very few specimens for our zoological collection.

Philip Wood, who worked for the then Smith Wood, now the Smith-Bell Co. wrote in his diary for March 10, 1881 an account of his visit to Enchanted Lake. This is published in the book "Under Four Flags — The Story of Smith Bell in the Philippines", Bristol, England, undated.

1881

"The next morning we were under way by dawn, and got safely into the lake after one short stick in the river. We landed on the delta, and had some shooting (this must be a very good place in the snipe season), and then set out for Los Baños. Arriving there about noon, we anchored in the bay, and landed as soon as the great heat was over to have a look at the Enchanted Lake; this is a pretty little circular sheet of water, separated by a very narrow neck from the large lake, and having all the appearance of the crater of an extinct volcano. The local people firmly believe it is bottomless, and the Spaniards, it appears, have never taken the trouble to sound it properly. It is certainly much deeper than any part of the big lake. It also contains alligators, which are known elsewhere in this part of Luzon, but we did not see any, though we went around the place twice in bancas, shooting several iguanos and waterfowl for the Filipinos who were with us. Among the birds were several samples of a remarkably pretty kind of heron, the names of which we could not determine. But Luzon abounds in beautiful birds, the most brilliant of which (so far as I have seen them) are the yellow mango bird, and the larger kingfisher, which is brown and blue."

Joseph Earle Stevens, ex-resident of Manila wrote a colloquial chronicle about "Yesterdays in the Philippines". This was reprinted in 1968 by the Filipiniana Book Guild in Vol. XIII "The Philippines Circa 1900".

His description of Enchanted Lake then can fit the lake today. He related an interesting story connected with the lake:

We anchored near a little settlement, Los Boños, shortly before midnight. The deck planking did not make a soft bed, but nevertheless, the snoring soon became hard likewise, and Sunday morning found us refreshed by the bracing air of the provinces. The rain had cleared away, and after an early breakfast the pilot ran the launch slowly ashore on smooth beach, beneath a high bank fringed with bamboo. The gang-plank was run out, and several of our little party started off

with guns to get some duck, snipe, and pigeons, which were plentiful in the jungle beyond.

Those of us who were left, with a couple of native guides, climbed up the steep slopes of an extinct volcano to explore a so called "Enchanted Lake" that occupied the low crater. The way led past several ponds filled to overflowing with pink pond-lilies, and, as we wound up along the rising knolls, the air was as fragrant as that of a greenhouse. Then came a short climb which brought us to the crater's edge. The Enchanted Lake lay like a mirror below, and the rich foliage all about was almost perfectly reflected in the still, green water.

The locality being romantic, it is quite regular that there should be connected with it an interesting story which seems to bear on its face the evidences of truth. It seems there used to live a fisherman and his wife hard by the sloping banks that surround the Enchanted Lake. One day, so the story goes, the fisherman's spouse had reason to suspect the fidelity of her husband, and aflame with pious rage, she concocted a scheme to rid herself of her worser half. Calling upon two rival fishermen whose hut was not far distant, she promised them the large amount of twelve dollars if they would put her husband out of the way. This being a pot of money to them, they agreed to her proposition, and during one of the next excursions out to the distant fish-weirs in the parent lake below, contrived to tip him overboard and hold him under. Coming back in the afternoon, they went to the hut of the freshly made widow and demanded the twelve dollars.

"I can give you but six," said she, "for I'm hard up."

"But you promised us twelve if we would do the business", said they.

"But I tell you I can give you but six," responded the widow. "Take that or nothing."

Angry at having been thus deceived, the two murderers excitedly paddled over to the neighboring village of Los Baños, went to the cuartel, presided over by a Spanish official, and addressed him with these words:

"A lady over there by the Enchanted Lake promised us twelve dollars if we would kill her husband. We have done the job and asked for our money, but she will only give us six. We want you to arrest her."

The official, thinking the whole thing a joke, laughingly said he would attend to the matter. The two simple-minded criminals went off, apparently satisfied, and disappeared.

Later, our friend the official thought there might be some truth behind the apparent absurdity of the yarn, and on investigation found that a murder had actually been committed. But someone more credulous than the Spaniard have a friendly warning to the committers of the deed, and they were not brought to justice until some months afterward. Such is the comparative esteem in which the native holds human life and Mexican dollars.

Demetrio L. Hilbero wrote "Ang Hiwaga at Suliranin ng Lawang Encantada" in the Souvenir Magazine of the Mabuhay ang Filipino Movement, Calamba, Laguna, June 19, 1974 1st Anniversary. He reported that in 1889 an American trader released in the lake some live alligators from Florida, U.S. The idea was to culture them to provide a ready steady source of alligator leather for the bag and shoe factory he intended to put up. For one reason or another, the alligators were unable to adjust themselves to their new environment and the last survivor was seen dead in 1920.

PART II

In October 1977 a Census of the Population, Economic and Social Characteristics of Barangay Tادلak was undertaken. By November 2-3, 1977 the raw data has been compiled and presented in usable form. The raw data are kept in the "archives" of the Department of Local Government at Los Baños. There is only one remaining copy of the compiled data, also in the custody of the Department of Local Government (Mrs. Carmelita L. Pamuspusan, Municipal Development Officer).

In the original questionnaire, some questions were vague and so the responses were equally indeterminate. Many blanks remained unfilled, perhaps for fear that such data may be used to their disadvantage. Many of the sums do not tally. In spite of these minor discrepancies, as a whole, the census provides a wealth of valuable information that may serve as basis for policy making, development plans, etc.

Demographic Characteristics of Tادلak

Number of households. — There are 92 households and 542 inhabitants. The average household then has 5 members.

Sex distribution. — Of the 542 inhabitants 292 are males and 250 females. This is a sex ratio of nearly 1:1.

Civil status. — There are 164 inhabitants below 10 years. Why 10 years was made the dividing line between the marriageable and those that are not is not explained. There are 185 singles, 177 married, 14 widows or widowers and 2 are separated or divorced.

Population by age groups. — The age distribution is as follows:

Age group	Number
0 - 6 years	111
7 - 12	93
13 - 14	37
15 - 18	43
18 - 21	43
22 - 45	152
46 and above	63
Total	542

There are 202 inhabitants below 12 years, 327 below 21 years, and 63 above 46 years.

Population by educational levels. — It is not clear to which age group these educational levels refer to. Likely it is the "adult" population. Of these who responded 19 had no schooling, 142 had some elementary education, 42 graduated from the elementary schools, 5 are high school graduates and 7 had some college education of less than 4 years.

Population by dialects. — The inhabitants are predominantly Tagalogs. There are 501 who speak Tagalog, 24 Bicol, 2 Ilocano, 10 Waray, 2 Pangasinan, 5 Pampango and 7 speak Mandarin.

Population by religion. — Almost all the families are Catholics. There are 86 Catholic households, 1 Protestant, no Iglesia ni Cristo, Aglipayan nor Islam and 5 are Sabadistas.

Economic Characteristics

Population by economic activity. — Does economically active mean those with gainful occupation? Does economically inactive refer to those who are unemployed, jobless, without means of livelihood? Do both categories include only the adult population? All these are unclear. Of the total population 164 are reported to be economically active and 185 are not active. Many are unaccounted for.

Household incomes. — The 92 households reported a total annual income of ₱374,365.85. This amounts to an average annual income per household of ₱4,069.19. If spread evenly over the 542 inhabitants, the per capita income is ₱697.10. In a sense, the average figure is deceptive. A few big incomes might offset many small incomes. An income distribution by ranges would present a better picture but this data is not available.

Appliances. — The appliances enjoyed by a household or a community is indicative of the economic level of that household or community. In Barangay Tادلak the 92 households reported 65 radios, 4 electric ovens, 2 refrigerators, 3 stereos, 5 televisions, 4 electric fans, 8 sewing machines and 64 gas cooking stoves. The numbers of battery operated radios and gas cooking stoves are significant. No doubt that when rural electrification reach Tادلak there will be more electrical appliances.

Number of boats, fish pens, fish corrals, fishing nets. — The means of livelihood of the people is mostly fishing. There is hardly any agriculture to speak of. A very important possession of a fisherman is a boat, yet only 20 motorized bancas and 12 without motors have been reported. Casual observations of the Laguna Lake shore bordering

Tadlak and the eastern shore of Enchanted Lake show a number of fish corrals, fish pens, lily bombons, but there are no statistical data compiled about them. Many households possess gill nets (pante). These are also unrecorded.

Number of chickens, ducks, pigs. — Except for one poultry establishment of commercial scale, all the rest of domestic animal raising are backyard affairs.

Environmental Characteristics

Types of residences. — Of the 92 households, 22 live in bungalow-type houses, 7 in 2 story houses, 21 in shanties (barong-barong), 16 occupy rooms only, and 26 live in nipa houses.

Ownership of residences. — Of the 92 households, 73 own their residences, 3 rent their houses, 12 stay with relatives, and the rest of the 4 did not fill the proper blanks.

Types of lighting facilities. — Only five households reported that they are enjoying electrical power. Three of them are close to Masili and are served by Philpodeco. One family generates its own electricity. The rest rely on kerosene for lighting purposes. The establishment of rural electrification in Tadlak is beset with many legal problems, and court litigations are going on.

Water sources. — A 3/4 inch pipe which is connected to Camp Eldridge (Los Baños Water District) runs along the barangay road, but this has long been non-functional. So the 77 households that reported that their source of water is the LBWD is not really getting water from there. There are 13 households that own shallow pumps, 4 with deep wells, and 18 with shallow wells. For laundry and domestic purposes, the waters of the 2 lakes are sufficiently suitable, but for drinking, water has to be brought over the Camp Eldridge by trolley or from Los Baños by banca. The LBWD has surveyed Tadlak and there is a feasibility study for laying out 2-inch pipe system.

Types of toilets. — There are 9 flush water sealed toilets, 47 open-pit Antipolo toilets, and 20 palikurang bayan. Where many of the populace dispose of their human waste can be anybody's guess.

Types of garbage disposal. — Most of the families, 83 of them burn their garbage, 7 dispose of them in pits and 3 just pile them in some corner of the yard.

Types of drainage. — About 1/3 of the households disposes of their waste water in culvert-open canals, 16 just allow them to stand, 30 reported blind drainage, whatever that means, the rest did not mention anything.

Health Practices

Medical and Dental Services. — There are 62 households that take advantage of the medical services of the Rural Health Unit and 32 that consult private doctors when necessary. There are also 71 families that consulted the RHU for their dental problems and 15 go to private dentists.

Family Planning Practices. — Only 36 households reported that they are practicing family planning. Of these, 12 use pills, 10 the rhythm method, 6 IUD, and 8 either condom or withdrawal. Almost all obtained their information from the Rural Health Unit. Of those who do not practice any form of family planning, various reasons were given — still childless, only one child, husband does not like to, not concerned, newly married, already reached menopause, no longer child-bearing, widow-afraid, lack of information.

Social Characteristics

Source of News. — The following were the sources of news in the community: newspapers, 34 individuals, friends 9, teacher 1, radio 79, neighbors 33, television 9, barangay officials 18. The transistorized battery operated radio has become so cheap that it is within the means of practically everyone. It is good source of news and entertainment.

Reading Material. — The comics were the most popular form of reading material. There were twice as many readers of comics as there were of newspapers. There were 60 readers of comics, 34 of newspapers, 33 of magazines and 3 also read pamphlets.

Education is the acquisition of the art of the utilization of knowledge. This is an art very difficult to impart. Whenever a textbook of real educational worth is written, you may be quite certain that some reviewer will say that will be difficult to teach from it. Of course it will be difficult to teach from it. If it were easy, the book ought to be burned; for it cannot be education. In education, as elsewhere, the broad primrose path leads to a nasty place. This evil is represented by a book or a set of lectures which will practically enable the student to learn by heart all the questions likely to be asked at the next external examination. A. N. WHITEHEAD.

EAST ASIAN URBANIZATION IN A WORLDWIDE CONTEXT

by

JACQUES DENIS*

One of the most striking problems facing our generation is the rapidly developing process of urbanization all over the world. Whether in developed countries or in newly industrializing nations, one can see a general trend of millions and millions of people moving from the countryside to the cities and, in the first instance, to the biggest ones.

This has happened in America as in Western European countries. The same phenomenon is now occurring in Africa, involving such cities as Cairo, Ibadan, Kinshasa or Johannesburg, and also in Asia, in Calcutta, Bombay, Tehran, Jakarta, Bangkok and Manila, for example.

In the Far East too, the same phenomenon is to be found. In Korea, for instance, during the last twenty years or so, Seoul has seen a tremendous increase in population, rising well above the 7.5 million figure. A series of industrial towns around Pusan are also growing at a very fast pace. And there is Japan which has the biggest urban conglomerate in the world, with about 30 million people, in the Tokyo Metropolitan Region, a country where the urban population numbers 85 millions, distributed throughout 634 towns of more than 30,000 people. One could also mention the City States like Singapore and Hong Kong which differ quite markedly from the other towns.

The most apparent consequences of the urban explosion are of two kinds: incredible traffic jams, not only at the rush hours but almost at any time of the day. This problem will be dealt with later. The other striking problem one is faced with is an acute housing shortage. The building of houses and apartment blocks cannot keep up with the rapidly increasing population. Overcrowding is the common rule. In many places people try to squat whenever possible. Slums are spreading on the outskirts of many cities as, for example, in Jakarta. In some cases, people unable to find shelter become mere pavement-dwellers, as in Calcutta or Bombay.

The rapid urban development is mainly due to large-scale migration from the countryside to the cities. As with every other type of migration, one can see two kinds of factors occurring simultaneously: on the one hand what we shall call repulsive or centrifugal forces, on the other

* Chairman, Department of Geography, Namur University, Belgium.

hand, attracting or centripetal forces. In the countryside, lack of resources, lack of land, poor educational or medical facilities, a low standard of living, push people to leave in search of better opportunities. But even when the living conditions are improved and the agricultural methods modernized (by means of mechanization, use of fertilizers, land reclamation and so on), the trend to migrate does not stop. Fewer people on the farms can produce more crops, and the surplus of manpower has to find other occupations. Where? In the cities, of course. In countries that have been industrialized for a long time, like the United Kingdom, the U.S.A., or Belgium, 5 per cent or less of the active population is occupied in agriculture and this figure is sufficient. Until this low percentage level is attained in other countries, emigration from the countryside will continue, provided jobs are available in the cities. Job availability, higher earnings, educational facilities, hope of a brighter life are the main incentives, the centripetal forces drawing people to the cities (1). In those countries where economic progress is growing rapidly, cities can indeed provide employment even for the unskilled workers. According to the Economic Planning Board of Korea, the official unemployment rate in that country, at the end of June 1978, was only 2.7%, the lowest for years.

But if migration plays a significant role in the rapid development of cities, it is not the only factor involved. In countries with a relatively high birth-rate, the natural increase has to be taken into account. As a matter of fact, most of the migrants from the countryside are young adults, or young married couples; they settle in towns at the age of having children and they in fact have children. Due to an unusual structure of ages, it may actually happen that the crude birth-rate is higher in cities than in the countryside. On the other hand, a lower proportion of old people amongst city dwellers, better sanitary conditions and medical facilities drastically reduce the crude death-rate, especially, the infant death-rate. It is only at the second generation that a noticeable change in natural increase can occur with a better balanced age structure and a real birth-rate decrease resulting either from demographic policy or from personal or family change of behaviour. In the meantime, for the reasons given, one can expect that the population of the cities will continue to grow.

But in which cities? Very often, in the past just as in recent times, urbanization has been linked with industrialization. In the nineteenth century as a rule, but also in the first half of this century, industries were located on or near the sources of raw materials and energy, iron ore and coal playing a leading role, as one can see in the Ruhr industrial belt in Germany or in Pennsylvania in the States. In fact, with trade becoming more and more international and truly worldwide, the new industrial complexes and the largest plants tend to be located near seaports

in order to facilitate the import of raw materials and energy from any part of the world and to facilitate the export of finished products to any place in the world. The best known example of this pattern can be found in Japan, but now one can see the same process developing in many industrialized countries, for instance France, at Dunkerque on the North Sea, or at Fos, near Marseilles, on the Mediterranean, where there is a regrouping of oil refineries, steelworks, shipyards and every kind of heavy and chemical industry. The same phenomenon is already developing along the south-eastern coast of Korea at Pohang, Ulsan, Onsan, Pusan, Masan, Yeosu and on the western coast at Inchon and Banwol.

Every large, rapidly developing city is challenged with many problems. We cannot of course review all of them in a few pages. But it would be interesting to draw attention to three of the more striking issues: in the first place, traffic and public transportation, secondly, the planning of the Central Business District (C.B.D.), and thirdly, housing for low-income people. (Fig. 1)

In many places, traffic jams seem to be an unavoidable part of urban life. What one can observe in downtown Kowloon or Central Hong Kong is also to be seen in Seoul, Taipei, and above all in Manila. And everywhere the municipal authorities try to alleviate this burden. Apparently the most obvious solution is the widening of the streets, at least the main arteries. This solution is however expensive if a fair compensation is paid for the land and for the buildings to be demolished. Life is becoming worse for pedestrians who are forced to run from one side of wide avenues to the other. Even pedestrians bridges or subway crossings are very inconvenient for the aged and the disabled. In the end, these large avenues cut through the urban tissue, splitting up the natural neighbourhoods. Fly-over highways do not seem to provide a better solution. They simply contribute to the noise pollution. In some places, Brussels for instance, at most of the main intersections, tunnels have been dug so that vehicles cross at different levels. But this solution, too, is very expensive. The building of a subway, in the cities of over one to two million people with a fairly high density, becomes an actual necessity, even if the cost constitutes a heavy burden to the municipality. Not a single line but a real network is needed in order to see a positive effect on the surface traffic. In Tokyo, Osaka, Seoul, Hong Kong subways are actually operating.

Only an integrated scheme can bring an effective solution to the problem. One of the best examples is that of Senba Center, in downtown Osaka, Japan. This ward of the city, where most of the textile shops were grouped, was being suffocated by a permanent traffic jam of trucks and cars. Then over a distance of more than one kilometer, between two parallel streets, the authorities decided to raze all the buildings, one block after another and to rebuild them according to a new

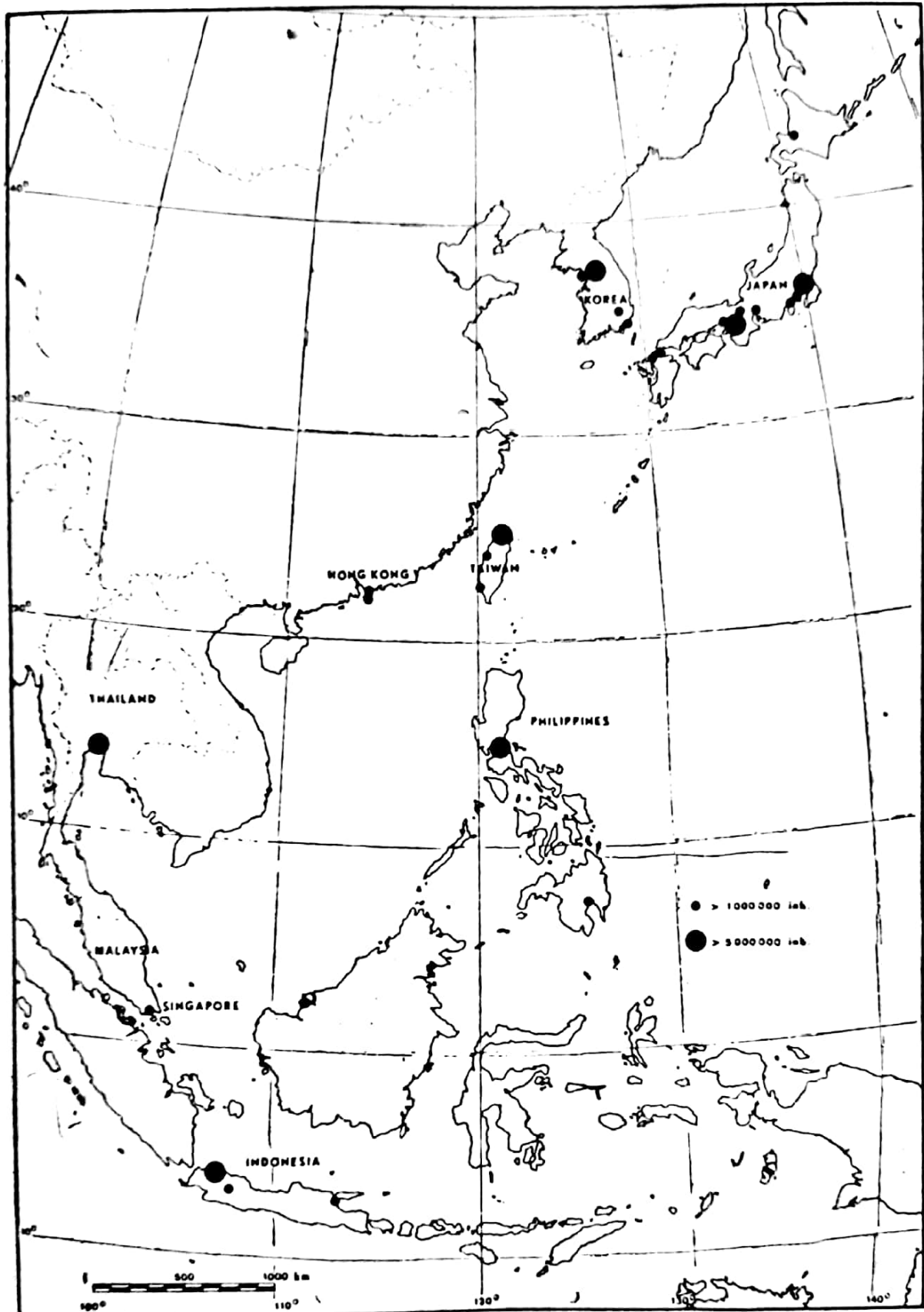


FIG. 1. EAST ASIAN URBAN CENTERS

pattern. Two levels were laid out underground: the lower for parking, the upper for the unloading, loading and storage of goods as an inner alley between the basements of the shops. At the street level, new modern shops were built and above them three stories of offices. Running above all this, a wide expressway with eight lanes drains the transit traffic. In this way, all the problems were solved and at a very low cost, for the renting of the offices and parking lots brought in almost enough to cover the whole financial burden of the investment (2).

Another problem to be faced by cities is the conception and planning of the Central Business District where most of the tertiary activities tend to concentrate. High-rise office buildings are replacing houses and shops of smaller size. The inhabitants are progressively being expelled from the City center. This process is well known since it first began to appear in London in the twenties, sixty years ago, where it was called the "City phenomenon". The same process has rapidly developed in many American towns; the C.B.D. is empty and dead after 7:00 p.m. One can see only an occasional police car patrolling the streets. The same phenomenon is also spreading now in some Asian cities. If you go for a walk in Makati, the new C.B.D. of Manila, on a Sunday morning, you will find yourself alone in the streets. In Chiyoda-ku, the central district of Tokyo, for instance, according to the last census, the day population (people working there) amounts to 930,000, the night population (residents) being only 74,000, a mere one twelfth. A revealing experience was provided last Chusok, a kind of thanks-giving day, in downtown Seoul. All the shopping arcades stretching southwards from Jongro Street were closed, as were all the shops in the usually very active Myeongdong. All around the City Hall, the streets were quiet and the traffic ran smoothly. This is what will likely be seen, in 5 or 10 years from now, every Sunday and, in the more distant future, every evening. One has to beware of this problem. In order to remain alive, a city center needs not only offices, but also shops, with shopping streets for pedestrians only, parking lots and lodgings evenly distributed. An excessive concentration of office buildings has to be avoided in order to maintain a city centre's life.

A third problem to look at, and not the least, is the housing of low income people. Wealthy people can without too much difficulty find accommodation; the real estate companies develop building sites, houses and apartments. But, for the poorest — and most of the new town-dwellers are short of money, they have first to find a job, usually unskilled work with low pay — for the poorest it is very hard to get lodgings. The municipal authorities have to do something in this respect and usually they do. We have witnessed a remarkable achievement in Hong Kong where accommodation has been provided for almost two million people. It was done quickly, cheaply, and reasonably well and most

of the slums have disappeared (3). In many Korean towns, one can also notice a serious effort to resolve or alleviate the housing shortage. Even a quick look at the surroundings of Seoul makes the point clear. The quality and the finish of some of these apartment blocks are not always of a very good standard, but nevertheless thousands of families have a roof over their heads. Nevertheless, the building of apartment complexes is not the only, or even the best, solution to this difficult problem. In some places a greater role is allowed to the people in building, improving or rebuilding their dwellings, even in squatters' areas. One can see in the countryside of Korea many villages totally rebuilt by the Saemaul movement. Is it impossible to think of something of the same kind being done in the cities, in the older neighbourhoods and first and foremost in the squatters' areas? Provided a general plan is drawn up, allowing space for streets and alleys, for schools, playgrounds, dispensaries and other public facilities, people will be induced to improve their dwellings if they are guaranteed the right to stay there for a fairly long time or even to buy their plot at a nominal charge. In this way the municipality has only to provide the basic facilities, electricity, water, a sewage network and so on. On the other hand, for the inhabitants, their social ties are maintained with the neighbourhood: they do not feel expelled, rejected by a kind of anonymous power. One of the very few examples of such a policy can be seen in Davao City, in Mindanao Island, the Philippines.

These problems — and many others — remain a permanent concern for the authorities, particularly in the very large cities. A magic word appears as the only answer: decentralization. Of course, decentralization is a sound solution, but what to decentralize and where?

As the capital city is very often the biggest city in a country, many people think that the first function to be transferred is the political and administrative one. It seems the most obvious and the easiest solution because the decision relies only on the political authorities.

In point of fact, it is not an easy solution at all. We are no longer in an age like that of the Emperor Menelik of Ethiopia in the nineteenth century. During a reign of fifty years, he had no less than ten different capitals. The capital was the place where the Emperor decided to settle for a while. And according to political, strategic or other circumstances he moved from one place to another, until the day when foreign consuls and traders were allowed to enter the country and to settle where the capital happened to be at that time, in Addis Ababa. From that time on, all the efforts to move the capital again proved useless.

In some very peculiar circumstances a new capital can emerge and develop. When the former British Empire of India was divided into India and Pakistan, the State of Punjab was also broken up. As the capital

city, Lahore, was in the western part, now Pakistan, a new capital was built in Eastern Punjab, in Chandigarh. At the end of World War II, Berlin, the former capital of Germany, was occupied by the four Powers and separated from the rest of the Federal Republic. The latter had to find a new "temporary" capital and the resort town of Bonn was chosen. Now, after more than thirty years, this provisional capital has become a large and alive city.

When such external necessities do not exist, however, modern efforts to transfer a capital city have failed to attain the proposed targets. This was the case with Ankara, the new capital of Turkey, after the revolution of Kemal Ataturk in the twenties; it has also been the case to a large extent with Brasilia, which was intended to replace Rio de Janeiro in Brazil. In both cases, the hub of economic, cultural and even political activities remained in the former capitals. In Korea, some time ago, a group of experts was appointed in order to study the feasibility of transferring the capital to another place. What will come of this, nobody knows.

In recent years, another type of decentralization was tried in some countries by creating new towns around academic and scientific institutions. A town of this kind was built in the Soviet Union, Akademgorod, but it is very difficult to get permission to visit it for "security" reasons. An example can also be found in Belgium, with the creation of Louvain-la-Neuve, centered on a university of 12,000 students. In Japan, the new town of Tsukuba, a hundred kilometers north of Tokyo, comprises a university of 10,000 together with several national research centers and is planned eventually to have a population of two hundred thousand inhabitants. Also in Korea a science town is developing at Daedok, near Daejon, sixty miles south of Seoul. In both cases the experiment started only five or four years ago respectively and it is too early to evaluate correctly the results. In fact, many students and most of the professors and senior scientists do not actually live in these new towns; they come in the morning and leave after their work (4). In order to understand this reluctance, we can ask ourselves what are the students or scientists looking for, when they choose a university. First of all, good academic standards, but also a cultural environment and, last but not least, good employment opportunities. All these things they can find only in larger cities of at least a hundred, and preferably two to three hundred, thousand people.

A third and much more efficient means of decentralization, the only one that really can slow down the internal migrations is the creation, all over the country, of small or medium sized industrial parks, with facilities and incentives for labor intensive factories. Instead of attracting people to the industrial zones, industry goes to the places where potential

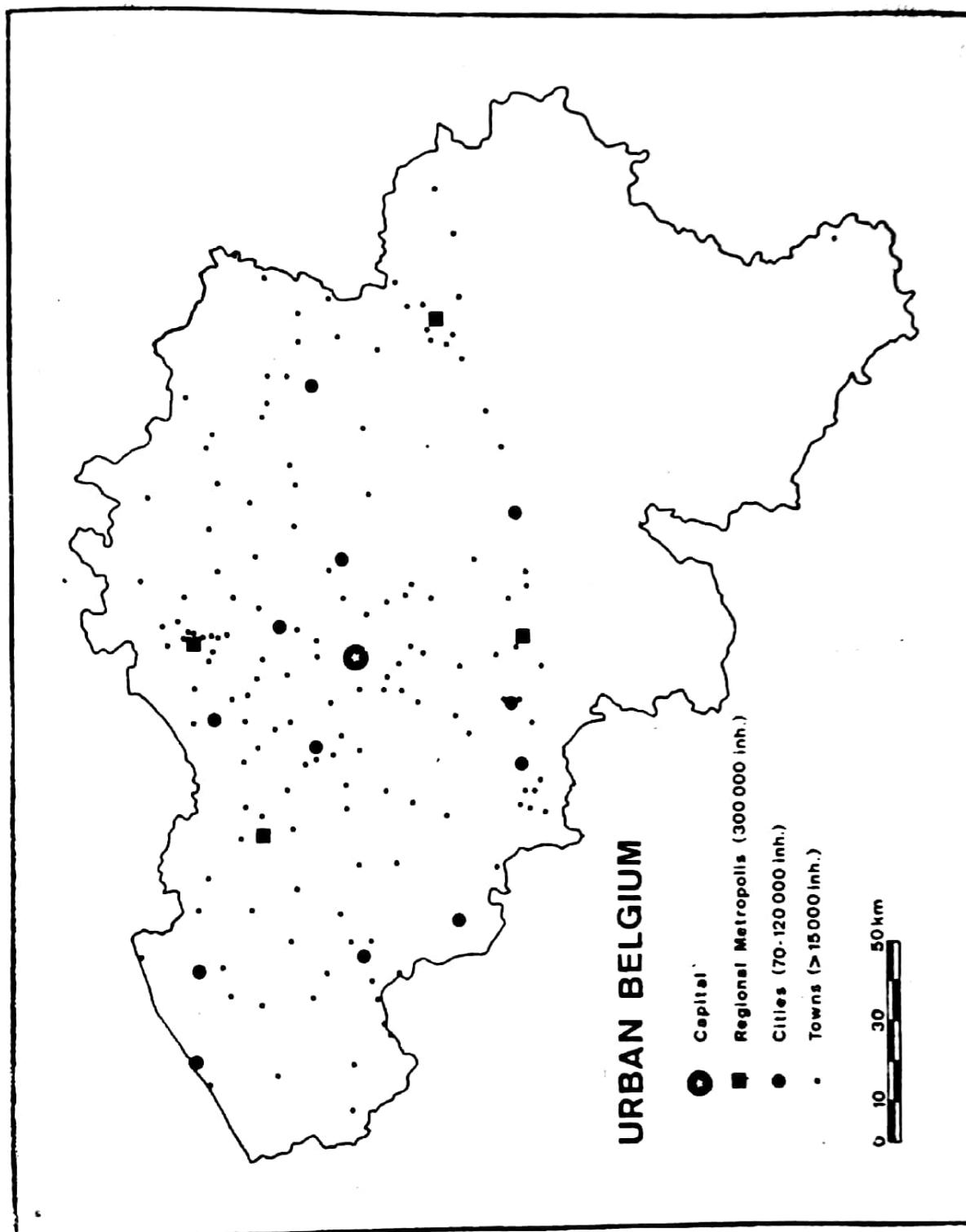


FIG. 2. URBAN BELGIUM

manpower exists. Something of this approach can be found in the expanding industrial park of Jeonju, for instance, in Korea. Of course, heavy industries need to be concentrated in areas which are very carefully chosen, but light industries can easily be scattered about in small or medium sized towns, giving these a chance to take part in the general development of the country. Moreover, urban problems can be solved much more easily on a smaller scale than in a huge metropolis.

To have a balanced network of cities, integrated in a hierarchical system, is the goal to be attained in order to maximize the advantages for the town dwellers and to minimize the worries of urban life. The theory of urban networks elaborated by the German geographer Christaller is not a mere theory. One of the best examples may be found in Belgium, (Fig. 2). This country of ten million people has only one city of over one million, Brussels, the capital, with one million two hundred thousand inhabitants, situated in the very centre of the country. The capital is balanced by four regional metropolis, Antwerp, Gent, Charleroi and Liege, located north, west, south and east of Brussels and containing from three to six hundred thousand inhabitants each. Every regional metropolis has in its hinterland two to five cities of about a hundred thousand people, twelve cities in all. Each of these is surrounded by three to six or seven smaller towns of ten to thirty thousand and so on. In this way, economic activities as well as social and cultural facilities are spread evenly and efficiently all over the country.

Urban planning has to be integrated within the general framework of national development planning. The driving force of development is economic growth, of course, but such growth is not a goal in itself, it is only a means to improve the living conditions of the population of a country. When one is thinking of cities and of their future, one always has to bear in mind that they are for the people who live in them, not the other way round. Hong Kong, Korea, Singapore, Taiwan and, to a certain extent, the Philippines have known an exceptional industrial development in recent years, which is very impressive. For the years to come, a general improvement in living conditions, in the cities as well as in the countryside, will be a challenging target, at every level of responsibility.

REFERENCES

1. Denis, J., *Die Verstädterung am Biespiel Ostasiens*, Stimmen der Zeit, München, Vol. 199, 1981, p. 377-386.
2. Denis, J., *Dynamique de l'urbanisation au Japon*, Gand, Société Belge d'Etudes Géographiques, Mémoire n° 31, 1977, 63 p.
3. Denis, J., *Hong Kong*, Paris, Presses Universitaires de France, 1980, 128 p.
4. Denis, J. *Villes nouvelles et organisation de l'espace en Extrême-Orient*, Bull. de la Soc. Belge d'Etudes Géographiques, Gand, T. XLIX, 1980, n° 1, p. 105-142.

TROPICAL CYCLONE IN THE WESTERN NORTH PACIFIC

by

SHENG-I HSU (PH.D.)¹

ABSTRACT

A tropical cyclone spells danger and threat. It is particularly true to the dwellers of the western North Pacific coastal regions.

Delineations of the physical characteristics, occurring frequencies, moving tracks, and intensities of tropical cyclones based upon meteorological records in the past decades are synopsized in this report.

It is observed that most of the western North Pacific tropical cyclones occur in the warm waters of 5°-15°N latitude and 130°-150°E longitude. Cyclones originate in the area of 5°-10°N latitude and 110°-140°E longitude often move toward the west or northwest without recurvature, while those that originate from waters of 15°-25°N latitude and 140°-160°E longitude are believed to have the least threat to the Asian dwellers.

INTRODUCTION

On a humid summer day when the wind is calm and the sky is covered with cirrus or cirrostratus clouds, the radio may often interrupt its regular program and warns the local audience that a tropical cyclone is developing and is moving northwest toward Hong Kong.

Despite modern surveillance tools (such as high flying aircrafts and orbital satellites) and advanced prediction techniques that have been utilized for forecast and warning of the track and intensity of a tropical cyclone in recent years, a fully developed tropical cyclone may carry strong gusty winds and great amount of rainfall which cause property damages and loss of human lives. These are inevitable during typhoon seasons. Hong Kong, being a densely populated area and located in the probable path of tropical cyclones, is therefore vulnerable to these destructive storms. It is essential that its residents understand the nature of a tropical cyclone and the proper precaution needed to protect themselves from suffering of lost human lives and property damage.

¹ Lecturer, Department of Geography, the Chinese University of Hongkong, Shatin, N.T., Hongkong.

CLASSIFICATION AND NAMES

The term "Tropical Cyclone" is referred loosely to any pressure depression (close to 1000 mb) occurring in the warm open ocean surface. It does not necessarily imply any particular intensity. However, according to the Royal Observatory of Hong Kong, tropical cyclones are classified into four categories; namely (1) Tropical Depression (T.D.) with maximum sustained winds of less than 18 m/s, (2) Tropical Storm (T.S.) with maximum sustained winds in the range 18-25 m/s, (3) Severe Tropical Storm (S.T.S.) with maximum sustained winds in the range 25-33 m/s, and (4) Typhoon (T.) with maximum sustained winds of 33 m/s or more. Typhoon, in Chinese means "big wind". Different monickers may be used at various regions in the world. They are listed in Table 1.

TABLE 1. MONICKERS OF TROPICAL CYCLONES AT VARIOUS REGIONS

<i>Region</i>	<i>Names</i>
West Pacific	Typhoon
Philippines	Baguio
Indian Ocean	Cyclone
Australia	Cyclone or Willey-Willey
East Pacific	Hurricane
Atlantic, Caribbean Sea	Hurricane
Gulf of Mexico	Hurricane
Mexico	Cordonazo
Haiti	Taino

In the western North Pacific region, when a tropical cyclone reaches the intensity of a Tropical Storm (i.e., maximum sustained winds exceeding 18 m/s, a boy's or girl's name is then assigned to it in alphabetical order by the Joint Typhoon Warning Center located at Guam. There are twenty-one names in a set, and a total of eighty-four names in four sets. When all names have been used up, the process repeats itself. A new name list of the tropical cyclones for the western North Pacific, initiated in 1979, is provided in Table 2.

ORIGIN AND DEVELOPMENT OF TROPICAL CYCLONES

Detailed information about the causes of tropical cyclones are not fully understood and are still under investigation by many groups of atmospheric scientists. It is generally believed that easterly waves are extremely important on account of their physical as well as geographical characteristics in relation to the formation of tropical cyclones. Essentially, these waves are troughs of low pressure, which are embedded in

TABLE 2. NAMES FOR TROPICAL CLYCLONES IN THE WESTERN NORTH PACIFIC

<i>Set 1</i>	<i>Set 2</i>	<i>Set 3</i>	<i>Set 4</i>
Andy	Abby	Alex	Agnes
Bess	Ben	Betty	Bill
Cecil	Carmen	Cary	Clara
Dot	Dom	Dinah	Doyle
Ellis	Ellen	Ed	Elsie
Faye	Forrest	Freda	Fabian
Gordon	Georgia	Gerald	Gay
Hope	Herbert	Holly	Hazen
Irving	Ida	Ike	Irma
Judy	Joe	June	Jeff
Ken	Kim	Kelly	Kit
Lola	Lex	Lynn	Lee
Mac	Marge	Maury	Mamie
Nancy	Norris	Nina	Nelson
Owen	Orchid	Ogden	Odessa
Pamela	Percy	Phyllis	Pat
Roger	Ruff	Roy	Ruby
Sarah	Sperry	Susan	Skip
Tip	Thelma	Thad	Tess
Vera	Vernon	Vanessa	Val
Wayne	Wynne	Warren	Winona

the deep easterly currents located to the south of the western Pacific high pressure area. The air currents converging into the low pressure trough normally result in unstable atmospheric conditions. This unstable zone of convergence is defined as the "Intertropical Convergence Zone" or ITCZ as abbreviated by meteorologists. The ITCZ tends to follow the sun. It meanders northward in the summer time and southward in the winter time of the Northern Hemisphere. With these reasons, most of the tropical cyclones form over the warm ocean waters between 20°S and 20°N latitudes. However, the area between 5°N and 5°S latitudes offer least or nil Coriolis effect that disables a low pressure center, if any, to form circular motion. Consequently, very few tropical cyclones are reported near the Equator.

Physical process and transfer of energy occurring in a tropical cyclone are extremely complicated and not as yet fully understood. Nevertheless, it is commonly agreed that the formation of a tropical cyclone is attributed to: (1) a warm open ocean surface between 5° to 10° latitude with mean temperature not less than 27°C, (2) light or calm wind condition at the origin to keep moisture from being dispersed, and (3) the existence of ITCZ (Riehl, 1954).

With continuous supplement of warm moist air at the lower level of a tropical cyclone, the energy is converged and transferred to a higher level. Large amount of latent heat released through condensation not

only causes heavy rainfall, but also deepens the pressure at the centre. The intensified storm may result in stronger gradient wind.

FREQUENCY AND MOVEMENT

Mean frequency of tropical cyclone occurred in the western North Pacific is compiled by the Royal Observatory of Hong Kong based on a 32-year record (1946-1978). Statistics indicates that there are 31 cyclones sighted per year. Most of these cyclones, about 83% of the annual total, take place between June and November. About one half of them attain typhoon intensity (i.e., maximum sustained wind speed is greater than 33 m/s), and there is a 50% chance that these 31 cyclones will move into Hong Kong's area of responsibility.²

Monthly frequency distributions of these cyclones and typhoons are presented in Figure 1. Despite the frequent occurrences of tropical cyclones in the western North Pacific, only six times per year on the average are warning signals required to display in Hong Kong.

Most commonly, when a typhoon is on its westerly direction, a small-scale sinusoidal track is usually observed, and the speed of movement

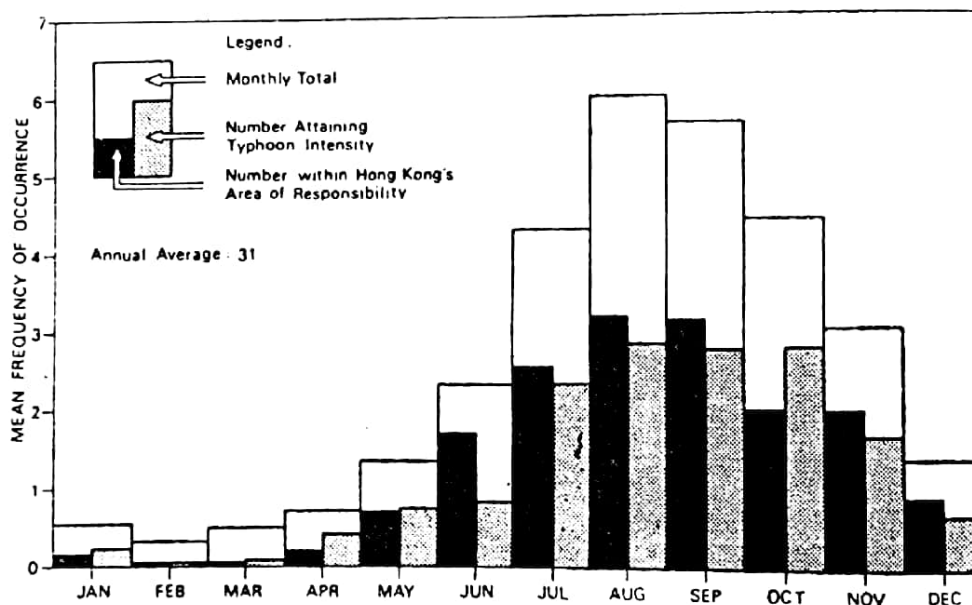


FIG. 1. MONTHLY DISTRIBUTION OF THE MEAN FREQUENCY OF OCCURRENCE OF TROPICAL CYCLONES AND TYPHOONS IN THE WESTERN NORTH PACIFIC AND THE SOUTH CHINA SEA, 1946-1978 (CLASSIFIED IN ACCORDANCE WITH THE FIRST 6-HOURLY POSITION OF EACH TRACK).

(Source: The Royal Observatory of Hong Kong, Tropical Cyclone Summaries, 1979.)

² An area covers from 10°N to 30°N, and from Vietnamese coastal line to 125°E.

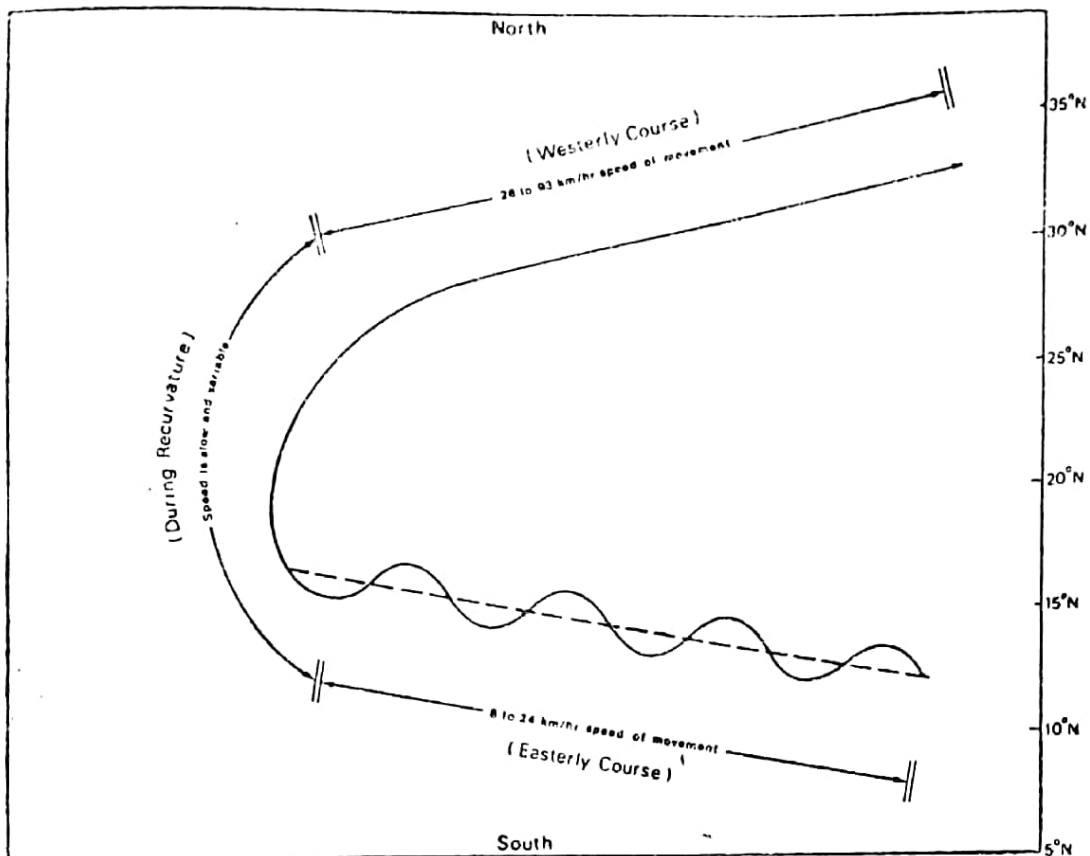


FIG. 2. RECURVATURE OF A TROPICAL CYCLONE.

ranges from 8 to 24 km/hr. Nevertheless, when a typhoon turns to an easterly direction after recurvature³ into higher latitudes, its direction ordinary speed becomes straight-forward with a speed of movement ranging from 28 to 93 km/hr. The moving speed during recurvature often appears to be slow and variable (Figure 2).

As a typhoon recurves from the tropics and enters the belt of the westerlies, its size usually decreases and its intensity decays as well. However, not all tropical storms recurve. A small number of them may die over the tropical oceans and many dissipate after entering a continent.

Based on the past ten years' records as published by the Royal Observatory of Hong Kong, the tropical cyclones are estimated to have a westbound speed of 14 km/hr (direction ranging from 270° to 300°), 12 km/hr during recurvature (direction ranging from 300° to 030°), and 32 km/hr after recurvature (direction ranging from 30° to 90°). The change of moving speed in the course of a tropical cyclone is affected basically by the tropical easterly winds in the lower latitudes and the westerly winds in the higher latitudes. In the transition zone between the easterlies and the westerlies, movement of a cyclone is retarded. However,

³ The term "recurvature" is referred to the change of a tropical cyclone moving course 30° clockwise as defined by the Royal Observatory of Hong Kong (1978).

after recurvature, the westerly current aloft begins to take over the steering effect, and the movement of a cyclone is channelled into both the direction and the speed of the upper strong westerly steering current.

It is also observed that the tropical cyclones occur most frequently in the area of 5° - 15° N latitude and 130° - 150° E longitude of western Pacific ocean waters. Those cyclones originate from waters of 15° - 25° N latitude and 140° - 160° E longitude are believed to have least threat to the southeast and the northeast Asian regions; for these cyclones usually move either northward or northeastward, and then accelerate eastward under the steering effect of westerly winds soon after recurvature. Very little chance do they strike the populated islands or the continental coastal regions, although many of these cyclones reach to severe intensities.

The tropical cyclones that originate in the area 5° - 10° N latitude and 110° - 140° E longitude often move straight westward or northwestward by the easterly steering current without recurvature. For this reason, the Philippine Islands, Southeast China coast, and the Indochina Peninsula coastal regions are vulnerable to the assault of severe storms of the kinds (Figure 3).

In fact, no two recorded typhoon tracks have been exactly the same. Forecasting the future track or movement of a typhoon is challenging and difficult, and sometimes a gratifying task that any operational

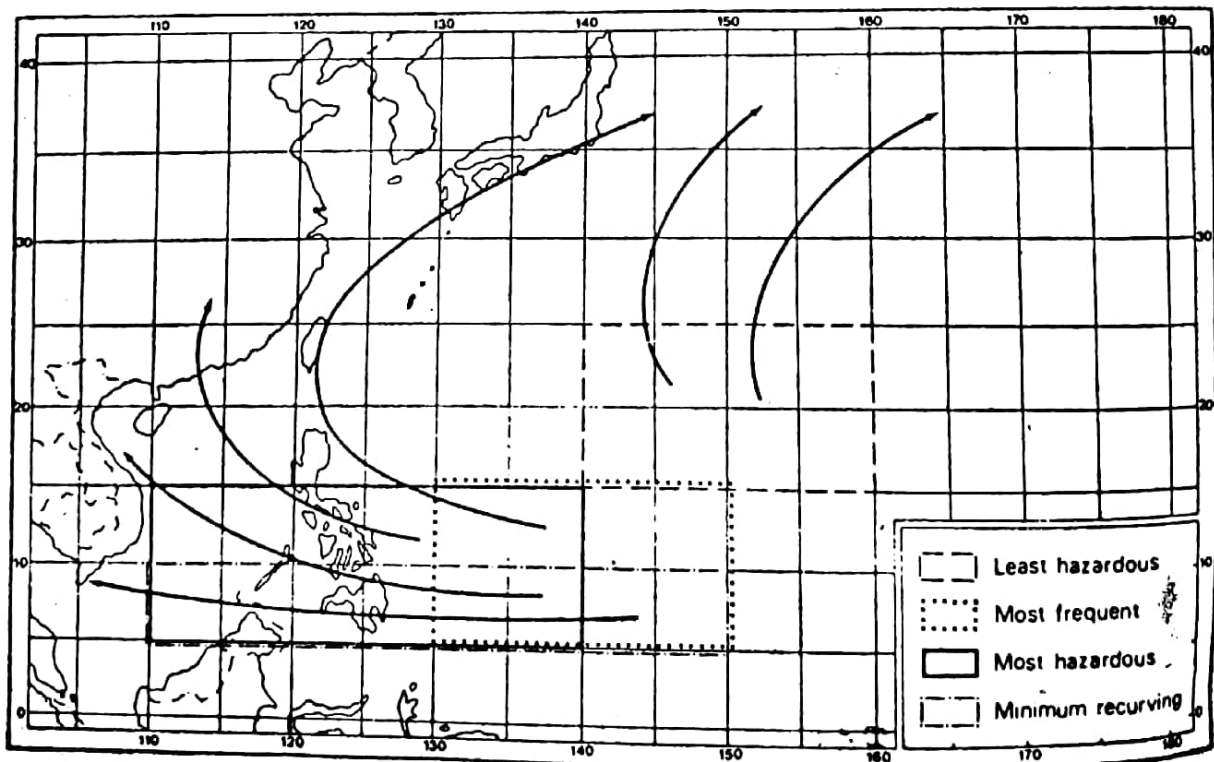


FIG. 3. GENERAL TRACKS OF TROPICAL CYCLONES THAT ORIGINATE FROM VARIOUS REGIONS IN THE WESTERN NORTH PACIFIC.

meteorologist has to face. Despite all the irregularities, almost all typhoons have one thing in common, i.e., a tendency to move eventually toward higher latitude. Typhoons tend to move under the influence of both internal circulation and external steering current. The steering current is dependent on the mean flow from the earth's surface upward to 300 millibars at a height of roughly 10,000 kilometers.

HAZARDS

The minimum central pressure of a tropical cyclone seldom drops under 850 millibars, and the maximum wind speed of greater than 100 m/s is unusual as well. Theoretically, gradient wind speed of a cyclone centre is not linearly dependent on the depression of the central pressure. Based on a two-year record, maximum wind speed in m/s and central pressure in millibars of all cyclones occurred in 1978 and 1979 are plotted in Figure 4. For practical reason, the maximum wind speed can be estimated by a simple formula, i.e., $m.w.s. = 15 + (1000 - \text{central pressure})/2$. For instance, a tropical cyclone with central pressure of 900 millibars, may have a maximum wind speed of 65 m/s over the ocean surface.

Most of the casualties and property damages in Hong Kong which resulted from tropical cyclones are directly related to the destructive wind force, storm surge, and flooding. Winds of 100 m/s have never been recorded in a typhoon on the ground, since most wind-measuring equipment is destroyed at much lower velocities. When typhoon Wanda landed at Hong Kong, the pressure of the cyclone centre recorded was 953.2 mb, with maximum gusts to 72 m/s measured at the Royal Observatory. This is equivalent to about 390 kilograms per square meter pressure (Pettersen, 1969). Very few doors, with dimension of 2 meters by 1 meter, can sustain this damaging power of 780 kilograms in total.

About 15 percent of Hong Kong's territory is less than 50 metres above mean sea level (Chin, 1977). Flash flood caused by rain water from hillsides is quite common. Low-lying coastal areas which are only a few metres above mean sea level are untenable to sea water flooding by storm surges accompanied by tropical cyclones. Residents in these areas should be alert to the hazard of flooding by the sea during the passage of tropical cyclones. It is a rule of thumb that the sea surface may rise 1 meter when the atmospheric pressure drops by 100 mbs due to the suction effect of typhoon center.

A severe storm surge is impelled by strong wind and low pressure. Amplitude of a big swell may reach as high as 10 meters as recorded in Hong Kong. This damaging swell is usually found to the front right-hand side of a moving tropical cyclone (Tannehill, 1938) as shown in Figure 5. This resulted from the combined effect of the strong counter-

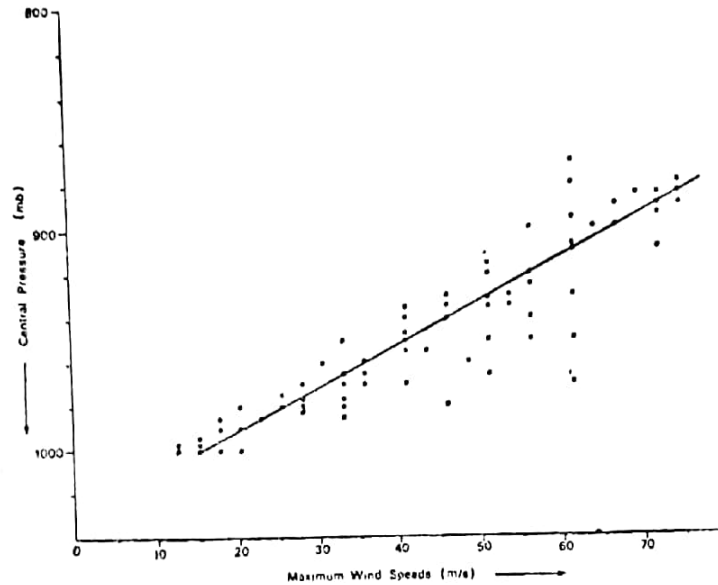
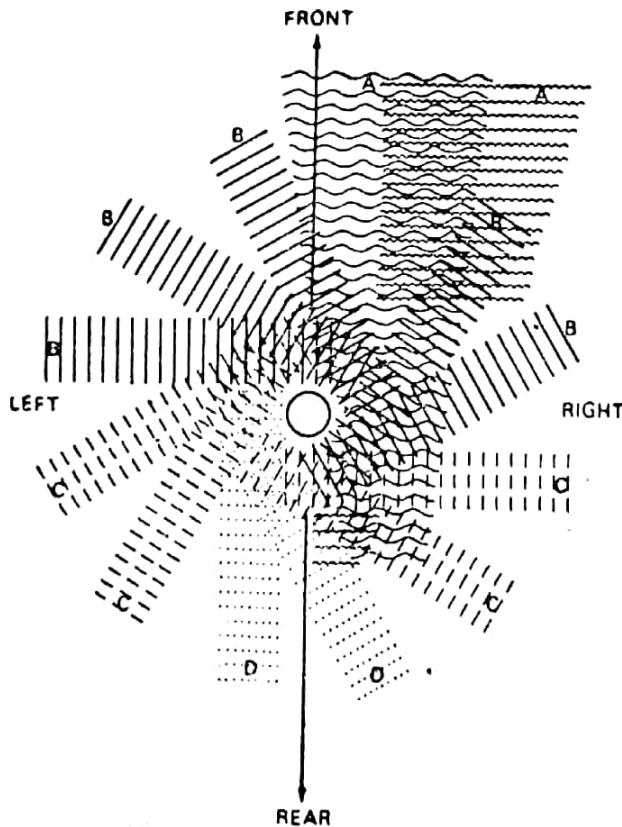


FIG. 4. MAXIMUM WIND SPEEDS IN RELATION TO CENTRAL PRESSURE OF TROPICAL CYCLONES IN THE WESTERN NORTH PACIFIC REGION.

FIG. 5. SCHEMATIC DEVELOPMENT OF SWELLS IN A TROPICAL CYCLONE:



A — swells of greatest length and magnitude, traveling in the line of advance of the tropical cyclone.

B — swells and waves of moderate length and magnitude in the front segment moving outward to the right and left of the line of advance.

C — swells and waves of smaller length and lesser magnitude in the rear segment moving outward to the right and left of the line of advance.

D — swells and waves of least magnitude moving outward from the rear of the hurricane.

(Source: Tannehill, 1939)

clockwise circulating wind and the moving speed of the cyclone system as indicated in Figure 6. All ships and vessels should avoid this dangerous quadrant during their voyages.

Tremendous amount of water vapour is circumscribed in a typhoon as aforementioned. When the latent heat of condensation is released, it may precipitate 20 billion tons of water. And total amount of energy is equivalent to six months electricity supply of the United States. When typhoon Wanda landed at Hong Kong in 1962, 260 people were wounded, 130 killed, 53 missing, and a total of 2,089 ships and crafts were disabled (Table 3).

In spite of these tremendous destructive forces of cyclones, they may have a beneficial result. Taiwan and South-east Asia, for instances, rely on tropical storms for much of their water supply. In the case of typhoon Ida, a significant drought was relieved in Taiwan in July 1980. In Hong Kong, the average amount of rainfall of a tropical cyclone is about 150 mm. Maximum amount of 560 mm had been recorded. This is higher than the monthly mean rainfall in June. The amount of rainfall duly accompanied by the tropical cyclones is sometimes precious when needed.

The rainfall of a tropical cyclone varies greatly from one cyclone to another. However, it contributes to about one half of the summer rainfall amount, and about one quarter of the annual amount in a tropical region. The 67-year mean annual rainfall for Hong Kong during the periods of 1900-1939 and 1947-1975 is 2176.3 mm. The annual rainfall brought in by the tropical cyclones during the same period amounts to 574.4 mm which is 26.74% of the annual rainfall (Cheung, 1979). Mean monthly rainfall and mean monthly tropical cyclone rainfall of Hong Kong are presented in Figure 7.

WARNING SIGNALS — ISSUED BY HONG KONG ROYAL OBSERVATORY

A series of warning signals and precautionary measures had been published and distributed for Hong Kong residents. When a tropical cyclone is centred within about 730 kilometers (400 nautical miles) of Hong Kong, a "stand by" signal or Signal No. 1 is issued. Residents are warned to take preliminary precautions and keep in mind the existence of tropical cyclone and listen to the weather broadcasts.

When the wind is expected to blow with a sustained speed of 11-17 m/s, Signal No. 3 is issued. At this instant, people should take all necessary precautions and secure all loose objects.

When the wind is expected to blow at a speed of 18-33 m/s, Signal No. 8 is hoisted. Residents should complete all precautions as soon as possible. Windows and doors should be bolted and shuttered.

TABLE 3. CASUALTIES AND DAMAGE CAUSED BY TROPICAL CYCLONES IN HONG KONG.

Source: The Royal Observatory of Hong Kong, 1979.

Year	Date	Name of tropical cyclone	Ocean-going vessels in trouble	Small craft sunk or wrecked	Small craft damaged	Persons dead	Persons missing	Persons injured
1937	1 - 2 Sep	Typhoon	28	545	1,255	11,000	*	*
1957	20 - 23 Sep	T. Gloria	5	2	Several	8	*	111
1960	4 - 12 Jun	T. Mary	6	352	462	11	11	127
1962	28 Aug - 2 Sep	T. Wanda	36	1,297	756	130	53	260
1964	26 - 28 May	T. Viola	5	18	18	0	0	41
	2 - 9 Aug	T. Ida	3	7	60	5	4	56
	2 - 6 Sep	T. Ruby	20	32	282	38	6	300
	4 - 10 Sep	T. Sally	0	0	0	9	0	24
	7 - 13 Oct	T. Dot	2	31	59	26	10	85
1971	15 - 18 Jun	T. Freda	8	0	0	2	0	30
	16 - 22 Jul	T. Lucy	10	0	0	0	0	38
	10 - 17 Aug	T. Rose	34	303	*	110	15	286
1973	14 - 20 Jul	T. Dot	14	*	*	1	0	38
1975	9 - 14 Oct	T. Elsie	7	3	*	0	0	46
1976	21 - 24 Aug	T.S. Ellen	0	4	7	27	3	65
	15 - 21 Sep	T. Iris	6	0	1	0	0	27
1977	22 - 25 Sep	S.T.S. Freda	2	0	0	1	0	37
1978	24 - 30 Jul	S.T.S. Agnes	0	25	33	3	0	134
	23 - 28 Aug	S.T.S. Elaine	6	3	0	1	0	51
1979	28 Jul - 3 Aug	T. Hope	29	56	108	12	0	260
	16 - 24 Sep	S.T.S. Mac	2	0	0	1	0	67

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.

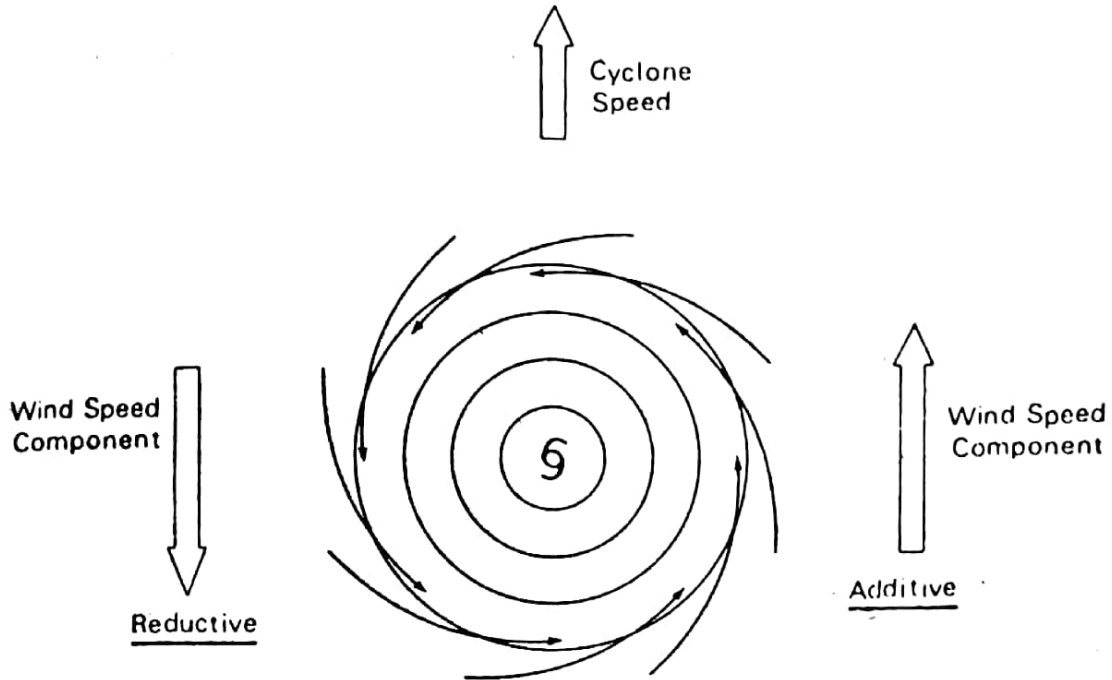


FIG. 6. RESULTING EFFECT OF A CYCLONIC WIND COMPONENT AND ITS MOVING SPEED.

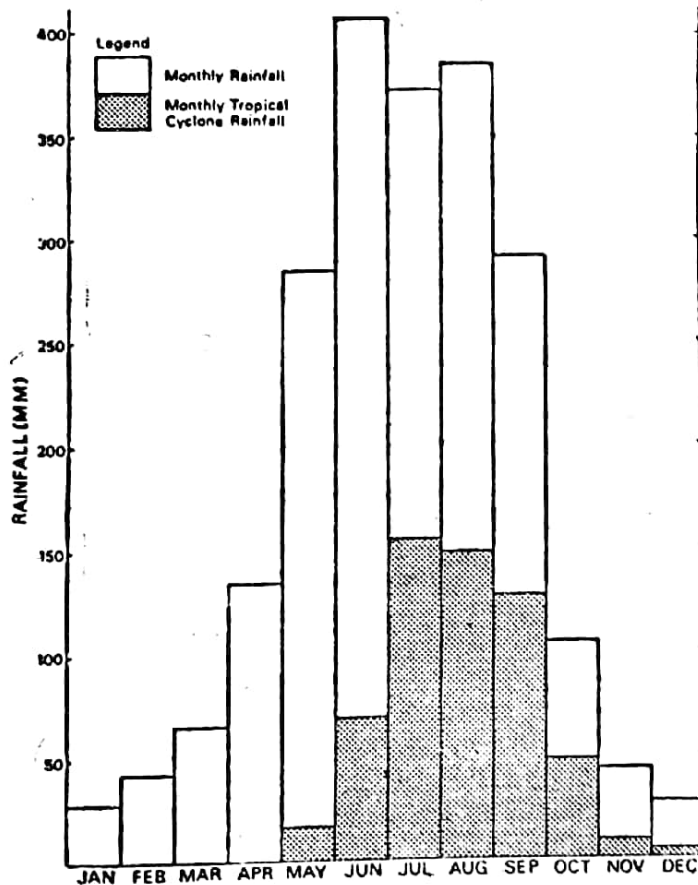


FIG. 7. MEAN MONTHLY RAINFALL AND MEAN MONTHLY TROPICAL CYCLONE RAINFALL.

All schools and law courts close down and ferries stop running. In the low-lying areas, heavy rain may cause flooding, rockfall and mudslides.

Signal No. 9 indicates that a gale or storm may be expected to increase significantly in strength. Signal No. 10 means that the strong wind is reaching upwards from 33 m/s and with gusts that may exceed 62 m/s. This signal implies that a severe tropical storm or a typhoon will come close to Hong Kong. And certainly, people should keep alert both physically and mentally to prevent or lessen the damages of a probable accident.

There are about 240 hours of warning signals hoisted annually by the Royal Observatory of Hong Kong. About 85% of them are limited to Signal No. 1 and Signal No. 3. Only 2% of the total chances is necessary to hoist No. 10 signal. In 1964, when heavy casualties and severe damage of properties were caused by frequent attacks of tropical cyclones, a total of 570 hours of warning signals were hoisted by the Royal Observatory of Hong Kong during the year.

SUMMARY

Tropical cyclones that originate in the area of 5°-15°N and 110°-140°E present big danger to the southeast Asians due to their westbound movements and their high probabilities of landing the Asiatic coastal regions.

Among many other natural hazards, the occurrences of tropical cyclones is most frequent and widespread in the southeast Asia. Floodings and strong gusty winds are responsible for casualties and property damages. It is suggested that a good understanding of a tropical cyclone, its formation, moving path, and related hazards, as well as the warning system, are essential to the Hong Kong residents who live in the low-lying areas in the old squatter areas.

REFERENCES

- Chan, M.Y. 1978. Satellite Photographs as an Aid to Forecast Tropical Cyclone Recurvature. Forecasters Note No. 4. Hong Kong Government Printer. Hong Kong.
- Cheung, H.Y. 1979. A Study of Tropical Cyclone Rainfall in Hong Kong (1900-1939, 1947-1975). *Journal of The Chinese University of Hong Kong*. Vol. V., No. 2, p. 537-551.
- Chin, P.C. 1977. The Life History of a Tropical Cyclone. Hong Kong Government Printer. Hong Kong.
- Hong Kong Royal Observatory, 1969-1979. Tropical Cyclone Summaries. Hong Kong Government Printer. Hong Kong.
- Petterssen, S. 1969. Introduction to meteorology. McGraw-Hill Publishing Co., Ltd., London.
- Riehl, H. 1954. Tropical Meteorology. McGraw-Hill Publishing Co., Ltd., London.
- Tannehill, I.R. 1938. Hurricanes. Princeton University Press. Princeton.

RESIDENTIAL SEGREGATION AMONG OCCUPATIONAL GROUPS IN CAGAYAN DE ORO¹

by

MICHAEL A. COSTELLO and MARILOU PALABRICA-COSTELLO²

Human ecologists and urban geographers have long been interested in analyzing the spatial distribution of status groups in the urban setting. Cities, it is commonly asserted, tend to become more spatially differentiated as they grow in size and functional complexity. Distinct commercial and industrial districts arise, while racial, ethnic, or class groups come to live in segregated neighborhoods. In his classic discussion of "urbanism as a way of life," Louis Wirth has outlined the forces operating to bring this about:

"Density, land values, rentals, accessibility, healthfulness, prestige, aesthetic considerations, absence of nuisances such as noise, smoke, and dirt determine the desirability of various areas of the city as places of settlement for different sections of the population. Place and nature of work, income, racial and ethnic characteristics, social status, custom, habit, taste, preference, and prejudice are among the significant factors in accordance with which the urban population is selected and distributed into more or less distinct settlements. Diverse population elements... thus tend to become segregated from one another... The city consequently tends to resemble a mosaic of social worlds in which the transition from one to the other is abrupt."³

The purpose of this paper is to empirically analyze this phenomenon, as it existed in the mid-1970's among members of different occupational status groups in the Philippine city of Cagayan de Oro. It is hoped that this study can help in the establishment of a comparative urban ecology of Philippine cities.

MEASURING RESIDENTIAL SEGREGATION

Residential segregation in urban areas is frequently quantified by means of two measures proposed by Otis and Beverly Duncan.⁴ The

¹ This study was supported by a grant from the Population Center Foundation of the Philippines, for which the authors would like to express their sincere appreciation. All findings shown in this study are taken from the final report for this project, entitled *Residential Segregation and Centralization in Cagayan de Oro, 1972-1975*. Copies of this report are available from the Research Institute for Mindanao Culture.

² Research Associates, Research Institute for Mindanao Culture, Xavier University, Cagayan de Oro City.

³ Louis Wirth, "Urbanism as a Way of Life," *American Journal of Sociology*, Vol. 44 (July, 1938), p. 15.

⁴ Otis Dudley Duncan and Beverly Duncan, "Residential Distribution and Occupational Stratification," *American Journal of Sociology*, Vol. 60 (March, 1955), pp. 493-503.

first of these is the "index of dissimilarity" (delta) which is designed to measure the extent of unlikeness of any two groups that are residing in different subareas of the city. This is given as

$$\Delta_{xy} = \frac{\sum |x_i - y_i|}{2}, \text{ where}$$

Δ_{xy} = the index of dissimilarity between groups x and y;

x_i = the percentage of all respondents in group x who reside in subarea i of the city; and

y_i = the percentage of all respondents in group y who reside in subarea i of the city.

According to the Duncans, this index "may be interpreted as a measure of displacement."⁵ That is, it shows the percentage of persons in either of the two groups who would have to move to a different subarea of the city in order to achieve perfect residential integration.

If the researcher calculates an index of dissimilarity between any one group and all other groups combined, this is known as the "index of segregation." A computation formula for this measure is

$$\Delta'x = \frac{\sum |x_i - T_i|}{2(1-p_x)}, \text{ where}$$

$\Delta'x$ = the index of segregation for group x;

x_i = as above;

T_i = the percentage of all respondents in all groups (including group x) who reside in subarea i of the city; and

p_x = the proportion of the total population (in the city as a whole) who belong to group x.

Using these two measures, the Duncans discovered a number of interesting facts about the residential location of occupational groups in the city of Chicago. In the first place, a clear tendency was found for these groups to live in different subareas of the city; i.e. to be segregated residentially from one another. Furthermore, residential dissimilarity between any two specific groups was directly related to the "social distance" between them. Thus, professional workers were least isolated residentially from managers and proprietors while being most segregated from unskilled laborers. Finally, when indexes of segregation were plotted for each group, a U-shaped pattern emerged, with the very highest and the very lowest status groups being most segregated.

⁵ *Ibid.*, p. 494.

Subsequently, a number of American and English studies confirmed the findings obtained by the Duncans for the single case of Chicago.⁶ In general, the results from the few studies conducted on this topic which analyzed data from cities of the less developed world have also been consistent with the patterns first noted by the Duncans.⁷ One slight exception to this generalization lies in the fact that studies conducted in three Puerto Rican cities and in Alexandria, Egypt found a relationship between occupational status and segregation levels that can be better described as J-shaped rather than as U-shaped, since higher status households in these cities were considerably more segregated residentially than were those in either the middle or lower occupational classes.⁸

THE DATA

This study represents a secondary analysis of data from the "dual records" program of the Mindanao Center for Population Studies (MCPS) of the Research Institute for Mindanao Culture, Xavier University, Cagayan de Oro. The program was operational between September 1971 and July 1975 and was chiefly concerned with the measurement of vital events in Cagayan de Oro City and a nearby rural area.

Only data from the urban sample of the dual records study will be analyzed in this paper. This was 75 percent, one stage, cluster probability sample drawn from Cagayan de Oro's poblacion. The clusters used were enumeration district from the 1970 Census. Data on all persons living within a total of 41 districts were gathered for the urban sample. Segregation data analyzed in this study are taken from the last household survey undertaken by the project. This was conducted in July, 1975.⁹

⁶ Cf., for example, Eugene J. Uyeki, "Residential Distribution and Stratification, 1950-60," *American Journal of Sociology*, Vol. 69 (March, 1964), pp. 491-498; Reynolds Farley, "Residential Segregation in Urbanized Areas of the United States in 1970: An Analysis of Social Class and Racial Differences," *Demography* Vol. 14 (November, 1977), pp. 497-518; Peter Collison and John Moge, "Residence and Social Class in Oxford," *American Journal of Sociology*, Vol. 64 (May, 1959), pp. 599-605.

⁷ Cf., in particular, Surinder K. Mehta, "Patterns of Residence in Poona (India) by Income, Education, and Occupation (1937-65)," *American Journal of Sociology*, Vol. 73 (January, 1968), pp. 496-508; Kent P. Schwirian and Jesus Rico-Velasco, "The Residential Distribution of Status Groups in Puerto Rico's Metropolitan Areas," *Demography*, Vol. 8 (February, 1971), pp. 81-90; A.H. Latif, "Residential Segregation and Location of Status and Religious Groups in Alexandria, Egypt," in Kent P. Schwirian (ed.), *Comparative Urban Structure: Studies in the Ecology of Cities* (Lexington, Mass.: D.C. Heath and Co., 1974), pp. 423-432.

⁸ Schwirian and Rico-Velasco, *op. cit.*; Latif, *op. cit.*

⁹ This was the semi-annual "ROVER" household survey. For further details, cf. Francis C. Madigan and Alejandro N. Herrin, *New Approaches to the Measurement of Vital Rates in Developing Countries* (Chapel Hill, N.C.: Carolina Population Center, University of North Carolina, 1977).

FINDINGS

The basic findings for this study are presented in Table 1. Shown in this table are the indexes of residential dissimilarity and of segregation for employed males aged 20 and over along with comparable data for a subsample of male household heads in this same age range. Sample sizes for these two groups were 5,215 and 3,269, respectively. A number of interesting findings are evident from these data, as are discussed below.

First, the apparently universal finding that "spatial differences between occupational groups are closely related to their social distances"¹⁰ is again obtained for our Cagayan de Oro data. Starting at any point on the diagonal, "social distance" increases either as one moves up and to the right of the table or down and to the left. Thus, if prevailing theory is correct, the indexes of residential dissimilarity shown in the table should also tend to increase in a parallel fashion. This is indeed the case, with only one inversion (among all employed males aged 20 and over, unskilled workers are slightly less segregated from professionals than are semi-skilled workers).

Secondly, the indexes of segregation presented in Table 1 show that moderately high levels of residential segregation by occupational status seem to be present in Cagayan de Oro. It would probably be misleading, though, to characterize the city as a "mosaic of social worlds in which the transition from one to the other is abrupt." Rather, a fair degree of within-district heterogeneity seems to be the case as only about a quarter of the male workers in the city would be required to change residences in order to achieve perfect integration among occupational groups.¹¹

In general, segregation scores are largest for the two highest status groups — "professionals" and "semiprofessionals and administrators." Residential segregation scores are only slightly higher among respondents in the lowest status occupations than they are among workers of intermediate status. This supports our earlier observation about the J-shaped segregation curve found for cities in less developed countries and suggests

¹⁰ Duncan and Duncan, *op. cit.*, p. 500.

¹¹ This finding is supported by R. Bulatao's comments on segregation patterns in the city of Manila. This observer relates that his attempt to draw a sample of class-segregated districts in the Greater Manila area was hampered by the fact that "except for slum areas, sample areas were generally not homogeneous. Subsequent data checks indicated a considerable overlap between supposedly middle-class and supposedly lower-class areas." Rodolfo A. Bulatao, *The Value of Children: A Cross-National Study, Volume Two, Philippines*, (Honolulu: East-West Population Institute, 1975), p. 12.

that the really salient class distinction in this setting may well be between elite and non-elite positions.¹²

Finally, the data shown in Table 1 hint at the existence of a specific institutional mechanism which can serve to reduce segregation levels between occupational groups. This is the fairly widespread presence of non-nuclear households in Philippine cities. As Stinner has shown, urban households in the Philippines often include one or more adults who are not part of the household head's family of procreation. In fact, non-nuclear households are actually more common in urban areas of the country than they are in the supposedly more "traditional" rural setting.¹³ Extended relatives who have recently migrated to the city, servants, boarders, and lodgers represent the major examples of persons who, by joining the urban household, serve to make it non-nuclear in structure. In many of these cases, the non-nuclear adults who have joined the household will belong to different (usually lower) occupational status groups than that of which the household head is a member. Thus, the absorbent power of the Philippine urban household can serve to decrease patterns of residential segregation, as some individuals who would be unable to afford individual rents in the more well-to-do neighborhoods of the city are enabled to live there in the capacity of a servant, extended relative, or lodger. Such within-household occupational heterogeneity is less likely in the Western setting, where nuclear or single-person households prevail overwhelmingly.

Evidence for these speculations can be had by comparing indexes of dissimilarity and of segregation among our subsample of male household heads with those found for employed males in general. If the above argument is correct, we would expect that this latter subsample should exhibit higher levels of occupational segregation, since (unlike servants or extended kin) it must bear the major burden of rental costs for the household. This is indeed the case, as shown by the fact that the household head subsample scores are higher than are those for the overall sample in five out of six comparisons for the index of segregation and eleven out of fifteen comparisons on the index of dissimilarity. This contrast is particularly strong for the lowest status occupational category (i.e. unskilled workers). On the average, the index of dissimilarity scores for household heads who are unskilled workers are 6.6 points

¹² This observation is supported by Lynch's description of the Philippine class system as consisting essentially of two main groups: "big people" (i.e., the elite) and "little people". Cf. "Big and Little People: Social Class in the Rural Philippines," in Mary Racelis Hollnsteiner (ed.), *Society, Culture and the Filipino* (Quezon City: Institute of Philippine Culture, 1979), pp. 44-48.

¹³ William F. Stinner, "Urbanization and Household Structure in the Philippines," *Journal of Marriage and the Family*, Vol. 39 (May, 1977), pp. 377-395.

higher than are those for unskilled workers in general. The implication is clear: if a man is poor *and married* (i.e. a household head) in the Philippine urban setting, this means that he is quite likely to end up residing in a lower class district, since he will probably be unable to afford the rents in higher status neighborhoods. Fairly large numbers of unmarried, lower status males are living in more well-to-do sections of the city, though, chiefly as extended relatives, lodgers, or low-skilled employees of the household head.

Further evidence for the above conclusion can be had by inspecting the index of segregation scores found for employed *females* aged 20 and over. These data are shown below.¹⁴

Professional	45
Semiprofessional and Administrative	28
White Collar	22
Skilled	22
Semiskilled	24
Unskilled	16

The most unusual aspect of these data is the very low segregation levels found among low status (unskilled) working women. As a result of this finding, the overall relationship between occupational status and residential segregation for women is more nearly linear than U-shaped in form. Since over half of the "unskilled" female workers in Cagayan de Oro were working as domestic servants at the time of the dual records study, this again shows how the capacity of the Philippine urban household to absorb non-nuclear members can serve to decrease patterns of residential segregation among occupational groups.

SUMMARY AND DISCUSSION

This paper has been concerned with describing patterns of residential segregation among occupational groups in the Philippine city of Cagayan de Oro. In general, our findings have served to both support and extend the observations obtained in earlier analyses of this phenomenon. As with most previous studies, residential dissimilarity between any two occupational status groups was found to parallel quite closely the "social distance" between them. Moderately high levels of segregation by occupational status were observed among males, with the two highest status groups being most isolated residentially. If Park's famous dictum that

¹⁴ These indexes are calculated upon a sample of 3408 working women, as distributed among six occupational status categories in the following fashion: Professional (54 cases); Semi-professional and Administrators (459); White Collar (660); Skilled (421); Semi-skilled (703); and Unskilled (1,111).

"physical distances so frequently are... the indexes of social distances"¹⁵ is indeed correct, this would seem to argue that stratification patterns in the urban Philippine setting are characterized by an especially clear status division between the elite and the masses.

It was noted that segregation patterns among occupational groups in Cagayan de Oro are generally higher among male household heads than they are for males in general. This was interpreted as being due to the ability of the urban Philippine household to absorb peripheral members (such as extended relatives, servants and lodgers) who often hold differing occupational statuses than the household head. Thus, a certain amount of cross-status integration may be taking place at the household level, even in cases where districts are predominantly composed of households which are headed by persons of rather homogeneous occupational status,

In conclusion, it is to be hoped that further, comparative studies of residential segregation patterns can be made for the major urban areas of the Philippines. As the nation gradually evolves toward a more urbanized and industrialized future, it will be of interest to see how status groups will align themselves residentially in the country's burgeoning cities.

TABLE 1. INDEXES OF DISSIMILARITY AND OF SEGRATION FOR SIX OCCUPATIONAL STATUS GROUPS, EMPLOYED MALES AGED 20 AND OVER AND EMPLOYED MALE HOUSEHOLD HEADS AGED 20 AND OVER: CAGAYAN DE ORO CITY, JULY 1975.^a

OCCUPATIONAL GROUP	INDEXES OF DISSIMILARITY (Δ)						INDEXES OF SEGRATION (Δ')	
	I	II	III	IV	V	VI	All Males	Household Heads
I. Professional	—	30	32	40	46	43	38	39
II. Semiprofessional and administrative	31	—	24	32	38	40	31	33
III. White Collar	31	26	—	20	29	32	21	26
IV. Skilled	36	31	20	—	25	30	20	19
V. Semiskilled	47	41	34	26	—	18	18	22
VI. Unskilled	53	49	42	35	19	—	20	26
Sample Size ^b	222 (142)	423 (295)	669 (417)	960 (654)	1971 (1260)	970 (501)	5215 —	— (3408)

^a Figures above the diagonal are for all males aged 20 and over; those below the diagonal are for employed male household heads age 20 and over.

^b The top figures are the number of cases for the sample of all employed males aged 20 and over, those in parentheses are for employed male household heads aged 20 and over.

¹⁵ Robert E. Park, "The Urban Community as a Spatial Pattern and a Moral Order," in Ernest W. Burgess (ed.), *The Urban Community* (Chicago: University of Chicago Press, 1926), p. 18.

ORIGIN AND DISTRIBUTION OF MANGO

by

N. D. BONDAD¹

The origin of mango (*Mangifera indica*, Linn.) is difficult to trace because it is a fruit of the old world cultivated for more than 4,000 years (De Condolle, 1886) or nearly 6,000 years (Hill, 1952). Records of its culture, history, and distribution are shrouded in antiquity. Three major areas relatively close to each other are believed to be the home origin of mango: (1) India and IndoChina, (2) IndoBurma border, and (3) Southeast Asia. The first view divides mango into two big groups: monoembryonic types native to India and polyembryonic types originating in IndoChina. This is essentially an extension of the presently accepted view that mango is native to the IndoBurma border. No strong argument supports the Southeast Asian origin of mango.

Evidences in favor of, or against, the three possible areas of origin of mango are discussed below.

INDOBURMA REGION

Present concensus indicates that the home origin of mango is the border of India and Burma in the Assam (Northeast India) region (De Candolle, 1886, Mukherjee, 1972; Vavilov, 1951). Evidences supporting this include: the history of the mango genus; occurrence of numerous wild and cultivated mangoes in India; archeological and literary evidences; the number of ancient names particularly Sanskrit ones; geographical distribution; genetic and taxonomic relations; and its abundance in the gardens of Bengal and Deccan since ancient times, among others (Mukherjee, 1951).

SOUTHEAST ASIA

Many authors (Ali and Khan, 1975; Allen, 1967; Campbell and Malo, 1967; Hobson, 1969; Merton and Merton, 1946; Sastrapradja, 1975; Singh, 1957; Singh, et al., 1967; Yee, 1958; Young and Sauls, undated) regard Southeast Asia, specifically the region about Malaysia, the Philippines and Indonesia as the origin of mango. The main argument is the the existence in this region of most of the 41 species of the genus *Mangifera* (Mukherji, 1949). Only two species exist in the wild in India (Gangolly, et al., 1957). The greatest diversity of the species is in

¹ Assistant Professor, Department of Horticulture, College of Agriculture, University of the Philippines at Los Baños, College, Laguna.

Malaysia (Table 1) which prompted many authors to suggest that mango must have its origin in this area. This is influenced by the Vavilovian concept that a species originated where its greatest diversity occurs.

TABLE 1. WORLD DISTRIBUTION OF *MANGIFERA*
(MUKHERJEE, 1972).

Areas	Section I			Section II		
	Total	Endemic	Wide	Total	Endemic	Wide
India	3	1	2	—	—	—
Ceylon	2	1	1	—	—	—
Andamans	3	1	2	—	—	—
Eastern Peninsula	10	5	5	4	—	4
Malay Peninsula	12	7	5	7	1	6
Sunda Islands	10	6	4	6	—	6
Eastern Malaysia	4	2	2	2	—	2
Philippines	6	4	2	2	—	2
New Guinea	2	—	2	—	—	—

However, Malaysia could not have been the home of mango. Its heavy rainfall distributed throughout the year is not suitable for the crop. Only small parts of Indonesia and the Philippines are dry. The overall climate is too wet for mango. Truly wild mangoes are unknown in the Philippines and Malaysia. Good cultivars do not exist in Malaysia and those grown in the Philippines are not indigenous. They are abundant in India. Burkill (1966) and Wester (1920) are of the opinions that mango was probably introduced to Malaysia and the Philippines, respectively. Li (1970) did not include mango among fruits originating in Southeast Asia.

INDIA AND INDOCHINA

Most Indian mangoes are monoembryonic. Polyembryonic mangoes are practically unknown. Those discovered in the West Coast of India are of little significance, if any (Gangolly, et al., 1957). Early introduced Indian mangoes were the parents of cultivars that produced fibrous fruits with turpentine flavor and of poor quality (Chandler, 1958). Long-established polyembryonic mangoes are fiberless, highly esteemed, and free from turpentine flavor. Monoembryonic mangoes grown outside India become polyembryonic because of their natural crossing with polyembryonic pollens common in Southeast Asian countries, for example (Singh, 1960). This implies that polyembryonic mangoes were present to start with, quite contrary to Mukherjee's (1972) view that most of the existing cultivars in other countries evolved from introductions from India.

Polyembryonic mangoes must have a center or origin outside India. Burma could very well be the home of polyembryonic mangoes. The form of wild mango fruit in the Burma border has remained practically unchanged owing to polyembryony (Valmayor, 1962). But this form is also typical of mangoes in Thailand where native polyembryonic mangoes are numerous (Bembower and Chempoo-pho, 1955; Prambot, 1977; Vangnai, 1974). A large number of undescribed forms, most likely polyembryonic similar to the better-known 'Xoai Cat', 'Xoai Voi' and 'Xoai Thanh Ca', are also believed to exist in Vietnam (Van Tan, 1975).

Apparently, polyembryonic mangoes are native not only to Burma but a large part of IndoChina (except Malaysia). This, if indeed is the case, would broaden the IndoBurma region to India and IndoChina as the home of mango. Although largely unheard, A.P.C. Bijouwer expressed this view in 1937. He wrote to Juliano (1937) that the two big centers of origin of mango are India with monoembryonic types and the area of Vietnam with polyembryonic types. However, together with Vietnam, he considered Indonesia and the Philippines as centers of origin of mango which is not supported by present-day evidences. Indonesia is among the areas with the greatest diversity of *Mangifera* (Singh, 1976) but the Philippines, where mango is most likely introduced, has only a few native species (Meijer, 1975).

DISTRIBUTION OF MANGO

Indian mangoes are the parent materials of present-day cultivars of the Western Hemisphere. Mukherjee (1951) credited the Portuguese for bringing mangoes from Goa, India to East Africa, then to West Africa early in the 16th Century, and subsequently to Brazil. However, Purseglove (1972) credited the Persians for bringing mangoes into East Africa about the 10th century A.D. He noted mango growing in Somalia in 1331, which is earlier than the 16th century given by Mukherjee (1951).

From Brazil Mukherjee (1951) and Purseglove (1972) agree that mango was introduced into the West Indies, first to Bardados in 1742 and to the Dominican Republic. Englishmen, who captured a French ship carrying mangoes (identified as "No. 11"), brought the plants to Jamaica. No. 11 became the parent of the West Indian mango which was once popular in that area.

West Indies has been a major source of mangoes introduced to Mexico, Hawaii (Pope, 1929), U.S.A. (Ledin, 1958), and many parts of tropical America (Ochse, et al., 1961; Valmayor, 1962).

According to Indian writers Malaysia is the first country in which mango was introduced. The evidence presented by Mukherjee (1951) is the existence of the Malayan common name of the mango, "mangga,"

which is a variant of "manga" in the Tamil (South Indian) language. Indian monks traveling between the 4th and 5th centuries, B.C., for cultural and religious missions, are believed to have carried the mango to Malaysia and other countries of East Asia.

It is tempting to suggest that mangoes in Burma were brought to neighboring Thailand, Vietnam, Campuchea, and Laos. But polyembryonic mangoes may be native to many parts of IndoChina as earlier pointed out.

Today, mango is found almost anywhere in the tropics and subtropics. It is grown as a curiosity, ornamental, or commercial crop in the following countries (Bondad, 1980):

- | | | |
|---------------------|---------------------|-------------------|
| 1. Algeria | 30. Guinea | 59. Paraguay |
| 2. Argentina | 31. Guyana | 60. Peru |
| 3. Australia | 32. Haiti | 61. Philippines |
| 4. Bahamas | 33. Honduras | 62. Puerto Rico |
| 5. Bahrain | 34. India | 63. Reunion |
| 6. Bangladesh | 35. Indonesia | 64. Samoa |
| 7. Barbados | 36. Iran | 65. Saudi Arabia |
| 8. Benin | 37. Iraq | 66. Senegal |
| 9. Bolivia | 38. Israel | 67. Sierra Leone |
| 10. Brazil | 39. Ivory Coast | 68. Somalia |
| 11. Burma | 40. Jamaica | 69. South Africa |
| 12. Cent. Afr. Rep. | 41. Kampuchea Dm | 70. Spain |
| 13. Chad | 42. Kenya | 71. Sri Lanka |
| 14. China | 43. Laos | 72. St. Lucia |
| 15. Colombia | 44. Libya | 73. St. Vincent |
| 16. Congo | 45. Madagascar | 74. Sudan |
| 17. Cook Islands | 46. Malawi | 75. Taiwan |
| 18. Cuba | 47. Malay Peninsula | 76. Tanzania |
| 19. Dahomey | 48. Martinique | 77. Thailand |
| 20. Dominica | 49. Mauritania | 78. Tonga |
| 21. Dominican Rep. | 50. Mauritius | 79. Trinidad |
| 22. Ecuador | 51. Mexico | 80. Tunisia |
| 23. Egypt | 52. Morocco | 81. United States |
| 24. El Salvador | 53. Mozambique | 82. Upper Volta |
| 25. Fiji | 54. Nicaragua | 83. Venezuela |
| 26. Ghana | 55. Nigeria | 84. Vietnam |
| 27. Guadeloupe | 56. Oman | 85. Yemen |
| 28. Guam | 57. Pakistan | 86. Zaire |
| 29. Guatemala | 58. Panama | 87. Zimbabwe |

ORIGIN AND DISTRIBUTION OF PHILIPPINE MANGOES

Mango introduction into the Philippines was one of the earliest. Wester (1920) concluded that mango in Southern Mindanao was probably introduced from Indonesia between 1400 and 1500. The evidences he presented is the identical forms of 'Dudul' of Mindanao and 'Dodol' of Indonesia. No statement contrary to this exists and recent Indonesian literature tend to support Wester.

Kusumo, et al. (1975) described three Dodol cultivars in Indonesia. 'Dodol Puthi' has a form (short oblong), length (9.0 cm), width (5.4 cm), thickness (4.5 cm), and weight (118 g) which closely agree with the descriptions of 'Dudul' by Wester (1920). The other two, 'Dodol Wirosongko' and 'Dodol Jembar' are relatively large fruits weighing 290 and 400 g, respectively (Kusumo, et al., 1975). Malaysia has a "mangga dodol" (Allen, 1967) considered a race of mango in Malacca (Burkill, 1966) but no descriptions are available.

Another common mango in Mindanao has a form and character closely matching the photograph and quantitative data for an important Indonesian cultivar called 'Golek'. Fruits sampled in a Davao fruit stand in 1978 had a length and width of 17.3 and 7.6 cm, respectively. F.N. Rivera provided the following descriptions: size large, form oblong oblique, stem inserted obliquely, sinus absent to shallow, base obliquely rounded, cavity absent, ventral shoulder prominent, dorsal shoulder falling abruptly, apex broadly pointed, beak broadly mammiform, color of unripe fruit pale green and ripe fruit pale yellow, lenticels large and closely spaced, flesh slightly fibrous. The same form and size had been observed in Kabacan, Cotabato.

'Golek' described and illustrated by Kusumo, et al. (1975) and Kusumo and Tjiptosuhardjo (1971) has about the same form, weigh 512 g and is $16.7 \times 7.9 \times 6.2$ cm. The full size plate of Ochse (1931) measures 18.2 cm long and 8.2 cm wide. Thus the size of fruits sampled in Davao is well within the ranges of Indonesian 'Golek'. Other striking similarities are the large and closely spaced lenticels, distinctly mammiform beak, and presence of fibers in flesh. 'Sophia' is another large (600 g; $17.5 \times 7.8 \times 5.0$ cm) mango of Indonesia with a form related to 'Golek' (Kusumo and Tjiptosuhardjo, 1971). Ochse (1931) mentions "mangga Seemanalagi" being the biggest Indonesian mango larger than, but similar to, 'Golek'. Lenticels on peel are similarly prominent. The largest Philippine mango so far reported is also found in Mindanao, about Pagadian, Zamboanga del Sur (Guillem, 1954). The fruit has dimensions of 19.7×7.6 to 10.2×6.4 cm and the seed measures $12.7 \times 5.1 \times 2.5$ cm. This is reported to be fibrous, pale-green with good flavor but pungent odor like huani (*M. odorata*). Large mangoes in Luzon including 'King', 'Sufaida', 'Xoai Cat' and 'Valencia Pride' are very recent introductions (Valmayor and Espino, 1975).

It is unlikely that introduction of mangoes in Luzon was by Spaniards carrying mango from India to Manila as suggested by Ochse, et al. (1961). The Philippines received mangoes from India only in 1911 (Webster, 1920) and those that long existed here are not of the Indian type.

For a long time, the most widely-grown mangoes in Luzon and Visayas are 'Carabao' and 'Pico' (Valmayor, 1972; Wester, 1920). This has remained so until today (Table 2). The characters of these cultivars are closely related to Thai and Vietnamese mangoes indicating the likelihood of their origin in IndoChina, as earlier put forward by Wester (1920). IndoChinese cultivars showing resemblances especially to 'Carabao' and to a lesser extent 'Pico' include 'Okrong', 'Tong Dum', 'Xoai Cat', 'Xoai Thanh Ca', 'Saigon' and 'Cambodiana'.

TABLE 2. PROPORTION OF 'CARABAO' AND 'PICO' IN THE TOTAL MANGO POPULATION IN THE PHILIPPINES (BUREAU OF AGRICULTURAL ECONOMICS, 1979)

Cultivar	Bearing trees		Bearing + non-bearing trees	
	No. (million)	%	No. (million)	%
Carabao	1.17	66.5	1.47	64.5
Pico	0.47	26.7	0.62	27.2
Others	0.12	6.8	0.19	8.3
Total	1.76	100.0	2.28	100.0

Detailed study of these cultivars will undoubtedly yield features distinguishing them from each other but in general characters (form, color, flavor, embryony, fiber content), 'Carabao' and 'Pico' are related to the polyembryonic mangoes of IndoChina.

The common mango in some Southern Tagalog provinces of Luzon called 'Pahutan' is more closely related to Indonesian and Mindanao mangoes. Whether 'Pahutan' came from Mindanao or was a direct introduction from Indonesia is uncertain. Wester (1911) saw at an early date fruits of the type known in Cavite as 'Pahutan' being sold in Cagayan de Oro (Mindanao). 'Pahutan' may be of the same origin as 'Dudul' to which it is closely similar (Table 3).

Mango is found in all regions of the country (Table 4). The largest population is in Northern Luzon (Ilocos region) which has a long dry season. Mangoes grown in a particular area are mixed types but one commonly finds 'Carabao' and 'Pico' in the drier areas of Luzon and Visayas. 'Katchamitha' abounds in relatively wet areas. The Hawaiian race of mango is common in Central to Northern Luzon. Mindanao and some provinces of the Visayas have other types grown for local consumption. They seldom reach the markets of Metro Manila.

TABLE 3. FRUIT CHARACTERS OF 'PAHUTAN' AND 'DUDUL' MANGOES (WESTER, 1920)

Character	'Pahutan'	'Dudul'
Size	small	small to medium
Length (cm)	9	9
Diameter (cm), major	—	6
Weight (g)	90 (ave.), 120 (max.)	—
Form	oblong oval with full cheeks	short, oblong
Surface	smooth with finely netted veins at maturity	smooth
Color	orange yellow tinged with green	yellowish green to greenish yellow with a faint blush on sun exposed-side
Skin	moderately thick	thick
Skin texture	tough	tough
Flesh color	pale orange yellow	deep yellow
Flesh texture	tender	firm
Taste	very sweet	very sweet
Flavor	rich and aromatic	good, resinous
Flesh fiber	profuse	abundant
Seed size	large	large
Seed fiber	abundant ^a	abundant

^a Unpublished

TABLE 4. REGIONAL MANGO POPULATION (THOUSAND TREES) IN THE PHILIPPINES (BUREAU OF AGRICULTURAL ECONOMICS, 1979)

Region	Total	Bearing
(Philippines)	2,282	1,757
Ilocos	718	643
Cagayan Valley	62	34
Central Luzon	277	210
Southern Tagalog	319	248
Bicol	5	1
Western Visayas	290	260
Central Visayas	107	68
Eastern Visayas	2	1
Western Mindanao	121	58
Northern Mindanao	87	70
Southern Mindanao	236	137
Central Mindanao	58	27

REFERENCES

- ALI, N. and M. KHAN. 1975. The mango in Punjab. Tech. Bul. 22. Government Printing, Lahore. 56 pp.
- ALLEN, B.M. 1967. Malayan fruits: an introduction to the cultivated species with Thai and Tamil names. Moore Press, Singapore. 245 pp.
- BEMBOWER, W. and A. CHAMPOOPHO. 1955. Mango varieties of Thailand. Indian J. Hort. 12:58-62.
- BONDAD, N.D. 1980. World mango production and trade. World Crops 32(6):160.
- BUREAU OF AGRICULTURAL ECONOMICS. 1979. Crop Statistics. Bureau of Agricultural Economics, Metro Manila.
- BURKILL, I.H. 1966. A dictionary of the economic products of the Malay Peninsula. 2nd ed. Ministry of Agriculture and Cooperatives, Kuala Lumpur. 2:1424-1431.
- CAMPBELL, C.W. and S.E. MALO. 1967. The mango. Univ. Fla. Fruit Crops Fact Sheet No. 2. 4 pp.
- CAYGILL, J.C., R.D. COOKE, D.J. MOORE, S.J. READ, and H.C. PASSAM. 1976. The mango (*Mangifera indica* L.) harvesting and subsequent handling and processing: an annotated bibliography. Trop. Prod. Inst. G 107. 124 pp.
- CHANDLER, W.H. 1958. Evergreen orchards. Lea & Febiger. Philadelphia. 535 pp.
- DE CANDOLLE, A. 1886. Origin of cultivated plants. 2nd ed. Hafner Pub. Co., New York. 468 pp.
- GANGOLLY, S.R., R. SINGH, S.L. KATYAL, and D. SINGH. 1957. The mango. Indian Council of Agricultural Research, New Delhi. 530 pp.
- GUILLEM, R. 1954. "Russian" mango of Zamboanga del Sur. Agric. Indus. Life. 16(8):31, 33.
- HILL, A.F. 1952. Economic botany: a textbook of useful plants and plant products. 2nd ed. McGraw-Hill Book Co., Inc., New York. 560 pp.
- HOBSON, L. 1969. Mango growing. In: Proceedings of the conference on tropical and subtropical fruits. Tropical Products Institute, London. pp. 211-215.
- JULIANO, J.B. 1937. Embryos of Carabao mango (*Mangifera indica* Linn.). Philipp. Agric. 25:749-758.
- KUSUMO, S. and S. TJIPTOSUHARDJO. 1971. Mango varieties suitable for dessert. Bul. Hortik. Tjahort No. 5. 24 pp. (In Indonesian, translation cited in Caygill et al., 1976).
- KUSUMO, S., R. SOEHENDRO, POERNOMO, and SUMINTO, T.J. 1975. Mangga (*Mangifera indica* L.). Lembaga Penelitian Horticultura, Pasarminggu, Jakarta.
- LEDIN, R.B. 1958. Mango varieties in Florida. Hort. Adv. 11:16-26.
- LI, H. 1970. The origin of cultivated plants in Southeast Asia. Econ. Bot. 24:3-19.
- MEIJER, W. 1975. Distribution and possible centres of origin of species of *Mangifera* in Malesia. In: South East Asian Plant Genetic Resources. International Board for Plant Genetic Resources, Bogor. pp. 45-46.
- MORTON, K. and J. MORTON. 1946. Fifty tropical fruits of Nassau. Text House Publication, Florida. 118 pp.
- MUKHERJEE, S.K. 1951. The origin of mango. Indian J. Genet. Plant Breed. 11:49-56.

- MUKHERJEE, S.K. 1953. The mango — its botany, cultivation, uses and future improvement, especially as observed in India. *Econ. Bot.* 7:130-162.
- MUKHERJEE, S.K. 1972. Origin of mango (*Mangifera indica*). *Econ. Bot.* 26:260-264.
- MUKHERJI, S. 1949. A monograph on the genus *Mangifera* L. *Lloydia* 12:73-136.
- OCHSE, J.J. 1931. Fruits and fruit culture in the Dutch East Indies. Batavia.
- OCHSE, J.J., M.J. SOULE, JR., M.J. DIJKMAN and C. WEHLBURG. 1961. Tropical and subtropical agriculture. Macmillan Co., New York. 1:530-545.
- POPE, W.T. 1929. Mango culture in Hawaii. *Hawaii Agric. Exp. Sta. Bul.* 58. 27 pp.
- PROMBOOT, P. 1977. Mango. *Bangpra Center J.* 15(1):47-54.
- PURSEGLOVE, J.W. 1972. Mangoes west of India. *Int. Soc. Hortic. Sci. Tech. Communic.* 24:170-174.
- SASTRAPRADJA, S. 1975. Tropical fruit germplasm in South East Asia. *In: South East Asian Plant Genetic Resources. International Board for Plant Genetic Resources, Bogor.* pp. 33-44.
- SINGH, H. 1957. Genetic stocks of agricultural and horticultural plants of South Asia. *Indian J. Genet. Plant Breed.* 17:343-361.
- SINGH, L.B. 1960. The mango: botany, cultivation, and utilization. Leonard Hill (Books) Ltd., New York. 483 pp.
- SINGH, L.B. 1976. Mango. *In: Evolution of crop plants.* N.W. Simmonds, ed. Longman Inc., London. pp. 7-9.
- SINGH, S., S. KRISNAMURTHI, and S.L. KATYAL. 1967. Fruit culture in India. *Indian Council of Agricultural Research, New Delhi.* pp. 81-101.
- VALMAYOR, R.V. ca 1962. The mango: its botany and production. College of Agriculture, Laguna. 90 pp.
- VALMAYOR, R.V. 1972. The Philippine mango industry — its problems and progress. *In: Symposium on mango and mango culture.* *Int. Soc. Hortic. Sci. Tech. Communic.* 24:19-23.
- VALMAYOR, R.V. and R.C. ESPINO. 1975. Germplasm resources for horticultural breeding in the Philippines. *In: South East Asian Plant Genetic Resources. International Board for Plant Genetic Resources, Bogor.* pp. 56-76.
- VANGNAI, V. 1974. Certain commercial mango varietal characteristics in Thailand. *Proc. Int. Hortic. Cong.* 19(18):481
- VAN TAN, N. 1975. Utilization and conservation of plant genetic resources in South Vietnam. *In: South East Asian Plant Genetic Resources. International Board for Plant Genetic Resources, Bogor.* pp. 247-250.
- VAVILOV, N.I. 1951. The origin, variation, immunity and breeding cultivated plants (translated by K.S. Chester from the Russian articles of N.I. Vavilov which appeared in *Chron. Bot.* 11:1-366). Ronald Press Co., New York. 364 pp.
- WESTER, P.J. 1911. Tropical fruits in the Visayas. *Philipp. Agric. Rev.* 4:545-558.
- WESTER, P.J. 1920. The mango. *Philipp. Bur. Agric. Bul.* 18. 70 pp.
- YEE, W. 1958. The mango in Hawaii. *Univ. Hawaii Circ.* 388.26 pp.
- YOUNG, T.W. AND J.W. SAULS. undated. The mango industry in Florida. *Univ. Fla. Bul.* 189.70 pp.

MEMBERS FORUM

Beginning this year 1982 this page is reserved for the use of PGS Members to give them the opportunity to make comments or reactions on whatever aspects each member may have in mind about the Society, the Journal and the articles thereof.

Dear Members, I invite you to utilize this page. Please make your comments short and straight to the point.

Some members have suggested that we should aim high in order to attain an approximate level as that of the National Geographic Society and the National Geographic Magazine of the United States.

What do you say?

Incidentally, the National Geographic Society has now a 94-year history (1888-1982). The membership has reached 10,850,000 from more than 180 countries of the world, including the Philippines.

The Editor

business begins

with the printed word. . .

You start with your favorite newspaper to keep you up-to-date. Through the day, magazines, reports and documents go with the progress of your work. But, as we know it, business could not exist for a day without the printed word. And of course, you always prefer better printed words. You have this quality printing at . . .



BOOKMAN, INC.

**OFFSET AND LETTERPRESS PRINTER • PUBLISHER
• BOOK MANUFACTURER**

373 Quezon Avenue, Quezon City
Tel. 60-96-49 • P. O. Box 709, Manila