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# The PHILIPPINE GEOGRAPHICAL JOURNAL

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**GROWING UP IN A SOUTHERN TAGALOG PROVINCE**

by

LEOPOLDO B. UICHANCO<sup>1</sup>

In a prewar voyage across the Atlantic to New York, on the good ship "Ile de France," I fell into conversation with an American professor, in the course of which he asked me, "Is it true that the American occupation forces at the turn of the century used the water cure on Filipinos?" I told him I was not old enough in those days to be in a position to supply first-hand information. However, I added, from what I heard and learned later it appeared there was some truth to that information, except that the Americans committed those atrocities in retaliation for the barbaric acts they had suffered from in the hands of the enemy. "That was no excuse at all," the professor countered, "the Americans at the time were more civilized and they had no business paying in kind."

As a child then hardly five, my earliest recollection of the initial skirmishes, not with the American forces, but, earlier, with the Spanish, was when my parents and we children were lying prostrate under the house in the dark of the night and we were surrounded by sacks filled with rice. We could hear the staccato reports from the rifles, now issuing from this direction, now from that, as the Filipino insurgents engaged the Spanish artillery in a running battle along the streets of Calamba, Laguna. For years thereafter an angry bullet hole stared at us from the transom of the main door to remind us of that nightmarish evening.

Some time afterwards, according to my mother, neighbors came running along the streets warning those within range that the Americans were coming. Nobody in town had ever heard of Americans before, but their evil reputation, probably disseminated by their enemies, the Spaniards or more likely by would-be looters, sowed panic among the townspeople. The Americans were reportedly satyrs who in their lechery spared neither man nor woman. My recollection of our next abode was of a nipa house which, I was to learn later, was in Santo Tomas, Batangas, next to Calamba. The house was surrounded by Mandarin oranges, bearing green and ripe fruits. One morning there was a commo-

<sup>1</sup> NSDB Technical Consultant on Agricultural Research; Professor Emeritus of Entomology and former Dean, College of Agriculture, University of the Philippines (1939-1943; 1945-1959).

tion in the town plaza, almost in front of our temporary home. I was attracted by the cacophony produced by the large crowd of people talking and shouting all at once. Along with other curious children, I went to see what it was about. On a long wooden bench a man was stretched on his belly while another was administering several lashes with a long whip on the buttock. I was told that it was the punishment meted out for petty thievery by the newly organized Philippine military government.

When relative peace came and the people learned that the Americans were not such horrible creatures after all, the refugee families cautiously returned to their homes. No sooner had we settled in our own house in Calamba than American soldiers, then occupying the town, came and told my father, through a Filipino interpreter in their employ, that we were to vacate the premises in twenty-four hours, because a military detachment was to be quartered there. If we failed to move on schedule, they added, they would throw all our possessions out of the window. All houses of some size in town were preempted by the Americans. My folks forthwith hired a gang of carpenters to build us a temporary nipa house in another lot which my father owned. The "temporary house" was to be our domicile for some five years.

Filipino guerrilla forces, under General Emilio Aguinaldo, were still resisting and Calamba was threatened for some time with armed clashes. Owing to the unsettled times, no school could be opened, although we children were not exactly unhappy over the situation. As a stopgap measure, my father placed me under the tutelage of the parish priest, Rev. Angel Ma. Villaruz. I studied in the *convento* (manse) with several other boys, many of them much older than I. Padre Angel taught us, beside the ABC, Latin grammar and catechism. Of course, the Padre was busy with his parish duties and could not give us full attention. Hence, we had plenty of time to play *patas* (bamboo popgun), slingshot, kite, frog-angling from the dikes, and similar pranks. On Saturdays, when we had the day to ourselves, since we had no classes, some of my friends and I, unknown to our parents, repaired to a rice field on the other side of the river, where people were threshing the harvest. There a kindly farmer taught us how to ride the carabao. The first lesson was how to fall. Said the farmer, "If you have to fall, choose the rear end of the animal to drop from. No horns will hurt you there and you are least likely to be trampled on." Moonlight nights were a signal for boys in the neighborhood to get together and play group games. A regular playground was then unknown, so we played on the streets, where we were interrupted only by occasional passing *calesas* (horse-drawn carts). Our favorite was the *tubigan* (of the etymology of which I am not certain). *Tubigan* was played by first marking with water across the dirt road as many parallel lines as there were members in a team. The lines were of about equal distances, approximately five meters apart. The boys were divided into two opposing teams, each under a captain. Members of one team manned the lines, while those of the other ran, first, from front to back, then back to the front. As many ran as could pass the lines unchallenged. Whoever was hit by the hands of the guard on any line was out, so the number of runners was usually reduced eventually to only one. The team wins and once more runs in full force if the lone survivor passed the gauntlet both ways; otherwise, its members now manned the lines, and those of the other took their place. There was a neighbor-

hood boy who was strong and quick-tempered. He was apt to draw anybody to a fight on the slightest provocation. The other boys dared not exclude him from the *tubigan* matches, although they were sure he could be violent when he was losing or he thought he was being cheated, which was often. At length, the other boys hit upon an idea. They conspired to keep him in one or the other of the running teams and the fellow, unaware of the trick, first ran in one direction, then in the other, and no line guard challenged him in earnest. When he got exhausted from the effort, panting and perspiring, he would withdraw, and everybody would be satisfied. How were we to know then that the boy was to grow up to be General Vicente Lim?

A foreigner came to town to make his temporary home and teach English for a living. His name was Santiago (I never knew his surname). My father enrolled me in his English class, where I had my earliest acquaintance with the language. Then, one day a municipal policeman came to advise my parents that all children of school age must enroll in the then newly opened public school. I had only a few classmates, all boys, and we had only one teacher, whom we called Maestrong Daniel. He was a crusty old man, who nagged us endlessly, and he was obviously a believer of the Spanish adage, "La letra con sangre entra" (Knowledge enters painfully). He used Tagalog to teach us, although we had Spanish textbooks, of which one I recall was "*Amigo de la Infancia*." I never entertained any "amigo" feeling toward the book, which was dull and uninteresting, especially as taught by Maestrong Daniel. In the opening and closing exercises daily, the assembled pupils were made to recite with the teacher, "Como sea la niñez, asi sera la vejez." (As you are in childhood, so you will grow as adult.) The school's one toilet was a dilapidated outhouse, where one day a pupil accidentally fell through the rotting floor to the ground below. The floor was not high, so he escaped unhurt, but when he returned to the classroom, he was stinking to high heaven. Although it was an accident and he was not at fault, the teacher scolded him and the poor victim became the butt of his schoolmates' jokes, which earned him the nickname "kepot" (manure scraper).

The regular public schools were subsequently opened, at first with American soldiers detailed as teachers. My soldier-teacher could speak some tagalog after a fashion. Large colored charts were used in the absence of textbooks. In the lesson one morning we were taught sentence construction. "I see a cat." Then the American teacher would render it to Tagalog for our benefit, "Ako nakikita ng pusa," instead of "Ako'y nakakakita ng pusa." When everybody laughed, he lost his temper, unaware that his Tagalog reversed the roles of the observer and the observed. Besides, his Tagalog pronunciation was fractured. Later, we were moved to a bigger school building of bamboo and nipa. In time there came American civilian teachers, the first batch of whom, I learned years afterwards, arrived by the now celebrated "Thomas." Regular textbooks then came and they were loaned to us rent-free, together with a free supply of pencils, slate, notebooks and other school needs. I remember that, as the pupils advanced in grade, more and bigger textbooks were issued to them. We were happy to have them, not primarily for our education,

but to lug around, whether or not we needed them in school, to impress the townsfolk. Our spelling bees were quite exciting, since the victor's reward was to pull the ears of the losers. One classmate was a very poor speller, but it was no fun to win over him. His ears were minimal and not easy to catch. Besides, he smeared both ears and made them slippery with lard or coconut oil before leaving for school. Then, there was my other classmate who hated writing exercises. Because I was younger and smaller than he, and we lived in the same neighborhood, he invariably picked on me to do the job for him. However, I considered I was not being imposed on. For every slate face I filled with writing, he paid me by telling a Philippine folk tale, which I enjoyed. Consequently, we were both happy over the bargain.

Acceptance of the Americans by Filipinos was a slow process. At first it was fear of reprisal which made the people cater to them. The Americans' direct and straightforward ways were a big departure from our circuitous manner of conversing or acting. Their gruffness was mistaken for rudeness. In those earlier days, the parents used to admonish their children not to behave like an American or scold them, saying, "You act like an American!" The English language, which we boys tried to practice speaking, evoked complaints, voiced loud enough to reach our ears, that English was harsh and barbarous, unlike the beautiful Spanish language, which was refined and melodious. For many years debate in the Philippine Legislature was carried on in Spanish. Once, when a young legislator, Mr. Tomas Confesor, who had graduated from the public schools and the University of the Philippines, got so bold as to try and interpellate in English, he was bluntly told by the gentleman on the floor, "Sit down, boy." Although it was explained afterwards that the remark was not as bad as reported in the press, but, "Sit down, *voy a continuar*," the effect remained the same, and poor Confesor was laughed out of court.

The Americans, however, were grudgingly admired for their towering size; so much so that everything big became American—American horse, American papaya, American pineapple. Incidentally, one of our big cockroaches, *periplaneta americana* (Linnaeus), was not named American cockroach by the Filipinos. Hitherto, the carabao had been the standard for bigness; hence, manggang kalabau (Carabao mango), makopang kalabau, and lipang kalabau (big nettle tree, *Laportea meyeniana* [Walp.] Warb.). Then, there is the expression, usually said in jest, "kasing laki ng damulag" (as big as the carabao).

When a cholera epidemic struck Calamba, we young children had no idea that the people were in panic. In some sections of the town cholera victims were dying so fast that their corpses had to be piled on carabao carts and buried in common graves. One American sergeant, fierce-looking with his handlebar moustache and formidable on his large mount, used to go around town and order every household to keep the bonfire going. Nobody explained at the time that the purpose of the bonfire was to drive away the flies, which carry the cholera germs. Smoke raced up from the bonfire on every yard in town, because everybody

feared Mr. "Snook" (corruption of smoke). I got to be very conscious of Mr. "Snook," because my father assigned to me the unpleasant task of bonfire tender, which I should have enjoyed if I had not been so scared. When anyone fell ill, his family got apprehensive lest it be cholera. Every effort was made to conceal the secret, otherwise the patient would forcibly be taken to the hospital of the U.S. Army. That hospital enjoyed the evil reputation among the townspeople of being a one-way station from which no patient ever got out alive. Besides, the house of the cholera patient was subjected to quarantine, with a white flag flying in front to keep people from entering or going out. In the evening, *lutrinas* were held, in which houses in the neighborhood were hosts by turn. A community prayer to San Roque, the protector saint against pestilence, was held. His image was carried in a procession along the streets, accompanied by devotees with lighted candles or torches. At the end of the procession, the host offered to the guests light refreshment, which consisted of *kumpites*—heavily sugar-coated roasted corn kernels—or *caramelo*, a light sugar confection.

Vaccination next came to town and it was obligatory. The vaccinators evidently had had no training at all in hygiene and sanitation and they were set to work without supervision. They used pocket knives of every description, some of them dulled by rust or dirt. They scratched the vaccine with the point of these knives on the skin of the arm, one subject after another in succession, without washing the knives at any time or even disinfecting the points. Hence, complications due to infection not infrequently followed. One of my baby sisters died a victim of their carelessness.

An American civilian once visited Calamba and distributed copies of the Bible in Tagalog. I understand now that the munificence came from the American Bible Society. I happened to be one of the lucky recipients of a black-bound copy with gold lettering at the back. That was my first actual exposure to the Bible and I was soon absorbed reading the genealogy of Joseph. (Matthew). By that time I had no trouble reading Tagalog, because I had already had plenty of practice reading the *corridos*, or *awit*. *Corridos* were inexpensive, paper-bound booklets relating in simple Tagalog quatrains the romantic adventures of some exotic prince and his princess. The now celebrated *Florante at Laura* was among these *corridos* and the best of them all. While absorbed in the Tagalog Bible, my father forcibly took it away from me and forthwith consigned it to the flames. The American military authorities were then combing every house for subversive literature and my father would take no chances, even with the Bible.

Somehow, I next got hold of a Montgomery Ward catalogue. (Nobody ever heard of any Sears Roebuck in those days.) The thousands of goods pictured and their attractive descriptions made my mouth water. My friends and I thus got our start in the mail-order business. We ordered only little things at a time, now a pair of shoes and at most a couple of ties, now a book on magic and a box of chalk. None of us had any too much money to indulge in purchases. Nevertheless,



every year I received a huge Ward catalogue free of charge. I devoured the description of every item that interested me, although I knew very well that many of the goods were beyond the reach of my pocketbook. In those days, sending payments abroad was simply a matter of purchasing a money order at the local post-office at the fixed rate of two pesos a dollar. No permission was required from a central bank. All transactions, of course, had to go by surface mail and it took some three months for an order to arrive. But arrive it did and I do not recall ever having lost any package.

I owe Montgomery Ward much of my earlier training in the English language and in business correspondence. Consequently, to this day I find it difficult to shake off the use of too many superlatives, with which the catalogue was liberally supplied. I believe that Company enjoyed quite an extensive trade in Calamba and vicinity, including the rural areas. Some of its customers must have traced their feet on paper with the pencil pointed outward, so the shoes they received proved too big for their size. On big church holidays, but particularly on the town *fiesta*, one would chance now and then on some visiting stranger with the right shoe on the left foot, and the left shoe on the right, doubtless to compensate for the mistake made in sending the order to Chicago. Then there was occasionally the young gallant who evidently thought it smart to wear two Ward ties together, a bowtie on top and a four-in-hand below, on the same shirt collar.

What did I want to be when I grew up? In my time, there were but a few recognized professions, among them the priesthood, medicine, pharmacy, and law. Archbishop Harty, of Manila, of whose diocese Calamba was then a part, once came to town on one of his pastoral visitations. After the church ceremonies, he called us boys who were playing in the churchyard and spoke to us in English. He even made each of us count from one to ten. Evidently, I passed his simple test, so his next question was, "Do you wish to be a priest?" Without a second thought, I answered, "Yes, Sir," not knowing enough to use, "Monsignor" or "Your Excellency." I had been so impressed by the glitter of gold in the rich brocade of the ceremonial vestments and the prestige and respect the priest enjoyed among the townspeople. On getting home, I gave the old folks the gist of the conversation. It was my grandfather who interposed the strongest objection. "Forget it," he said. "After you are ordained, you might be a devil with the women and be a disgrace to the church." He was probably recalling his care-free youth and was afraid lest the operation of Mendelian laws told on his grandson. That objection spelled the end of my priestly ambition.

My father next entered me as a volunteer apprentice, without pay, to the pharmacy clerk in a small local drugstore. He was toying with the idea of my eventually taking pharmacy as a career, and why not? The only licensed pharmacist in town earned one hundred pesos a month (a fortune in those days) by simply letting his board certificate hang in the drugstore. He rarely visited the establishment, and then only to read the daily paper. Besides, I was fond of raising drug plants in

the garden, of which I accumulated quite a collection—mayana, ayapana, aposotis, kamaria, manzanilla, lantin, Jimson weed, oregano, yerba buena, solasi, sorosoro, and the like. Local *herbolarios* (herb doctors) often came to ask me for some particular drug plants which they could not procure elsewhere in town. In return, they brought me from time to time other kinds which they knew I had not in my garden. In the drugstore I soon committed the names of the different drugs and their location on the shelves to memory and before long I was compounding prescriptions. Because the drugstore had no accurate balance, I was instructed to give allowance by deducting a little from the observed weight of each ingredient to avoid accidental overdosing. In the absence of faucet water, we used well water which we ladled from an earthen jar. Often the jar was alive with mosquito wrigglers. The dirty bottles and used utensils were washed in the irrigation ditch, which ran alongside the drugstore front. Its water was of dubious purity, since the ditch served the townspeople for about every purpose.

I discovered soon enough that my boss, the pharmacy clerk, was not very intelligent and I had to do most of the prescription-filling and attending to customers. Perhaps I was not very diplomatic in discussing the matter of division of labor with the pharmacy clerk, and he resented my insistence that he assume most of the bottle-washing job, instead of leaving it to his overworked assistant. He complained against me to the absentee manager, who forthwith came and, without hearing my side, upbraided me for falling down on my job, adding that housekeeping, including bottle-washing, fell among my duties. I kept my own counsel then and did not answer back, but I did not report for work the following day. After a few days of my absence, the manager conferred with my father, who in turn scolded me for my truancy and ordered me to return to work. From fear of the whip more than filial obedience, back I was in the drugstore. This time I found both the manager and the pharmacy clerk more understanding and they spared me from the hateful work of washing bottles. Just the same, I felt that I had had enough of the drug business and I no longer had much enthusiasm for the work. Timidly I braved a talk with my father, half fearing that he might insist in having his way. Fortunately, after listening to my nervous explanation, he relented.

The clerk's job also held its fascination for my father. There were two or three local boys who had made good as clerks in some government offices in Manila, for which they were getting not less than eighty pesos a month, which was big money then. Everybody in town envied them, and they were instant celebrities when they came home on vacation. Then, they were the only citizens who used shoes for daily wear, and they made scraping noise with their leather soles on the pavement, so people could not help noticing them. One of these clerks was a debate stenographer in the Philippine Legislature. Following the example of his bosses, he was fond of making speeches and he was much in demand for Rizal Day Programs and school graduation exercises. So my father wanted me to learn stenography, work as a clerk in Manila,

and study law in the evening. However, I had taste for neither clerking nor the law.

I also toyed with the idea of becoming a doctor. In fact, at the same time that I was completing my secondary course in the old Academy and Junior College of Liberal Arts, University of the Philippines, I was also enrolled in advanced subjects, which enabled me simultaneously to complete the first year of preparatory medicine. I happened to be one in the first batch of students in the then Philippine Normal School when the nucleus of the state university was formed there. I have no idea whether the school authorities deemed that it was not worth while to formulate separate secondary-level courses for us in the high school, but I found myself taking collegiate courses alongside regular college students. In that manner, I had the rare privilege of being taught by such inspiring teachers as Prof. Otto Johns Scheerer, in German, and Dr. and Mrs. Dean Spruil Fansler, in English. Such jewels on the faculty roll are indeed very few and far between.

As it turned out, a medical career proved eventually to be too expensive for my father's slim resources. I was the eldest of nine children in the family, and all of them had still a long way to go in their schooling. By a happy coincidence, the U. P. College of Agriculture was newly organized in Los Baños, a nearby town fifteen kilometers away. Hence, I decided to enroll there, amid jeers and taunts from everybody in town. I became the butt of good-natured jokes in any gathering, where people would ask me, "Do you have to go to college to learn how to plant cowpeas? Ka Anto (an illiterate peasant farmer) has been doing that very thing without the benefit of schooling." I should have been discouraged were it not for the fact that in the College I made many friends who were as determined as I to stick it out.

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ERRATA TO

Volume XIV No. 3, July-August-September, 1970

Random Travel Notes, With Special References to  
South Cotabato, Mindanao

p. 66, line 6, *replace sweep and oblige with sway*

p. 67, line 3, *replace Falcomidae with Falconidae*

# EARTHQUAKE RISK IN MANILA AND THE NECESSITY FOR SUB-SOIL ZONING MAPS

by

WELLINGTON A. MIÑOZA<sup>1</sup>

During the past few years, a number of earthquakes of large magnitudes occurred in the Philippines with epicenters along the fringes of the continental shelf in the vicinity of the Philippine Trench where the well-known Mindanao Deep is located and in the south and southeastern portions of the sea bottoms of the archipelago. Some of these earthquakes were of magnitudes higher than the 7.3 of August 2, 1968 and 7.2 of April 7, 1970 and yet not much attention has been paid to their occurrences. This is natural, considering that earthquakes become of great concern only when building structures are destroyed and human lives are lost. It is then that the clamor for investigations on why some structures failed becomes universal, it is then that the urgency for an adequate building code is pressed, it is then that the purchase or acquisition of seismic instruments is thought of and it is then that everybody becomes apprehensive and pays particular attention to precautionary measures. Ironically, after the feeble quaverings of the last after-shocks of a major earthquake, the thought of the ghastly occurrence is forgotten just as fast as the sudden fear that gripped the populace upon its arrival.

It is noteworthy to remember that the residents of Manila have been so fortunate. After two major earthquakes occurring within a space of less than two years, only two building structures suffered total collapse with each earthquake claiming one; the "Black Friday" earthquake of August 2, 1968 claiming the Ruby Tower and the April 7, 1970 earthquake, the P. Guevara Elementary School. Manilans should indeed be thankful that out of so many thousands of structures in the city only two suffered practically total failure, which is very providential, and also that no conflagration broke out as a result of the earthquakes. Although some other structures were badly damaged, the dangers posed on human lives within such structures were much less compared to structures subjected to total collapse. Furthermore, the August 2, 1968 earthquake occurred in the early morning when offices, schools, and public buildings were not occupied. The April 7, 1970 earthquake, too, occurred when there were no classes, thus sparing the lives of hundreds of school children. How lucky can we be and yet, how long can we

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<sup>1</sup> Weather Services Coordinator, Allied Sciences Branch, Weather Bureau.

stretch our luck? Would it be prudent judgment to depend purely on luck?

This period of quiescence or lull in major seismic activity is opportune time to assess prevailing conditions with regard to seismic risk and to evolve some practicable means of minimizing loss of lives and destruction of property. A number of basic information, however, have to be considered to obtain a realistic view of actual circumstances. First, the occurrence of earthquake cannot be prevented. Second, earthquake or seismic activity in the Philippines is rather high because of geographical location. In the Pacific Region, the structural weaknesses or faults in the earth's crust where earthquakes, generally originate are in the zones where the great Pacific Ocean impinges with the continents. The Philippine Archipelago is on the fringes of the Asian Continent and is part of the Circum-Pacific Seismic Belt. Third, earthquake occurrences cannot yet be predicted scientifically by expressing such factors as time, location, and magnitude in explicit terms. Fourth, the geologic conditions of a locality and its proximity to seismically active zones are contributory factors that determine seismic risk and seismic expectancy. These are basically the conditions that we have to learn to live with and to contend with.

The first two considerations mentioned above are intrinsic properties of the earthquake phenomena which are beyond human control. The third, however, which is the problem of earthquake prediction is being tackled by prominent seismologists all over the world. Diversified studies and researches in seismology are being undertaken and collated with geodetic, magnetic, and other geophysical observational results in an effort to come up with a feasible method of predicting earthquake occurrences. Earthquake prediction is the dream of seismologists and would indeed be a seismological "break through" if realized.

It becomes obvious at this point that geologic conditions of particular localities and earthquake expectancy in such regions are about the only factors in relation to earthquake phenomena where some amount of control may be instituted to reduce seismic risk. Seismicity studies of the Philippines have been conducted by various authors. Some of them made use of historical information for the past three hundred years while others availed of seismic information from instrumental recordings in later years. Under the classification of shallow tectonic earthquakes, which are the most destructive types, statistical studies by Gutenberg and Richter for the area around the Philippine Archipelago, show that about one earthquake of very large magnitude ( $M=7.75$  and above) occur every ten years; about seven earthquakes of major magnitude ( $M=7.0-7.74$ ) occur every ten years and about five earthquakes of moderate magnitudes ( $M=6.0-6.9$ ) occur every year. A list prepared by Willis (1944) of destructive earthquakes in the Philippines and a Catalogue of Philippine Earthquakes 1588-1899 compiled by Father William C. Repetti, S.J., reveal that Manila has been affected by

damaging earthquakes during historic times on the average of once every fifteen years although for the past sixty years destructive earthquakes have not been so frequent. Further seismicity studies by some authors from the Weather Bureau covering the period from 1907 to 1964 give additional information on the seismically active zones in the Philippines. From a seismicity map produced by the Weather Bureau using data on felt earthquakes, the region of eastern Mindanao and the Philippine Trench shows the highest seismicity with the northern Luzon area coming next. A moderately high seismic activity is also observed in the area around Manila while very slight activity is noted for Palawan Island and Cebu-Bohol area.

Information on earthquake expectancy of a region or locality is important in the design of structures. If a certain region, for instance has an earthquake expectancy of one damaging earthquake of say Intensity VIII, Rossi-Forel Scale (adapted), every fifteen years, and if the lifetime of a building structure is designed for twenty years, then its design should include a seismic factor of safety for the structure to resist an Intensity VIII earthquake. The difficulty, however, arises in assigning the value of ground acceleration which is equivalent to that generated by an Intensity VIII earthquake in the particular locality because of the lack or inadequacy of information. For reliable results, the value of ground acceleration should be derived from actual acceleration measurements of the ground rather than from calculations of expected values by empirical methods. To obtain values of ground acceleration would entail the use of accelerographs installed at selected ground sites and to measure actual responses of building structures would necessitate the installation of accelerographs at different levels or floors thereat. Since accelerographs are more or less strong motion seismographs, the time involved in the accumulation of recordings would depend upon how often strong earthquakes or moderately strong earthquakes would occur and this is not so often. This is a very important project, however, that a National Committee on Earthquake Engineering in the Philippines should envision to undertake. With sufficient information on ground accelerations and on responses of structures to earthquake forces in various localities, adequate values of the seismic factor of safety in terms of acceleration due to gravity may be assigned to the particular areas for incorporation in the design of structures thereat. Earthquake expectancy coupled with information on responses of ground and structure to earthquake movements can therefore provide some control against seismic risk in terms of specifying seismic safety factors in the construction of seismic or earthquake resistant structures.

The geologic condition of a locality is of prime consideration in the evaluation or study of seismic risk. It is a well accepted fact that poor ground or loosely compacted sub-soil, like alluvium is more severely affected by earthquake forces than solid rock or well-consolidated ground. For this reason, National Building Codes of most countries

including the Philippines give classifications of types of ground or soil where engineering structures rest and the corresponding seismic factors assigned for each type. Values of allowable bearing capacities of sub-soils are also given and requirements on boring logs and soil tests are provided to determine the properties and thicknesses of underlying layers or strata so that minimum requirements for the design of foundations of structures can be drawn. The classification of ground types, however, are for general areas or zones without specific locations, whereas the information of extreme importance are where these particular zones or microzones are. The data from boring logs and soil tests reveal properties mainly for static conditions of the ground or sub-soil. It is very essential, however, that adequate information be gathered on the dynamic response of soil structures to earthquake motions so that a map of proper scale can be constructed specifying microzones or areas where severe dynamic responses to earthquake motions are expected.

Experiences from a number of destructive earthquakes in the past have shown that the dynamic response of the ground surface is related to the thickness of soft alluvial soils. The greater the thickness, the greater the displacement and the longer the predominant or natural period of vibration of the sub-soil. Results of studies in recent years consider predominant period of ground vibration a very important factor that influences earthquake forces acting on buildings and other civil engineering structures.

A vivid example of the effect of earthquake forces on the thickness of soft alluvial soil and hence on predominant period of the ground is the 6.5 magnitude earthquake of Caracas, Venezuela. A portion of the report of Mr. R. I. Skinner, a Unesco Expert on Earthquake Engineering, is quoted:

“At 8:00 o'clock on Saturday evening on 29 July 1967, a moderately severe earthquake resulted in the death of 277 persons, injuries to 2,000 or more, and damage estimated at 100 million dollars in and near the city of Caracas, Venezuela. Estimates give the Richter Magnitude as 6.5, the epicenter as 70 km. North-Northwest of Caracas, and the depth as 10 kilometers.”

Many factors combine to give great importance to an engineering study of the damage in Caracas. The city contains over a thousand large modern buildings, nearly all being variations on the same theme, viz a slender reinforced frame with non-structural panels of hollow ceramic brick.

Dramatic microzoning effects were observed. The tall buildings in one city area were severely damaged, whereas there was no damage to *very similar buildings in nearby areas*. In areas where the alluvium was of moderate depth, the buildings that were only a few storeys high were attacked more severely than the taller buildings. Within the area of deep alluvium in Caracas only tall buildings were damaged;

however, at Macuto Beach, where the alluvium was deep, buildings and other structures were damaged irrespective of height. Buildings located on rock foundations suffered little or no damage whatever their height."

Although the magnitude of the Caracas earthquake was only 6.5 of the Richter Scale and less than the August 2, 1968 ( $M=7.3$ ) and the April 7, 1970 ( $M=7.2$ ) earthquakes, its epicentral distance from Caracas was only 70 kms. NNW while our two major earthquakes were 230 kms. NE and 160 kms. NE respectively of Quezon City. The Caracas tremor, furthermore, was very shallow, with depth of focus of only 10 kms. compared to our North-Eastern Luzon earthquakes which were more than 30 kms. deep at their foci or hypocenters.

The disastrous effects nevertheless of earthquake motion on deep or thick alluvium deposits were convincingly evident in Caracas and especially in Macuto Beach, some 8 miles north of Caracas, and hence, nearer the epicenter, where both tall and short building structures resting on deep alluvium were severely damaged.

Another earthquake of moderate magnitude of 5.75 Richter Scale proved disastrous in Agadir, a city in Morocco with about 33,000 inhabitants on February 29, 1960, leaving about 12,000 people killed, another 12,000 injured and many city districts in rubbles. The focus of the tremor however, was only 2 to 3 kilometers deep and its epicenter only about 8 kilometers North-Northwest of Kasbah, a district on the rocky portions of northwestern Agadir, the city known to tourists as the "Miami of North Africa" or the "Pearl of Morocco." Geologic conditions of Agadir show that the older part of the city was built on the spurs of the High Atlas range while the New City comprising mainly the industrial zone and part of the ocean front rests on the Sous River delta which is of Quaternary and recent unconsolidated and loosely consolidated sediments with the deepest portions reaching 800 meters thick. Again, depth of alluvium evidently played a dastardly role in the devastation of a city.

Another feature to show the severe effects of earthquake forces on soft or poor ground was the peculiar behavior of loosely consolidated sandy or silty type of soil experienced during the 7.7 magnitude earthquake of Niigata, Japan on June 16, 1964, with epicenter about 70 kms. from the city. In some sections of the city, away from the river, practically no earthquake damage was observed. Along the river and near the coasts however, the earthquake caused severe damage to the ground surface. At some locations, landslide movements of apparently dry sand occurred and elsewhere some settlement in flat land appeared to have resulted from compaction of dry sand. However, the *bulk of the damage* were due to compaction of *saturated sand*. In most locations of damage, the ground water level was only about one meter or less from the ground surface. The sand density, believed to be low due to loose consolidation, allowed water under pressure to penetrate the pore spaces during the earthquake occurrence, resulting in the reduction of the pressure



directly between sand grains. Some portions of the sand-water mass acted like a liquid with very little resistance to shearing force. This liquefaction behavior of the soil caused some quick-sanding effects on the structures resting upon them and those immediately adjacent. Many buildings were tilted, some settled and a few fell on their sides to the ground. It is believed that the vibratory response of the building upon the soil were also contributing influences in the liquefaction of the sand.

These destructive effects experienced during past earthquakes in relation to depth of alluvium are invaluable lessons that should be availed of to reduce seismic risk in our centers of population. For obvious reasons, it has been the nature of man to establish settlements where water is conveniently available. Consequently, most of our cities and towns are on the deltaic fan of rivers or along lake shores, the very places where soft ground and deep alluvium are in abundance, not to mention reclaimed areas which are generally poor ground. Manila and a number of cities in the Philippines fall under this category, and are, therefore, subject to the seismic risks those cities cited above are exposed to.

A brief review of the geology of Manila portrays the topography of the area as generally plain with a gentle rise in elevation eastward from the shores of Manila Bay, punctuated by random undulations where outcrops of the bedrock or volcanic tuff connect with the thinning layers of alluvium in an irregular circumferential pattern that describes the boundary between the low land alluvium cities of Pasay, Manila, and Caloocan and the hard rock "adobe countries" of Makati, Mandaluyong, San Juan, and Quezon City. The topography is further accentuated by the old and meandering Pasig River that, for many thousands of years, has transported sediments from the hinterlands of the Sierra Madre and deposited them on the underlying volcanic tuff which is now popularly known as "adobe." In the geologic past, there must have been alternating periods of sedimentation and volcanism, accounting for the "inter-tongueing" between volcanic tuff beds, on one hand, and sediments on the other. The progressive accumulation of sediments developed into deltas which, later on, coalesced to form the site of downtown Manila. The thickest deposits where sediments overlay the basement rocks of volcanic tuff are believed to be a few hundred meters deep.

It is evident that in downtown Manila there are microzones or particular areas consisting of thick layers of alluvium, presumably along the meandering Pasig River near the coast and proximate to its tributaries or distributaries in the deltaic fan. Results of determinations of predominant periods of microtremor measurements, done by UNESCO experts after the August 2, 1968 earthquake, show that at the sites where severe damages to building structures occurred in downtown Manila, the predominant periods of the ground were long, indicating the existence of these thick layers of loose or soft ground beneath. It is inferred that at these places the depth of soft ground is more than

30 meters, which is classified as the poorest type of ground in the Japanese classification of four categories.

These observations, all the more, emphasize the necessity for a subsoil zoning map for Manila. This map would provide building officials and structural engineers with information that would help them evaluate whether buildings already existing are adequately safe or whether they would need modification or strengthening to prevent possible disasters. Furthermore, requirements as to heights and designs of building structures for particular zones could be specified to avoid resonance in vibration between the structure and the ground during earthquakes. In low areas where water level is near the surface, specific types of foundation designs may also be enforced. Classifications of soil types for the city could also be formulated and adequate seismic safety factors assigned to each for incorporation in the design of civil engineering structures. If these controls or regulations could be instituted, then, seismic risk in Manila may be minimized. For the same considerations, sub-soil zoning maps for other cities in the Philippines are in order.

The construction of a subsoil zoning map, however, is not so simple. It requires the concerted effort of highly technical men from both government and private sectors. It involves the collection and collation of pre-existing materials or data on boring logs and soil analyses, the systematic perforation of city areas with drillings for sub-soil and depth of layers sampling in areas where they are found insufficient, the carpet-pattern procedure of microtremor recordings, the programming and analyzing by automatic period distribution analysers of these recordings to derive predominant periods of the ground, accurate geodetic and topographic survey, the plotting of actual locations on a map of adequate scale, etc. Before these things can be done, however, there are the all important prerequisites to be satisfied; that of organizing the highly specialized technical men from both sectors of our society into an effective working group and that of the government providing financial support. Achievement of this purpose will depend considerably upon attitude—how mentally prepared we are to meet the challenge of a new and tedious task and whether the government has the willingness and the capability to provide incentives and logistics to promote the project. Until something sufficiently fruitful is done along this line, the potential seismic risk in Manila is there to stay.

With the population explosion in our country, we now experience overcrowding in many of our cities. In this situation, economic and social problems become inherent and receive all the attention because they are problems of daily life. But yet, another problem or maybe a threat or a risk that could be more gruesome than both of these problems combined, lurks beneath our feet, beneath the very ground we step on, unknown to many, unseen by all. For all we know, the seemingly rigid concrete lanes, avenues, and buildings in some crowded districts of our cities may be as weak and brittle as the ground they rest on when a

severe earthquake occurs. There is no intent to cause alarm and we should not be so apprehensive, but on the other hand, can we afford to be non-chalant? Even with the guarrantly that no severe earthquake in the near future will affect us, would it still not be worth taking the necessary measures for our younger folks and posterity to benefit? Should we, their forbears, not exert an effort to make our cities safer places for them to live in? Should we inhibit ourselves from leaving them at least the legacy of safer living? Should our footprints only be for our ownelves to see? The answer to these questions, of course, are quite obvious.

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# PRESENT STATUS OF THE NATURAL WATERSHED AND WATER CATCHMENT AREAS IN THE PIAGAYONGAN MOUNTAIN REGION, WITH SPECIAL EMPHASIS ON THE EFFECTS OF THE LOGGING ACTIVITIES ON THESE AREAS

by

DIOSCORO S. RABOR<sup>1</sup>

The Mindanao State University Biological Expedition Party carried on biological explorations, surveys, and collections of natural history specimens, especially of land vertebrates, including amphibians, reptiles, birds, and mammals, in the forested areas above barrio Mapantao and up toward the densely forested localities at the base of the Piagayongan Mountain Range. The biological explorations and ecological surveys, and the collections of natural history specimens were carried on in the localities of Saronayan, Siwagat, Pagayawan, "300-Line" and in the logged areas between Saronayan and Mapantao Community, during the period April 21-June 10, 1970, or a period of seven weeks.

Our base camp was established close to the terminal of the logging road of the Maranao Timber in Saronayan, which at the time, had not yet crossed the Rugnan River. One subcamp was later established in Pagayawan, on the upper reaches of the Rugnan River, towards Piagayongan Peak, about six hours of hiking from our main camp. Another subcamp was also established in the area known as "300-Line", where the logging activities of the Maranao Timber Corporation were actively carried on and still are, at present.

I made personal surveys and observations on the ecological conditions of the logged areas and of the still densely-forested and unlogged areas, in the different localities where we worked in.

Following is a report of my ecological survey and observations of the areas above-mentioned:

## EXTENT OF THE LOGGING ACTIVITIES AND THEIR EFFECTS ON THE AREAS UNDER STUDY

*Extent of the logging activities.* — There is no question but that the logging activities of the Maranao Timber Corporation have resulted in varying degrees of destruction of the natural watershed and water catchment areas, in the first row of hills and low mountains between the lowlands of Lumba-Bayabao, at present occupied mainly by rice-fields, and the very rough mountain areas in Siwagat. The logging activities of the Maranao Timber Corporation have so far cut down the Dipterocarp forest on the first row of hills and mountains, immediately bordering Lake Lanao on its southern and southeastern parts. I esti-

<sup>1</sup> Research Professor in Biology and acting Director, Research Center of Mindanao State University, Marawi City.

mate that the logged areas have so far covered four or five kilometers distance in a straight line, from the lake shore straight towards the Piagayongan Mountain Range, and already a long distance along the lake shore. Between the logging road in Saronayan, where we have our base camp, and the base of Piagayongan Mountain Range, the forests are still untouched. Towards the eastern peak of the Piagayongan Mountain Range, in the area which is known by the loggers as the "300-Line", there are a number of logging roads that have penetrated quite deeply in the direction of the base of the Piagayongan Mountain Range. The main logging activities are at present in these areas. From this region, toward the interior, and up to the base of the Piagayongan Mountain Range, the forests are still virgin.

As one goes deeper into Siwagat, toward the base of the Piagayongan Mountain Range, the forest changes in character from the real "3-storied" Dipterocarp type, which yields the important commercial species of timber, to the "2-storied" Mid-Mountain type, with shorter and smaller tree species in the majority, and with the tall, large, and more commercially important Dipterocarp tree species becoming sparser and sparser, until they are totally absent at elevations of about 3,800 feet and higher. Logging, then, should no longer be commercially profitable. If this is so, then, this cessation of logging activities on the higher elevations of this region will be in favor of the conservation of the present natural watershed and catchment areas. At present, these natural watershed and water catchment areas are the main sources of the waters of Lake Lanao.

The same conditions have been observed in the regions in the vicinity of Mt. Magaturing and Mt. Butig. In all these regions, the destruction of the forests has been limited only in the areas covered by the first row of hills and low mountains, immediately bordering the lowlands along the lake shore. These areas measure about four or five kilometers from the lake shore into the interior, toward the high mountains in the direction of the Cotabato border. The greater areas of virgin forest from this region toward the high mountains are still intact.

Strangely enough, the slopes, peaks, and ridges of the Piagayongan Mountain Range are devoid of real dense forests, but are occupied only by wide tracts of grass, ferns, and dwarfed tree growths. By themselves alone, these types of vegetation cannot be depended upon to serve as really efficient natural watershed and water catchment areas for Lake Lanao. The main natural watershed and water catchment areas for lake Lanao at present are the untouched forests beyond the logged areas on the first row of hills and low mountains that immediately surround the lake, especially in the south, southeast, and southwestern regions. The very rough terrain of the region, characterized chiefly by very deep ravines and gorges, which have been produced by the erosive action of the numerous streams that originate from the Mt. Piagayongan localities, and the type of the forest that are found here, where the commercial Dipterocarp species have become very sparse, may most likely prove any logging to be unprofitable. If this would be so, then, the great expanse of virgin forests between the logging road at Saronayan and the base of Piagayongan Mountain Range will be conserved accordingly. The same conditions may be true in the adjacent regions. Logging then, should no longer be profitable. If this happens, then,

these conditions will certainly be in favor of the conservation of the present natural watershed and water catchment areas, which will serve as the main source of the waters of Lake Lanao for many years to come, unless the conditions will be changed by radical geological transformations.

*Observable effects of the present logging activities on the areas under study.* — The region covered by untouched forests from the Saronayan logging road toward the base of Piagayongan Mountain Range is rich in streams draining crystal-clear water always, regardless of the size and depth of the stream, regardless of whether it has rained or not, and whether the rain was strong or merely a shower.

There is a terrific contrast in the quality of the waters that run in the portions of the creeks and rivers in the areas that have already been logged and that of the waters drained by the upper reaches of these streams, within the virgin forest areas. Unfailingly the waters that flow in the creeks and streams in the logged areas show different degrees of brown to yellow color. One can easily see that these waters are loaded heavily with silt and eroded soil. There is no question that erosion is proceeding very fast in the greater parts of the areas that have been logged. The rate of soil erosion is easily seen to be much faster on the steeper grades of the hillsides and mountain slopes, especially where there is already a large degree of destruction of the forest trees that used to grow on these areas. These trees are not only the large ones that have been cut for logging but also those that are small and have been destroyed intentionally or not in the course of the logging process.

The extent of the destruction of the forest cover varies very much in different places in the logged areas. In some places, and fortunately these are in the minority, areas of about one to three hectares of what used to be beautiful Dipterocarp forest, have been totally cleared of any tree growth. Until now, I am confused and exactly do not know the real reason or reasons for some of these totally-cleared places in the logged areas. And yet, the countless tree trunks of variable sizes are merely left on the ground to rot! There is no question that there is such a needless waste and destruction of the vegetation in the logging process.

In the majority of the logged areas, one can easily observe that care has been taken that only the large trees have been selected for cutting. I am afraid, however, that the logging company has been a little careless in their logging techniques, and although it can also be observed that selective logging is being practiced, still, more economical and more careful logging procedures can be followed which will be more in accordance with the requisites of the proper conservation of the forests.

Another thing that I have personally observed in the areas under study, is the total lack of reforestation in the logged areas, including in those comparatively few places of one to three hectares which have been totally denuded of any vegetation. Although there is a nursery of Kaato-an bangkal and of another species of tree good for paper and pulp sources, still it can easily be seen that the nursery does not contain enough seedlings which can supply any effective and genuine reforestation attempt.

## LAKE LANAO IN RELATION TO THE FORESTS AROUND

The importance of Lake Lanao in the economy not only of Northern Mindanao but also even of the entire eastern mass of Mindanao Island, from the narrow neck between Pangil and Illana Bays, eastward to Agusan, and perhaps even up to Surigao, and southward to Davao and Cotabato, in terms of probable electric power that the waters of this lake can generate, is immeasurable, to say the least. Most people may not realize it but the electric power which can be generated by the National Power Corporation in its Maria Cristina plant, will directly and indirectly depend on the quantity and quality of water in Lake Lanao. The quantity and quality of the waters in Lake Lanao will in turn depend primarily on the extent of the natural watershed and water catchment areas that may still be intact around the lake, at any specific time. After all, one can easily see that the lake has to depend on its water supply from the forest cover which serves as its natural watershed and water catchment areas, especially on the forest cover on the hillsides, mountain slopes, valleys, and on all locations on the hills and mountains facing the lake. The innumerable streams and rivers that originate from the forested areas on these slopes drain the water from the natural watershed and water catchment areas eventually to the lake. As long as the extensive forest cover around this lake is maintained and properly conserved, then the total amount of water that is drained by each of these streams and rivers is automatically regulated. I need not go into details of how the forest cover regulates the flow of crystal-clear and unsilted waters in the numerous creeks and rivers that are found in these areas. It is enough that, through the years, careful studies, here and abroad, have unquestionably established both the direct and indirect relationships between the density of forest cover and the consequent regulation of the water flow, both in quantity and quality, in these numerous streams and creeks. In the particular case of the area under study, all these waters drained by these numerous streams and rivers eventually flow to Lake Lanao.

Other aspects of the question concerning the proper conservation of the forest cover on the hills and mountains surrounding Lake Lanao, include the countless effects, most of them unfavorable, on the ecosystem of the area, as a result of the destruction of the forest cover. The destruction of this forest cover around Lake Lanao need not be total or even near total, as in the cases of the forest covers around Ambuklao and Binga dams, and that of the Angat reservoir. Needless to say, these dams are approaching the end of their usefulness. For every size of lake or dam or reservoir, artificial or natural (like Lake Lanao), there is a certain minimum in the area of the natural watershed and water catchment that has to be maintained properly for the volume and quality of the water in said lake or dam or reservoir to be properly maintained. Destruction of the natural watershed and water catchment areas beyond this minimum will result in unfavorable effects on said body of water. While Lake Lanao has not yet reached this stage, in the destruction of its forest cover, it is time now, that the proper measures be taken to conserve whatever forest cover is still untouched around it. Slowly but surely the lake is approaching this danger point. Any delay may result in real difficulties and give disadvantages for the future of this very important lake.

I shall not deal on the advantages of conserving the forest cover around Lake Lanao. Some important aspects that are essential in the development of the area can be pointed out, however, which are closely connected with the proper conservation of the forest cover around this lake. The following are important:

1. Conservation of the very pleasant climate of the regions immediately around Lake Lanao;
2. Proper conservation of the fish life in the lake, which may suffer with any radical change either in the quantity or the quality of its waters;
3. Proper conservation of the wildlife, especially the rich bird-life in the lake and in the marshes around the lake, which can even be tapped for tourism;
4. Proper conservation of the rich farms in the low-lands around the lake, which can easily be affected by floods and droughts, that without any doubt will befall these areas around the lake, once the forest cover will be destroyed, or even reduced in total area to beyond a certain minimum;
5. Proper conservation of the beautiful scenery around Lake Lanao, which scenery is really breath-taking and can easily be an important tourism asset.

The Lake Lanao region in particular and Mindanao in general will be poorer, if Lake Lanao will be allowed to deteriorate. It will, without any doubt, deteriorate if the present remaining forest cover is allowed to be destroyed.

#### RECOMMENDATIONS

Some of the following recommendations may seem radical and may even be in direct contradiction to the immediate objectives of the development plans of the region, especially from the economic point of view. Nevertheless, I am making this recommendations from the point of view of an Ecologist and Conservationist, with the main aim of the eventual long-range and permanent benefits that include economic, aesthetic, scientific, as well as practical. The practical objectives are important because they will be concerned, directly and indirectly, with the conservation of the proper human environment, at least, in these parts of Mindanao Island.

The following recommendations are presented for what they are worth:

1. The forest cover on the hillsides and mountain slopes surrounding Lake Lanao, especially in the regions toward the Piagayongan Mountain Range, and the areas east and west of it, which serve as the present natural watershed and water catchment areas of the streams and rivers that empty into Lake Lanao, should be conserved. Regardless of immediate economic losses in terms of losses to government in income from the fees derived from the logging activities which are at present carried on in the area, the proper steps and measures should be immediately



taken to stop logging activities entirely in these areas, even if it means cancellation of the present logging concessions given to firm or firms which are at present engaged in logging activities in these areas. These firms should be granted logging concessions in Lanao del Sur or in other parts of Mindanao but not in the forests on the hills and mountains which are immediately bordering Lake Lanao.

2. All the forested areas around Lake Lanao should be made into national parks for better protection and conservation of the forests therein.
3. No factory of any kind should ever be allowed to operate in the immediate area around the lake, in order to prevent possible pollution of its waters. Any factories that will be located in areas either immediately around the lake or even at some distance from the lake will most likely produce effluents which will eventually be drained into the lake. The quickest way to "kill" a lake or any body of water, fresh or marine, is to allow heavily polluted factory effluents to flow into such body of water, just like Lake Lanao.
4. Stop any changes, whether engineering or of any other kind, to be done in Lake Lanao or in the Agus River, without a thorough and detailed scientific and technical study made on this subject. The present engineering construction involving the deepening of the mouth of the lake and the portion of the Agus River immediately near the mouth of the lake, and the construction of dam or dams, may be advantageous from the engineering and technological point of view, especially as far as electric power production may be concerned, but there are also other possible important ecological effects of such works. The changes produced in depth in the opening of the lake into the Agus River, and in the Agus River itself, and the construction of dam or dams along the length of the Agus River, will certainly produce profound changes in the ecosystems of the lake and in the Agus River. The effect of these changes will mainly affect the biotic components of the ecosystem in these regions, resulting from the changes in the biotic components of the ecosystem in the same regions. Perhaps these effects may not be immediate but certainly they will be reflected in changes of fish life, wildlife, conditions of the farms around the lake, and others, and the changes and these effects will not be beneficial.
5. In connection with making changes in the ecosystem of an area, it is recommended especially for our specific area here in Lanao del Sur, that any such plans should be subjected to a thorough and detailed analysis by a committee whose members will include specialists from different fields, among them being:
  - a. Civil Engineers;
  - b. Environmental Engineers;
  - c. Industrialists;
  - d. Economists;
  - e. Ecologists;
  - f. Foresters;
  - g. Agriculturists;

- h. Biologists;
- i. Botanists;
- j. Tourism specialists.

The plan will then be subjected to a thorough scrutiny. Actual surveys should, then, be made in the area. These are the most important specialists who should be the main members of a committee which will decide whether changes will have to be made in the ecosystem of any area of our country or not.

Detailed analyses of the results of the surveys which were conducted in any specific area should be made by these experts individually. Then a conference among the experts as a committee should be held to decide on the priorities that the area can be put to use, considering the conditions in such area before any change or changes will be made. Another such conference should list the priorities in the possible use of such areas, after the planned change or changes will be effected. They will then prepare the corresponding lists of these priorities for this particular area and decide on the final use that this will be best for, first before any change or changes will be made, and another list of priorities of the best use for the same particular area after the planned change or changes, shall have been effected. The members of the committee will then decide whether to institute or not the planned change or changes after considering all the possible factors. These factors will include the possible expense that will be incurred in making such change or changes, the possible effects on the ecosystem in this specific area, and the probable comparative profits that would result without effecting any change or changes, or with making the planned change or changes.

6. No kaingin clearings should ever be allowed in the areas that are at present already logged because any additional clearings in these already partially-cleared areas will make the present state of the natural watershed and water catchment areas worse. Already there are beginnings of clearings being made in some places in these logged areas. Fortunately, the people in the immediate vicinities of these logged areas are not like their Christian brothers in other parts of Mindanao Island, or for that matter, in the rest of the Philippines. I have personally observed that where logging activities have produced clearings of varied sizes leaving only comparatively few trees standing, making these places ideal for kaingin preparations, there are at present practically no such kaingin clearings made. The ordinary Christian settler would already have rendered these logged areas above the Lumba-Bayabao localities into extensive kaingin clearings of varied sizes.

It is not yet too late for the proper conservation of the present remaining natural watershed and water catchment areas, that are still left intact especially in the southern, southeastern, and southwestern sides of Lake Lanao.

I hope that you will find in this report something of help in the proper conservation of the remaining natural watershed and water catchment areas around Lake Lanao, which of course, will ultimately result in the conservation of the water of this lake.

# DO YOU KNOW THAT . . .

by

LYDIA C. PARAISO

1. *Petroleum Protein.* — A British petroleum company will soon be marketing oil-derived protein commercially. The protein is made by fermenting certain hydro-carbons with certain micro-organism. Two commercial plants now being built will produce 20,000 metric tons of protein-from-oil annually by the end of 1971. This will be used in the West European animal feed market which now actually consumes about 40 million metric tons of animal feed. The new protein will compete with such high protein products as fish, meat, and soybean extract. It is reported that extensive research is under way upon possible bacterial protein production from methane gas, constituent of natural gas. — *The Rotarian*, May 1970.

2. *Russian Republic.* — The official name of Russia is Union of Soviet Socialist Republics (USSR). The name in Russian language is SOYUZ SOVIETSKIH SOTSIALISTICHEKIA REPUBLIK (USSR). However, in the Russian alphabet, these letters are C.C.C.P. The U.S.S.R. is often referred to as the Soviet Union, but most people still call it Russia because this name has been in use for hundreds of years. *Journal of Geography*, No. 2, Vol. LXVI, 1967.

3. *Environmental Planning.* — Man's increasing concern for air, water and soil pollution has seemingly encouraged the use of a variety of terms for what has been known as conservation of natural resources. It must not be concluded that this term is obsolete. The word conservation is appearing in legislations related to education. However, other terms, such as resource management and environmental control, have made their appearance. Whatever title it may have, it is primarily the geographer's responsibility to deal with conservation. But, as in any subject, he must alter and adopt his accent. — *The Journal of Geography*, April, 1970.

4. *World Population.* — Using the data provided by the Population Reference Bureau, here are some facts:

World Total in July, 1969	3.551 Billion
"Have" countries	about 1 Billion
"Have not" countries	about 2.6. Billion
Rate of growth	2.2 per second
	1 Billion in 15 years
	about 2 percent a year

Range of growth ..... less than 1 percent in  
Europe  
over 3 percent in  
Latin America

Projected population ..... 4 Billion by 1975

— *Journal of Geography*, No. 6, Vol. VLXVIII, 1969.

5. *Story of the Banana Plant.* — The history of banana is also the story of tropical man. While very little is known of the evolution of the banana plant, a record dating back to 350 B.C. shows that bananas were known as far back as 2,000 B.C., and there are indications that this plant could have come from India. In fact, the Greeks, the Arabs, and even the Romans spoke of banana as the fruit of India. It was only in the middle of the 18th Century, however, that this plant was scientifically classified by Carl von L'inne. The banana plant was given the names of *Musa sapientum* (fruit of the wisemen) and *Musa paradisiaca* (fruit of paradise). In its movement westward, the banana plant followed closely the Moslem conquest of the Mediterranean. From there, the plant went down to Africa where the word 'Banana' originated. — *Animal Husbandry and Agricultural Journal*, April 1968.

6. *Manila North Harbor.* — About 3,497 vessels a year, or 315 vessels a month, are cleared by the Man'la North Harbor, the home port of nearly all big inter-island ships. This does not include fishing boats that lie anchor in the Pasig River and at the North Harbor basin itself, either to discharge their catch or unload provisions for their next fishing trip. — *Manila Sunday Times Magazine*, Nov. 1, 1970.

*Greetings*

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## BOOK REVIEW

LONGLEY, RICHMOND W., Editor. 1970. **ELEMENTS OF METEOROLOGY.** xi — 317 p. New York, New York: JOHN WILEY & SONS, INC.

This book written for undergraduates, is the answer to the textbook requirement of many colleges and universities, especially for students who have only the basic mathematics and physics and wishing to learn about weather. Being up-to-date, it is a handy reference for those who would wish to find out about weather and climate. In addition, this book can very well be used in the training and refresher training of weather observers (sub-professionals) of meteorological services. Having problems and answers, it is well suited as a textbook.

One outstanding feature is its discussions on the current state of knowledge of the field of meteorology. Latest techniques which include the use of radars, satellites, computers, etc. are discussed including the complexities and limitations of the art. The presentation is orderly concluding with discussions on the effects of weather on man and climatic changes.

— HUGO DELA CRUZ, BSGE (MET.)  
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## NEWS RELEASE

COLUMBUS, Ohio — The International Council of Scientific Unions Abstracting Board (ICSU AB) at its annual meeting here agreed to go ahead with a plan for the first stage of a world system for abstracting and indexing services for science and technology.

The Abstracting Board's members include eleven of the world's major abstracting and indexing services from France, Germany, U.S.A., U.S.S.R. and United Kingdom.

The first stage plan defines guidelines for cooperation among the member services of the Abstracting Board in the acquisition, selection, and exchange of documents for coverage by the services. It is aimed primarily at eliminating much of the duplication in journal acquisition that exists among the world's principal abstracting and indexing services.

Under the plan, the member services from each scientific discipline would assume the responsibility for acquiring and selecting articles for coverage from the most productive journals in their discipline. Articles in these journals that are of potential interest to other disciplines would be forwarded in microform, along with the author abstract and a standard computer-readable bibliographic description, to the appropriate other services, either directly or through a central redistributing unit. Responsibility for acquiring and selecting articles for coverage from a substantial number of journals that are primarily devoted to scientific fields outside of those covered by the member services will be allocated among the member services according to the languages of the journals, with articles of potential interest routed to the appropriate services for coverage.

The design, implementation and operation of a world system for abstracting and indexing services is a primary long-range goal of the ICSU Abstracting Board, Board President Dr. Byron Riegel said. Cooperation among the member services in journal acquisition and document selection is a first important step toward this goal.

Such cooperation would substantially reduce the costs of document acquisition and selection for each of the member services and for the world scientific abstracting and indexing complex as a whole, Doctor Riegel pointed out. Each of the member services will have to acquire and process far fewer journals. While services covering the same discipline in different languages will each continue to acquire the core journals of that discipline, they will no longer need to acquire a substantial number of journals devoted primarily to other disciplines.

The arrangement also will contribute importantly to the completeness of coverage of the abstracting services in each of the disciplines,

Dr. Riegel said. Each service in effect will be able to draw information from the aggregate journal coverage of the member services, which is estimated to be about 35,000 journals.

The first steps toward implementing the plan will be agreement upon common definitions of subject coverage, selection procedures, and forms for bibliographic citations among the member services, and studies of the degree of overlap that now exists in the journals abstracted by the member services. The plan calls for a detailed inventory of the computer-readable records produced by the various member services to identify the degree of compatibility and convertability among these records and analysis of the indexing approaches used by member services with the ultimate aim of the direct exchange of abstracts and index entries among the services.

The member services of the ICSU Abstracting Board are Astronomy and Astrophysics Abstracts, Bibliographie des Sciences de la Terre, Bibliography and Index of Geology, BioSciences Information Service of Biological Abstracts, Bulletin Signalétique, Chemical Abstracts Service, Chemischer Informationsdienst, Science Abstracts, Physikalische Berichte, Referativnyi Zhurnal, Zentralblatt für Mathematik.

The Proceedings of the July 1970 meeting of the ICSU Abstracting Board, which include the description of the first stage of the plan for a world system for abstracting and indexing services, are available at the ICSU Abstracting Board Secretariat, 17 rue Mirabeau, PARIS 16e, FRANCE, (U.S. \$15.00 plus mailing charges.)

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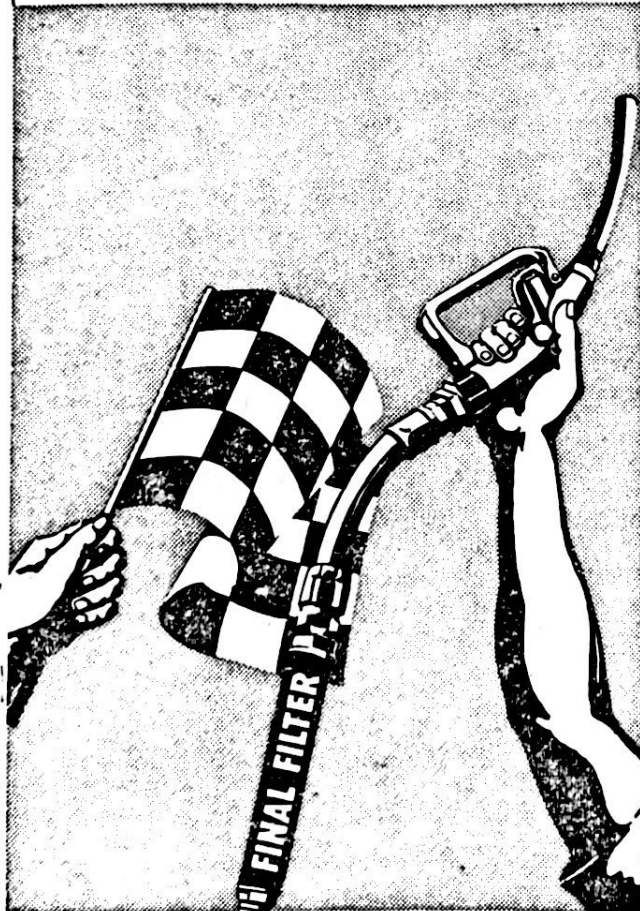
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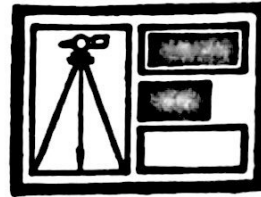
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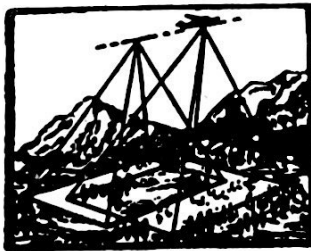
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