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REPORT OF
AID TEAM RELATIVE TO
ASEAN RESEARCH FOR WATERSHED CONSERVATION AND MANAGEMENT

J. STEPHENS & E. WILLIAMS

NOVEMBER 9, 1980

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Fort Lauderdale, Florida
November 6, 1980

U. S. Department of Agriculture
Office of International Cooperation and Development
Washington, D. C. 20250

Attention: Gregory Garbinsky, Rm 104 PP

Gentlemen:

On Sept. 8, 1980 I was awarded Contract No. 53-319R-O-241 issued by the U. S. Department of Agriculture, Foreign Agriculture Service, Rm 6077-S, Bldg., Washington, D. C. 20250. Said contract stipulated that I travel to the ASEAN Region (Philippines, Malaysia, Indonesia, Thailand) to assist in preparing an AID project Identification Document for an ASEAN Watershed Conservation and Management Research project.

This contract specified that each ASEAN country be reviewed and evaluated to assess the following: conservation and management policies and strategies, the "state-of-the-art", and technical requirements for viable watershed conservation projects; existing operational and support capacities; watershed development programs in terms of cost and effectiveness; the general magnitude of funding needed to initiate a viable national watershed management program; the quantity and quality of existing watershed resource surveys, and to identify needs for assistance to correct deficiencies; existing managerial, institutional, or technical constraints and to recommend rectification requirements including the feasibility of initiating pilot watershed operations in one or two subject countries; additional research needs and desirability of providing additional funds for ongoing watershed research projects; and prepare a comprehensive report reflecting composite observations and recommendations of the two-man international team, which would serve as the basis for an AID project Identification Document (PID) indicating U. S. inputs needed over a 5-year period.

The work was to be performed during the period Sept. 8 to Nov. 1, 1980. An extension of several days was granted to compensate for extended travel authorization and discussions with AID personnel in Washington, D. C. at the conclusion of the ASEAN tour.

I wish to express my appreciation to my AID teammate, Edward W. Williams, for his invaluable advice and assistance; to the officials and employees of AID in Washington, D. C.; and especially to the ministers, executives, professionals, and workers in each ASEAN country for their uniform courtesy and willingness to supply desired data and other information on our visit to each country.

Respectfully submitted,

John C. Stephens, P.E. - P.G.

PREFACE

The ecology of upland watersheds in ASEAN countries are undergoing serious adverse changes caused in part, by extensive logging, land clearing for agricultural expansion, and shifting agriculture. In densely populated rural areas, improper use of steep land for crop production, and forest denudation for firewood is responsible for erosion. There are comparable patterns of environmental degradation throughout the ASEAN region. Because of the geographical proximity of the ASEAN countries, they are within a tropical latitudinal confine with similar vegetation and rainfall patterns.

On the basis of the geographical and climatic similarities of the ASEAN countries and the broad common pattern of environmental degradation within the region, these countries are searching for a common strategy that will reverse the depletion of valuable forest and land resources. With this in mind, an ASEAN Watershed Conservation and Management project design workshop was held in Malaysia September 3-7, 1979. The U. S. Government provided funding for this workshop under the ASEAN-U. S. Development Cooperation Program. The workshop formulated a proposal for a regional ASEAN Watershed Conservation and Research Program, which was later endorsed by the ASEAN technical committee on Food, Agriculture, and Forestry (COFAF). This proposal was submitted to AID for assistance to implement the first phase of a program consisting of four distinct sub-projects: 1) an ASEAN Center (Regional) for Watershed Management and Development with four national sub-centers; 2) Integrated Research Studies on the Management of Forested Watersheds; 3) Integrated Research Studies on the Development and Management of Non-forested Watersheds; and 4) Integrated Studies

on the Social, Economic, Technical, and Institutional Profiles of Watershed Conservation, Management, and Development. Specifically, ASEAN has requested AID assistance in establishing a regional Center in Malaysia with national sub-centers in the Philippines, Malaysia, Thailand, and Indonesia.

This program offered by the Kuala Lumpur ASEAN Workshop Committee of 3-7 September 1979, proposing an ASEAN Regional Center with centers for each participating country was a comprehensive plan. This plan was modified by a review AID PID team because of monetary and personnel limitations. The proposal offered by the subject PID team was tabled by the AID Asia Bureau Project Committee due to reservations about the advisability of attempting to centralize comprehensive research on overall watershed conservation problems that are specifically site oriented; also because it was feared that a concentration of research scientists at a central location might dilute the available trained researchers now working on pressing conservation needs.

To determine how U. S. Government assistance could be utilized by ASEAN, a two-man observational team was assigned to visit each Asian country to gather, assemble and analyze data and other pertinent information relevant to upland forested watersheds in the Philippines, Indonesia, Malaysia, and Thailand. The team was charged to write a comprehensive report on their findings for use by the AID/ASEAN staff in preparing a new PID. This team was made up of the writer, John C. Stephens (P.E. & P.G.), a former U.S.D.A. watershed research scientist and administrator, and Edward W. Williams, agricultural management specialist, from the AID, S.E. Asia staff, Washington (ASLA/TR/ARD). The team was assisted by Don Melville, AID/ASEAN liaison officer, Manila, R. P.

On Sept. 11, the team met with AID/W - ASEAN personnel prior to leaving the U. S. for a general briefing on the ASEAN watershed situation. After arrival in Manila 09/12/80 we began our work Monday, 09/15/80, after courtesy calls on top ranking Government officials and directors at a briefing session at Quezon City, R. P., attended by technical and administrative personnel concerned with forest watershed research and management. The following three days, Tuesday, Wednesday, and Thursday were spent studying experimental watershed research and observational projects in the hinterlands, and a trip to the Forestry Research Division, University of Philippines, Los Banos, Laguna R. P. Friday, 09/19/80, was spent back in Quezon City for a final review and discussion session with Forestry officials. This general travel scheme was practiced throughout our travels in each of the ASEAN countries; i.e., a Monday meeting with government administrators at the national capitol, followed by 3 days of mid-week travel to outlying upland watersheds, and a wind-up briefing session back at the capitol. We spent weekends enroute to the next country. We spent approximately one week in each country. Upon completion of field work we returned to Manila for a final wrap-up session with ASEAN representatives, which is reported in "conclusions." We arrived in Washington, D. C. on 10/16/80. I spent the following 5 days in Washington, D. C. preparing and presenting a preliminary trip report to AID officials. I left Washington 10/21/80 traveling by private vehicle and reached Ft. Lauderdale, Fla., 10/25/80 with a stop-off enroute for personal business.

This report results from collaborative efforts with my team-mate, Edward W. Williams, and I have used his observations and notes freely. We did not always agree with a unanimity of opinion on minor issues, but I believe it represents our consensus on major issues. In any

event, I take full responsibility for this final report and statements contained herein.

Over 7 hours of tape recordings were made of our observations and during interviews on our tour. I have used these recordings in the preparation of this report and will retain them for a year for further use if needed.

EXECUTIVE SUMMARY

During September and October 1980, a two-man team consisting of John C. Stephens, P. E., P. G. (Personal Service Contract) and Edward W. Williams, AID, Washington, D. C. spent approximately 5 weeks in the ASEAN countries of The Philippines, Indonesia, Malaysia, and Thailand to evaluate ongoing research activities in watershed conservation research and management. The team was charged to report findings and make recommendations on requested financial assistance from U. S. - AID; the report to be used for preparing a Project Identification Document (PID).

We spent 1-week in each of the subject countries observing governmental organization, management, field activities, and additional research needs. We found that ongoing research was under the direction of forestry personnel in all cases, and was located primarily on steeper watersheds on upland stream tributaries. Conservation research needs and priorities varied from country to country. In The Philippines and Thailand priorities are forest management practices, rangeland and grazing problems, and "slash and burn" culture. Malaysia has opted for industrialization and forestry practices that yield optimum return on forest products and still maintain acceptable environmental conditions. Crop land development is mainly for quasi-cooperative plantation-type agriculture. Indonesia's intense population pressure dictates priority for food and fuel-wood production in Java.

Top-echelon personnel are first-class in all countries but deteriorate in training and numbers at the middle and lower grade levels. The value placed on research conservation ranks highest in Malaysia followed by the Philippines, Indonesia, and Thailand. The "state-of-the-art" corresponds closely to the value assigned to research.

We think that financial aid to the ASEAN countries would be most effective by assisting in establishing a regional research center in either Malaysia or the Philippines. The center should be directed by a competent research administrator aided by a group of knowledgeable staff scientists and extension specialists capable of covering the spectrum of ASEAN watershed conservation research and management needs. Functions of the center should include collecting, appraising, and disseminating research knowledge; providing liaison, and collaborating and cooperating with other ASEAN researchers; training mid-echelon research technicians; and packaging, promoting, and disseminating information leading to the adoption of approved conservation practices by land users. The center should be provided funds for travel, honorariums, seminars, and hiring consultants. The estimated annual budget for such a center is U\$1,226,000 based on 1980 costs. The host country should provide approximately 25% of the total cost by furnishing "in hand" services, housing and local labor.

We believe that the regional center should be viewed as primarily a staff service organization and not as the capstone of a hierocratic research structure. Watershed research and management problems peculiar to individual countries in need of financial aid should be handled on a bilateral basis. *

At the wind-up session in Manila attended by representatives of all the subject countries, we inferred that all were in general agreement with these recommendations.

NATURE OF THE WATERSHEDS

First, one must define the size and nature of the watersheds to be considered since watersheds vary in size from huge drainage basins such as the Mississippi River to small rivulets on the farm. The physical characteristics of the watersheds, including basin shape, hypsometry, vegetative, climatic, geologic, and edaphic conditions must also be assessed. The prevailing land-use and the socio-economic conditions of the countryside are primary items to be considered in the design of research for improvements in watershed conservation.

In the ASEAN countries visited it was apparent that the main concern was with small to medium-sized watersheds lying in the upper reaches of the streamflow networks. In general, the basins did not exceed 1,500 sq. miles in area, with the median appearing to be about 100 sq. miles. The instrumented experimental research watersheds inspected were much smaller, seldom exceeding 100 acres. A primary problem will be to extrapolate findings from these small research areas so as to properly reflect hydrologic conditions on larger representative watersheds.

Morphologically, we are dealing mostly with dendritic stream network patterns that do not exceed the 4th order (of course the exact order will depend on the quality and definition of the topographic maps utilized.) Hypsometrically, or gradientwise, the land surface is extremely steep, especially on the upper slopes, which makes erosion control most difficult.

Although the virgin climax forests were likely quite similar in all the subject countries within like altitude and edaphic ranges, land-use practices have significantly altered original vegetation conditions

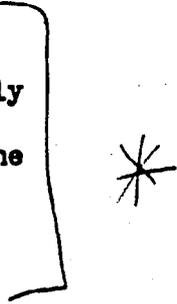
among the ASEAN countries according to economic needs and population pressures.

Climatic conditions for the ASEAN countries are within a fairly close range for all areas under comparable topographic and exposure situations. In fact, rainfall and other weather characteristics vary more within each country because of differences in mountain-range orientation than they do among the countries. Generally, high rainfall, which is seasonally distributed, and high humidity are typical of the ASEAN Region.

Geologically the Region lies within the so-called "Ring of Fire" zone and the rocks are mostly of recent (geologically) volcanic origin. Orogenic forces and igneous activity have resulted, however, in highly metamorphic rocks, and both limestone and arkose deposits were observed. Near the coastlines Pleistocene deposits of a sandy nature were observed from our air travel. However, such coastal areas do not appear to be significant in the watersheds considered.

Soils are lateritic, but appear to be highly different in infiltration rates, depending to a large part on the amount of topsoil that has been eroded and the amount of clay in the upper layer. Bentonitic soils were observed in Indonesia that shrink and crack when dried, but are not typical of all those seen. Natural soil fertility varied with land-use practices and length of time the soil had been tilled. Forested soils that had not been subjected to excessive burning were fertile. Minor element deficiencies are not believed to be a major factor in the virgin soils; although Zinke suspects a zinc deficiency in some Thailand soils. On cultivated soils that had been tilled for long periods under poor farming practices, the fertility is low. It is possible that aluminum toxicity may be present in the exposed clay-type subsoils

with high pH's (acid). On the other hand, even on reasonably steep slopes, cultivated lands that were properly terraced and on which good farming practices were employed, were fertile and produced good crop yields. Soil structure and aggregation on such areas were amazingly good. In Thailand, for instance, the F.O.A. "Technical Officer for Watershed Management Conservation Farming" noted that he had seen properly farmed sloping fields still yielding good crops that had reportedly been under continuous cultivation for 60 to 100 years. It was his opinion that a stabilized agriculture could be long maintained on slopes up to about 35 percent, and that the "slash and burn" practices used by many of the upland farmers were not needed to produce good crops. It would appear that the oft-stated conclusion that tropical soils are naturally unproductive under continued cultivation is likely a myth, and that the reason for poor production under sustained cropping is because of the lack of applied soil conservation and good farming practices.



PERCEPTIONS OF WATERSHED RESEARCH AND DEVELOPMENT IN ASEAN COUNTRIES

Land-use practices among the four ASEAN countries with watershed problems; i.e., the Philippines, Indonesia, Malaysia, and Thailand, differ as do the methods designed to obtain stable, long-term economic production of forest products, food, and fiber with minimum environmental degradation. These differences are due, in part, at least, to their colonial history as well as to the population pressure.

The Philippines

After Spanish rule the Philippines were associated for a few decades with the political, educational, social, and economic policies practiced by the U.S.A. that have left an imprint on Filipino activities and methods. Filipino progress was disrupted by World War II with the Japanese occupation, but postwar activities have maintained a comparatively good infrastructure upon which to further build. Forestry and agricultural production are given adequate priority in governmental consideration, but conservation research funding is inadequate to meet the needs. This was evidenced by several experimental watersheds for which laboratory and office space had been provided, but which lacked personnel housing and hydrologic instrumentation essential for operation. Also, some improvements in local roads leading to and within experimental sites are needed. Operational and observational types of research on forest conservation and rangeland improvements are progressing fairly well, but good firm data, upon which to base optimum operational practices are still lacking in many respects. Research on farm management practices is mostly applicable to lowland farms and rice production; although some data are reportedly available on the detrimental effects of shifting "slash and burn" cultural practices in upland watersheds. The need for better soil

and water conservation practices was seen by the high sediment load carried by the streams with consequent alluvial deposits and channel aggradation in the lower reaches of the rivers. Figures 1 and 2 show gravelly bed-load deposits in streams that drain into the Pantabean Reservoir, figure 3, which is a major multipurpose structure for irrigation, hydroelectric power, flood control, fish production, and recreation. The finer stream sediments, silt and clay, are deposited directly into Pantabean Reservoir.

The principal watershed problems in the Philippines as stated by Jesus B. Alvarez, Jr., Assistant Director of the Ministry of Natural Resources, Bureau of Forestry Development, and by Jose J. Leido, Jr., Secretary of Natural Resources, is the need to manage production of timber in a manner that will prevent the denudation of forests and preserve the ecology. Forest denudation is resulting in high rates of sedimentation that threaten the life of irrigation canals and the reservoirs of multi-million dollar hydroelectric-complexes. Removal of vegetative cover also results in upsetting streamflow regimens, which causes excessive flooding during the wet months, and extremely low flows during the dry months. A further contributing factor to streamflow and erosion problems is improper rangeland management, and "slash and burn" cultivation on the upland soils - termed kaingin by the Filipinos. Preliminary data show that surface runoff is highest in the old kaingin, followed in order by new kaingin, secondary forest, and grassland. These problems were reiterated in detail by Dr. Filiberto S. Pollisco, Director, Forestry Research Division, in a briefing at the University of Philippines at Los Banos. Dr. Pollisco also outlined the Forest Research Institute (FORI) research program on watershed management and its organizational structure. The organizational chart of FORI is shown in

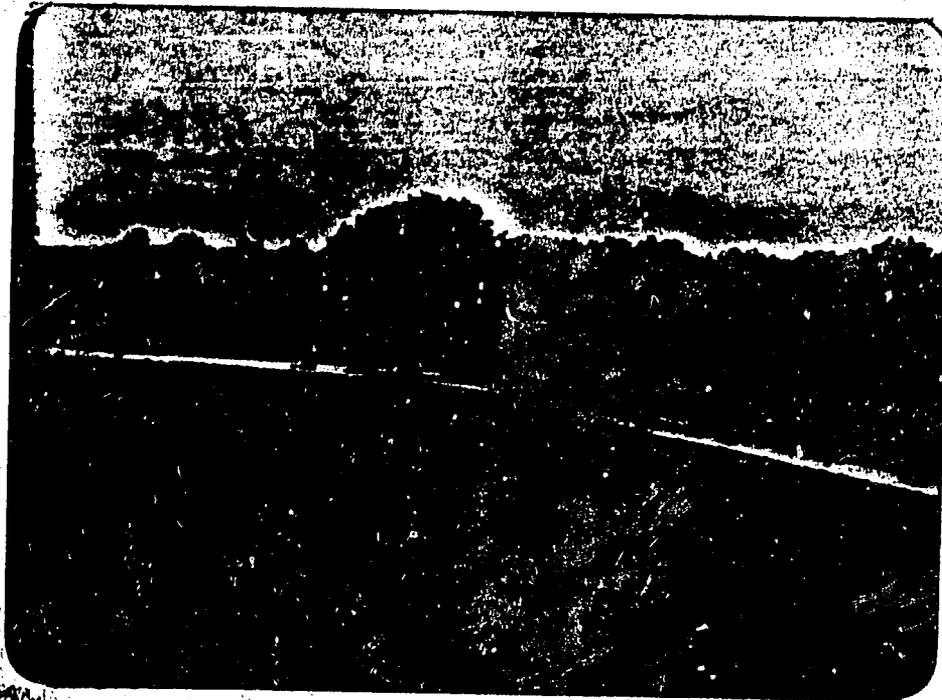


Figure 1 and Figure 2. Sand and gravel deposits in streams draining into Pantabean Reservoir.



Figure 3. Portion of Pantabaan Reservoir, a major multi-purpose structure for irrigation, power, flood control, fish production, and recreation in the Philippines.

the appendix as exhibit A-1, and Dr. Pollisco's prepared paper "Forest Research is an Imperative" as exhibit A-2.

The tremendous importance of forest operations and the complexity of the associated problems is illustrated by a recent report in the Asian edition of the New York Times, which states

". . . if existing patterns of deforestation prevail, there will be an acute shortage of timber for domestic use by 2000 because all of the countries original forests will have been cut down. The Government appears to be of two minds about what to do with the remaining woodland; at the same time that it conserves and reforests, it also establishes big corporations that use up the timber. . . .

According to the Philippine Export Council, export of logs will reach 2.5 million cubic meters (3.5 million cubic yards) this year (1980), or 23 percent of the production of the Southeast Asia Lumber Producers Association.

Domestic needs are expected to bring production of wood up to 8 million cubic meters. 'The need of our country and people have to be balanced against the requirements of ecology' said Edmundo Cortes, director of the Bureau of Forest Development. He said income from wood exports was needed to maintain the nation's balance of payments . . ."

The complete text of the subject Times' article is given as exhibit A-3 in the appendix.

The 1980 population of the Republic of the Philippines is approximately 47,700,000. The annual growth rate is 2.5%, indicating a doubling of the population in about 29 years. The educational system of the Philippines is probably the most extensively developed in the

Orient. Education is the second largest in the national budget, amounting each year to approximately 20 percent of the total. Education appears to be highly valued as a factor in individual advancement and national development. The literacy rate of those persons 10 years old and over stands at about 75%, the highest in southeast Asia. In recent years a large number of females are obtaining degrees in higher education, and appear to be fully employed by government and private industry. Tagalog, one of several Filipino linguistic groups, was adopted in 1946 as the basis for the national language; however, English is probably still the most widely used language, being spoken by about 40 percent of the population.

Higher educational facilities in the Philippines are quite good as illustrated by the high-caliber of the staff of the Forestry Department at the University of the Philippines at Los Banos on Luzon. Also the management and technical personnel for the Forestry Research Division and the Forestry Research Institute are top-quality in the upper echelons. Research organizational structure and experimental plans are soundly conceived. Unfortunately, the research budget is insufficient to carry out the proposed studies. It was pointed out by Dr. Pollisco that the total budgeted for research in the U.S.A. is about 2% of the G.N.P., but in the Philippines is only 0.02% of the G.N.P.; or two magnitudes less than for the U.S.A. Thus the middle and lower echelon groups in research are below standard in number and training.

The excellent opportunity that will be afforded for experimental research and training at the Republic of the Philippines-Japan Watershed Project (R.P.-J.), in association with the Carranglan operation, must be emphasized. This 10-million dollar complex is being built and equipped in cooperation with the Japanese Government. Funding is

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PHILIPPINES
TRAINING
PRACTICES

reported to be in the proportion of 70% Japanese and 30% Filipino. When completed the R.P.-J. project will afford excellent facilities for training forestry students, most of whom will be Filipinos at the technician level.

For the Philippines, as well as throughout the ASEAN Region, the payoff for conservation research in the long-run will come only after the recommended conservation practices are utilized by land owners and the farmers. Such methods have proven most successful whenever there are strong national and local government involvement. It has been found by the International Rice Institute (IRI) that when the better educated farmers, often the chiefs of their barrios accept new practices the poorer farmers usually follow. This means that research must be strongly supplemented by educational and extension work.



Indonesia

Indonesian watershed problems are different from any other ASEAN country as observed in central and west Java. Java is one of the world's most populated areas. It has a population in excess of 80 million, or nearly two thirds of the entire Indonesian population on 7% of the total land area of the Republic. Over 80% of Java's population is rural but the cities have grown at a rapid rate in recent decades. The rural density is highest in the south central plains, as represented by the area around Jogjakarta, and along the equally crowded northern plain between Semarang and Cheribon. The high rural density shows a close correlation with soils derived from limestone or basic volcanic materials. The acid soils of west Java have the lowest population density. The ethnic groups on Java are composed approximately of 97% Javanese and 2% Chinese, with the remainder being Europeans, Arabs, and other Asians. In Java three distinct languages are spoken: Sudanese in the western uplands, Javanese in the middle and east, and Madurese opposite the Isle of Madura. For the Republic as a whole the literacy rate for the population over 10 has been estimated at 43%, but is undoubtedly lower for rural areas. The annual population increase in the late 70's was 2.1%, which would result in doubling the population in approximately 34 years.

In the past, Chinese, Indians, Arabs, and westerners controlled most of the business and large farm enterprises. In 1961 a development plan to achieve Indonesian Socialism was started. The government announced "land-reform" regulations whereby each farm family would have at least 2 ha. (5 acres) of land, increased to 20 ha. (50 acres) in sparsely populated areas. However, with the increase in population with each new generation the present size of the acreage holding on

overcrowded Java is estimated at 0.46 ha. (approx. 1 acre). The Indonesian government has continued to promote Javanese resettlement to less densely populated areas, such as South Sumatra, but the number of trans-migrants has been too small to afford relief for Java's population pressure.

The demand for food is so great that cultivation for food crops is attempted even on the steepest slopes right up to the ridge and mountain tops. Likewise, the need for wood or charcoal fuel is so demanding that nearly all trees have been denuded from private farmlands and even on some government controlled land near the large cities. The result has been terrific erosion and loss of fertility on the steeper slopes, with relatively infertile soils being deposited lower down. For example, on the road between Solo and Wonogiri, we saw a large water reservoir being constructed, primarily for irrigation, that was originally estimated to have a useful life of 100 years; however, more recent estimates indicate a life span of only 30 to 40 years due to excessive siltation. Also, we have been informed that sky satellite photos show heavy silt loads that are being deposited in coastal waters.

In a briefing by Dr. Mursidin, Project Leader of the Watershed Management Development at Solo, it was explained that although the research activities are under the direction of the Forestry Department most of their problems dealt with cropland and they were using an integrated or holistic approach. The aims of the Solo Center and its tasks, functions, and activities are given in more detail in the booklet (English) as exhibit B-1, and the problems and practices used in watershed management, by the pamphlet (English), as exhibit B-2, in the appendix. Indeed, the discussion and illustrations indicated they were using many of the tactics and practices employed by the U. S.

Soil Conservation Service in the 30's. It was apparent that the leaders were competent, dedicated, and educated people that are facing an almost insuperable task because of the enormity of the problem and lack of trained technicians with modern know-how and equipment.

This observation was borne out by our visit to the dry land Wiroko sub-project near Wonogiri in central Java. There, the cultivated lands were steep and badly eroded, the bench terraces were poorly maintained, and the waterways did not function well. The hydrologic research facilities were inadequate, out-dated, and often improperly maintained. Automatic stage-recorders were not seen, but it was explained that runoff through the weirs was computed from stage-heights that were recorded visually every minute. In fact, because of a labor surplus and the need for cash employment practically all project construction was done by hand labor. Figures 4, 5, and 6 show typical conditions at this site. Nearby, we observed a dam with spillway, apparently built according to U. S. - S.C.S. specifications. Unfortunately the reservoir, designed to serve for irrigation, had too small a catchment area, and did not perform effectively except as a silt-trap, figures 7 and 8.

The next day on the trip to visit the sub-project near Tawangmangu, northeast of Wonogiri in a higher rainfall zone, we saw one of the larger observational watershed units with a well-designed weir where acceptable runoff records are said to be available, figure 9. Irrigated upland rice is grown in this area and the terrace construction and irrigation structures are superior to those at Wonogiri.

Enroute from Solo to Jakarta we stopped to observe the Panawangan sub-project, near Ciamis, West Java on the headwaters of the Citanduy project. According to Mr. McAllister, a U. S. supervisory engineer



Figure 4 and Figure 5. Eroded conditions near Wonogiri
in central Java.



Figure 6. Hydrologic instrumentation at the Wiroko
Sub-Project near Wonogiri in central Java.



Figure 7. Reservoir dam design to serve for irrigation near Wonogiri.



Figure 8. Reservoir silting upstream from dam on proposed irrigation reservoir shown above.

for the large Citanduy project, it started as a public works project under the Ministry of Public Works with little or no participation by the Ministry of Agriculture. It was designed primarily as a flood control and irrigation project to serve the lowland areas. The main physical structures were flood levees, irrigation diversions, one-way flap-gates in the levees to prevent river outflows at flood stage, and some spillway overflow structures that could divert extremely high flows into a parallel stream. In design, the project closely resembles that for the Mississippi River in the U.S.A., except that no storage reservoirs were provided in the headwaters. Soon after the Citanduy project became operational it became apparent that the high silt and bed loads in the river, derived from the uplands, were aggrading the channel and fouling the structures so as to seriously shorten the useful life of the project. At this time the Ministry of Agriculture was asked to provide upland watershed protection by reforestation and other soil conservation measures. The Ciamis operation, and specifically the Panawangan sub-project of the Watershed Management Development Center, is a direct contribution to this erosion control effort.

At the Panawangan sub-project we saw a demonstration area using good farm water-control practices to minimize erosion on steep slopes. We saw well designed, well constructed, and well maintained bench terraces, with grassed backslopes, figure 10. The terrace outlets and waterways were vegetated, which was giving adequate protection from scour. Dryland crops such as maize, peanuts and vegetable truck-crops were grown between the terrace slopes. These crops were fertilized, rotated, and tilled. They produced well above average yields and were declared to give the farmers well above average farm income. More importantly, it was stated that using the demonstration project as an



Figure 9. Stream gaging station on experimental watershed area near Tawangmangu, northeast of Wonogiri.



Figure 10. Well constructed bench terraces at the Panawangan Sub-Project in West Java.

example, and also using photo slides, talks, town meetings, and other extension techniques, surrounding farmers were rapidly adopting these practices.

Although Indonesia needs more livestock, we saw little rangeland improvement research, at least on densely populated Java.

The most urgent watershed needs in Indonesia are for more skilled people below the top level. There is a great need for an infusion of modern investigational practices, hydrological know-how, and for up-to-date instrumentation. The present state of the art is judged to be 3 or 4 decades behind western standards. This lag is probably due to a national income that was far below average for many years until recently when Indonesia became a major exporter of oil. Oil income is alleged to now yield from 50% to 70% of the total national income. Fortunately, for Indonesia their national income is now substantial so that the potential for improvement in food and fiber production and conservation of watershed resources exists, whenever the educational and investigational facilities become better developed and the population pressures on densely settled islands are relieved.

A road map of Java that shows the team's tour route through the island and sites visited with dates indicated, is given on exhibit B-3 in the appendix.

Malaysia

With the exception of Japan, the average standard of living in Malaysia is higher than in any other country in Asia. Malaysia has a plural society with different cultural communities living side by side. The mixed population groups are comprised approximately of Malaysians, 46%; Chinese, 42%; Indians and Pakistanis, 10%; and westerners and others, 2%. The present total population is estimated at about 14 million people with an average density of 200 per square mile, which is rather low for ASEAN nations. However, the average rate of population increase in the late 70's was 2.6% which would result in doubling the population every 28 years. The native Malaysian growth rate is slightly higher than that for other ethnic groups. Citizenship, an important issue in this multiracial nation, is open only for people who were citizens before Sept. 1957, or who were born within the country after that date. Non-citizens are eligible for citizenship after 7 years' residence.

Present Malaysia was under strong British influence or control from the 19th Century until World War II when occupied by the Japanese until 1945. When the Japanese were expelled the British returned and promoted a Malaysian Union. The Federation was established in 1948. An armed communist revolt started the same year and a state of emergency was declared which existed until 1960. Complete independence for Malaysia dates from Aug. 31, 1957; however, the British governmental, educational, and sociological patterns still exercise lasting impressions. Research operations in Malaysia are largely patterned after the British mode; although in recent years a number of the conservation research leaders have been trained in American universities at the post graduate level.

On our arrival in Kuala Lumpur we went to the office of Mr. Mok Sian Tuan, Director of Forest Management, Forestry Department, where he and Mr. Fruzaillah briefed us on the general Malaysian economy and the aims and operation of the Forestry Department, which is in the Ministry of Primary Industry. Malaysia has opted for industrialization. Little stress is placed on food crops for national consumption or export. Forestry practices that will yield optimum return on forest products and still maintain environmentally acceptable conditions are the aim. Some crop and range research is done in connection with the development of rubber, palm oil, cocoa and related plantation-type farming, which crops appear to be the number one priority in agriculture. Forestry research is pursued diligently in all aspects. Agricultural research, principally on irrigation and drainage for rice, is in the Ministry of Agriculture, and extension work is spread among several ministries. A national agriculture policy has yet to be formulated. From our talks with Mr. Mok it was apparent that he is devoted to forestry, is intelligent, is knowledgeable, and is a forceful administrator.

The following morning was spent at a U. S.-Malaysia meeting on an ASEAN watershed conservation and management research program at the Forestry Research Institute (F.R.I) at Kepong in the outskirts of Kuala Lumpur. This session was chaired by Mr. Mok and attended by 31 persons representing diverse disciplines and agencies. Each individual briefly outlined his field of work, and the forest hydrologists gave a detailed, illustrated description of the forest watershed conservation studies in progress. This research appeared well planned and is aimed at developing forest harvesting and log skidding methods and equipment that will minimize scarifying the soil and will reduce runoff



Figure 11. Main building of the Forest Research
Institute (F.R.I.) at Kepong in the outskirts
Kuala Lumpur.

and erosion; thereby, improving the quality of water flowing into receiving streams. Our team outlined the purpose of our visit to the ASEAN countries and described the possible option of establishing a central research center that would cover all facets of watershed conservation research and management including sloping crop and rangeland as well as forest lands. In the discussion, Mr. Mok explained that their research is not on crops lands because by the year 2000 clean tilled crops need not be grown on steep lands but can be grown on the more level valley lands in Malaysia. Admittedly, the problem exists in other countries and a bifurcation of research was suggested. Malaysian attendees generally agreed that the F.R.I. site at Kepong should be given first consideration as a location; whatever the final make-up of the proposed center.

The Institute (F.R.I.), located on a 1,500-acre tract, was set up in 1952; although forestry research was originally established in 1879 under the English scheme, which tends to be maintained. On our tour of the F.R.I. grounds, buildings, and laboratories we found the Institute to have a competent, well-trained, well-organized staff with a Director who seems to cooperate with the University and other related government agencies. Laboratory equipment was modern, properly cared for, and adequate for the work. Figure 11 is a view of the Institute's main building. Exhibit C-1 is a bilingual brochure that describes the organization and operation of the Institute.

In the afternoon we drove through beautiful, heavily forested, mountainous country to Jerantut, a small "sawmill" town approximately 75 miles (airline) northeast of Kuala Lumpur. Enroute to Jerantut we observed a number of streams that obviously carried silt and bed loads, which was probably derived from recent road construction.



Figure 12. Weir and stage recorder for measuring runoff at the Felda Agricultural Research Center.

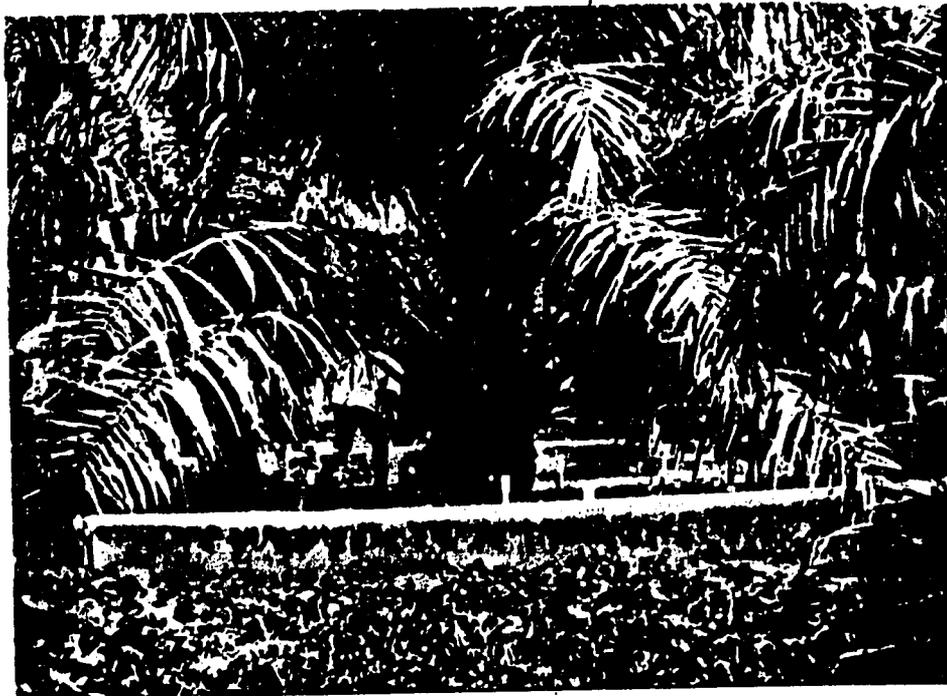


Figure 13. Lysimeter for evaluating evapotranspiration losses from a full grown palm tree.

The following morning we drove to the Felda Agricultural Research Center located on the Felda Land Development project. Here we saw one of the watershed research basins that was equipped to measure the water balance, the flow regime, and water quality. The sub-basins, now in the precalibration state, are on soils derived from granitic parent material. Figure 12 shows the weir and stage recorder for measuring runoff. A short distance away we were shown meteorological equipment that could adequately measure all aspects of climate, including a lysimeter approximately 20-25 feet in diameter that could evaluate the evapotranspiration losses from a full-grown palm oil tree. Measurements to establish the soil moisture extraction pattern for the root zone within the lysimeter were made using modern nuclear equipment, figure 13. All grounds and equipment were freshly cleaned and neatened for inspection by the Sultan on his visit the next day.

In the afternoon our team was driven to Jengha Forest Experimental Basin Project which is similar to the Felda Basin Project except it lies in a dense virgin forest and is underlain by sedimentary parent material instead of granitic. A map of the Jengha basin showing the layout and instrumentation is shown as exhibit C-2 in the appendix. Figure 14 shows the forested condition of the basin. This research area also denoted good planning and selection of good equipment. In general, our observations indicated a reasonably sophisticated knowledge of forest hydrology and research techniques.

On our inspection tour this day we saw two Government Land Reclamation and Development projects near Felda. We were informed that the Government Development scheme is to select national forested areas that are suitable for growing plantation-type crops such as palm oil, rubber, or perhaps, cocoa. The area is cleared and logged by contract.



Figure 14. Typical forest conditions at the Jengha Forest
Experimental Basin Project in Malaysia.

Money derived from the timber is used to make the soil tillable and to build roads, schools, and other needed infrastructure for a rural community. Eligible non-landed farmers are selected and given a long-term lease on 10 acres of land in the subject Development with certain stipulations including annual paybacks to the government from the crops sold. The Government agency acts as a quasi-coop. that furnishes housing, planting materials, fertilizer, crop processing, and sale of the final product. The individual farmer's net return depends on the yield and quality of the crop produced. Government moneys returned are said to be used for new agricultural development projects. Major research concerns are to establish criteria for selecting forest lands suitable for crop production, and to develop logging methods for minimizing erosion. The greatest amount of erosion we saw in Malaysia came from recently logged areas and logging roads. Some erosion was seen on cropped areas especially on the steeper slopes. New rubber plantings are on terraced land. Other groves are usually clean-tilled for fire prevention, and even mature rubber plantations have little ground cover because the closed canopy inhibits sunlight penetration.

Our Malaysian tour-route and locations visited are shown on the road map, exhibit C-3 in the appendix.

We had our usual "wrap-up" session in Mr. Mok's office Friday 10/03/80 to exchange tour observations, comments, and suggestions. We found that our team and Mr. Mok had some differences of opinion in the name, primary purpose, function, and mode of operation for the proposed ASEAN research organization. A frank, open, give-and-take discussion followed in which some misconceptions on both sides were cleared up. Terminology was defined, and compromises were reached



Figure 15. Typical scene in the north highlands of Thailand with paddy rice in the narrow valleys and a patch of swidden on the hillsides.

that were apparently satisfactory to all. The session opened by the team members complimenting Malaysia on the quality of forestry research. We stressed the need for cooperation of ASEAN countries to meet research needs for all, and questioned if Malaysia might not need to lay a foundation for more food crop research to meet an expanding population. Mr. Mok ably defended Malaysia's present research approach. The need for a holistic or integrated type of research organization that covers the entire spectrum of watershed conservation problems that included forest, crop, and rangelands was cited by the team. A somewhat contrary opinion was given by Mr. Mok who placed emphasis on forested watersheds, and pointed out that the original proposal was conceived and promoted by the COFAF group. It was his opinion that the foresters were the only group in ASEAN organized to do cooperative research for all the countries.

It was finally agreed that an integrated approach was appropriate and that a proper name for the center would be "The ASEAN Center for the Development of Watershed Conservation Research and Management." The term forest watershed was defined to include forested and non-forested land so that research on crop and rangeland would be relevant to the COFAF group. Mr. Mok advised that under the present ASEAN framework that contribution from Asian countries must be "in-kind" funds. The host country can furnish facilities such as laboratory space, office space, and equipment, but that the individual countries can only furnish technical personnel under contract. At the end it was generally agreed that the proposed center should be a center for the transfer of new technical knowledge, old technical knowledge, and for the exploitation of breakthroughs in research, but not in a search for breakthroughs. Insofar as the state-of-the-art is concerned, Malaysia is conducting good research on forest hydrology and plantation-type

conversions with an almost single-mindedness of purpose that is yielding useful and pertinent information applicable to their problems.

Thailand

Thailand is somewhat unique in that they have been conducting their activities in their own manner with little outside interference for several hundred years. They have developed their own methods that may seem unusual to Westerners, but which appear suitable for Thai culture and needs.

The present population of Thailand is estimated at 46.4 million with an annual growth rate of 2.5, which indicates that the population will double to 92.8 million about the year 2010. The religion is predominantly Buddhist. Although the country now exports rice we were informed by Government officials that a food supply problem is imminent.

The Kingdom of Thailand is a constitutional monarchy, normally headed by the Prime Minister. The King is the Chief of State. In summary the government is run by executive order dominated by the executive branch with a minimum "check and balances" system as exemplified by the executive, legislative, and judicial system. The King is primarily a symbol of the nation's unity. He represents the State at major ceremonies and with the Queen sets the standard of style and deportment. The King usually stands above the strife of politics, but is highly respected by the Thai people, which enables him to exert a strong influence in selecting the prime minister or head of the armed forces. The present King is an able and hard-working monarch with deep concern for the interests of his people as shown by his active participation in the Royal Watershed Development projects. These projects, commonly known as the "King's Project" were started in 1975 to improve forest and water resources and living conditions of the Hill Tribe people living in the northern highland areas.

Watershed research and development is carried out by the Watershed

Management Division, Royal Forest Department, Ministry of Agriculture and Cooperatives. Watershed conservation problems in Thailand appear to be akin to those in the Philippines in several aspects. They include swidden "slash and burn" cultivation on steep slopes, burning of the forest cover, and developing proper methods for stabilizing timber production by reforestation and selective cutting. Prevention of excessive erosion from rural and logging roads is a problem in Thailand, as it is in all the Asian countries. In addition, Thailand has the problem of opium production by the Hill Tribe people that results not only in conservation losses, but also in major social problems among the indigenous inhabitants as well as for other peoples.

Our team's first contacts in Thailand were with U. S. Embassy and AID personnel who assisted with our itinerary and contacts with Thai officials. They also briefly described features of the integrated watershed and social management plan for the Mae Chae Watershed in north Thailand, a cooperative venture with USAID. Later we were given a technical mimeographed paper written by Paul J. Zinke, Professor, University of California, outlining and spelling out a proposed design for this project. A review of this paper--after our tour--gave us a broader insight and perspective on the nature of the problems and proposed activities involving upland forested watersheds in north Thailand. As a whole, Zinke's paper is sound and constructive. However, as a hydrologist, one may argue over his conclusions on the effects of reforestation increasing evapotranspiration causing a significant decrease in total water yield obtained from extensive reforested areas. Water yield results derived from small watersheds are significantly modified by consideration of the heat budget of the atmosphere and the probable effect of the "Le Châtelier principle." The subject paper is exhibit D-1

in the appendix.

Our field trip began in Chiang Mai at the Headquarters of the Director's office of the Mae Sa Integrated Watershed Management and Land Use project. We were there briefed by Bhadharajaya Rajani (Pat), Chief, Watershed Engineering Sector, Royal Forestry Department (R.F.D.), and Jack Kraayenhagen, Technical Officer, Watershed Management Conservation Farming, UNDP/FAO, Mae Sa Project. The briefing included discussion of Hill Tribe migration, swidden cultivation cycles, animal grazing, and land tenure complexities. Efforts to stabilize farming practices include housing development; introduction of new cash crops, such as coffee, fruit trees, etc.; crop fertilization and rotation; and employment of tribesmen in building soil conservation and research structures. They then escorted us by Jeep and Land Rover to inspect the Pong Krai demonstration area northeast of Chiang Mai (altitude in excess of 1,000 m.). We saw housing and good crops on well constructed bench-terraced land on fairly steep slopes. We saw simple innovative runoff plots constructed with local labor and inexpensive equipment that measures runoff and soil losses for different erosion control practices. We were treated to lunch and shown slides illustrating recommended conservation practices that were used as an extension tool in indoctrinating the Hill Tribes. Terraces spaced at 3 X recommended intervals were proving successful at this location, which shows the need for soil infiltration studies to categorize infiltration rates for guiding the design of erosion control structures. Such research would promote use of S.C.S. runoff curve numbers that have proven successful in applying soil conservation practices in the U.S.A. Figure 15 is a familiar scene in the north highlands, with paddy rice in the narrow valleys and a patch of swidden on the hillsides. Figure 16 is an

overall view and figure 17 a close-up view of the runoff research plots at the Pong Krai demonstration area. Figure 18 illustrates one of the houses on the project. Figure 19 was taken a few miles distance from the Project higher up in the Hill country. It shows a Mao village chief surrounded by members of the day's tour group. The chief told us he formerly practiced swidden farming with the typical rice, maize, opium poppy rotation, but had now settled down and was growing coffee and other introduced crops, which provided him a good living.

The next day we proceeded northwest from Chiang Mai to visit one of the Royal Hill tribe development units. We traversed excellent paved mountain roads interspersed with less than excellent gravel surfaced roads, and wound up on a narrow unsurfaced newly built road, barely passable when wet, figure 20. When we reached the development unit, one of the King's projects, we were given an illustrated lecture by the Assistant Director. Figure 21 is a view of the project's headquarters and office building. See exhibits D-2 and D-3 for more information. In the afternoon we were shown an experimental watershed basin set up to measure the runoff and water quality of forest land. Some essential instrumentation was inoperative and the research was of poor quality.

On our return to Bangkok the city was badly flooded, allegedly due in part to high runoff from mistreated northern hill lands in the river headwaters, but also due to land subsidence beneath Bangkok caused by over drafts on the ground water. We had a final interview session with Dr. Ndhai Chanphaka, Director of the Watershed Management Division, who is a graduate of the Duke University Forestry School (North Carolina, U.S.A.). There appears to be a lack of cooperation between the government agencies. The Director of the Division implied they were forced to pretty much go-it-alone under a Tennessee Valley Authority type of



Figure 16. Overall view of research runoff plots at the Pong Krai demonstration area, Thailand.

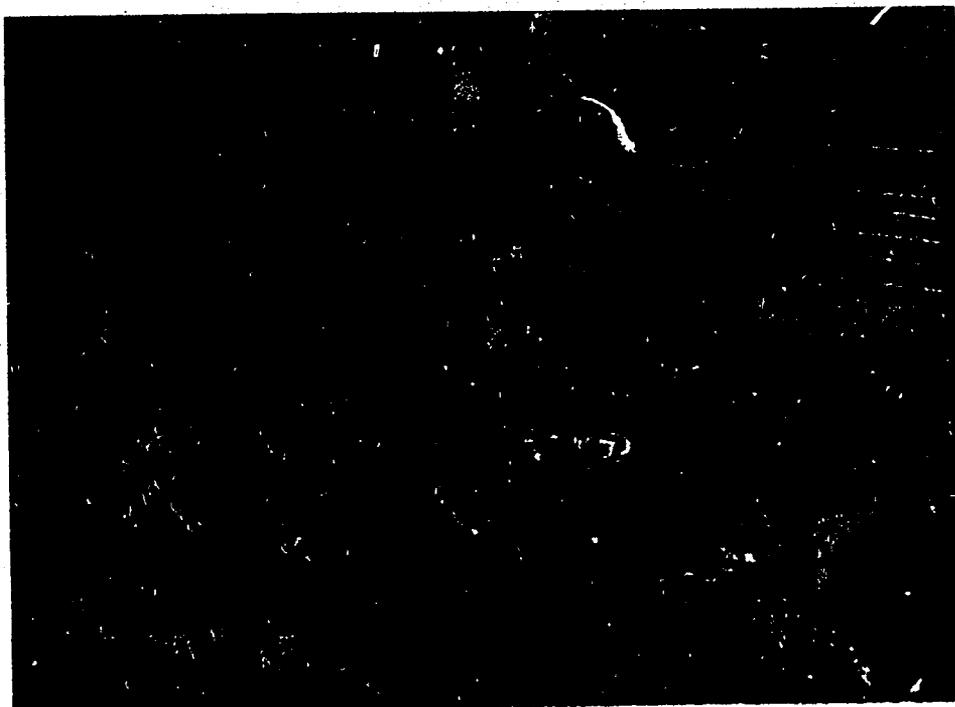


Figure 17. Close-up view of above research runoff plots with bench terraces in the background.



Figure 18. Typical house for Hill Tribe residents at the Pong Krai demonstration area.



Figure 19. Mao Hill Tribe village chief surrounded by members of the Thailand tour group.



Figure 20. Land Rover mired down on approach road leading to Royal Watershed Development unit in north Thailand.

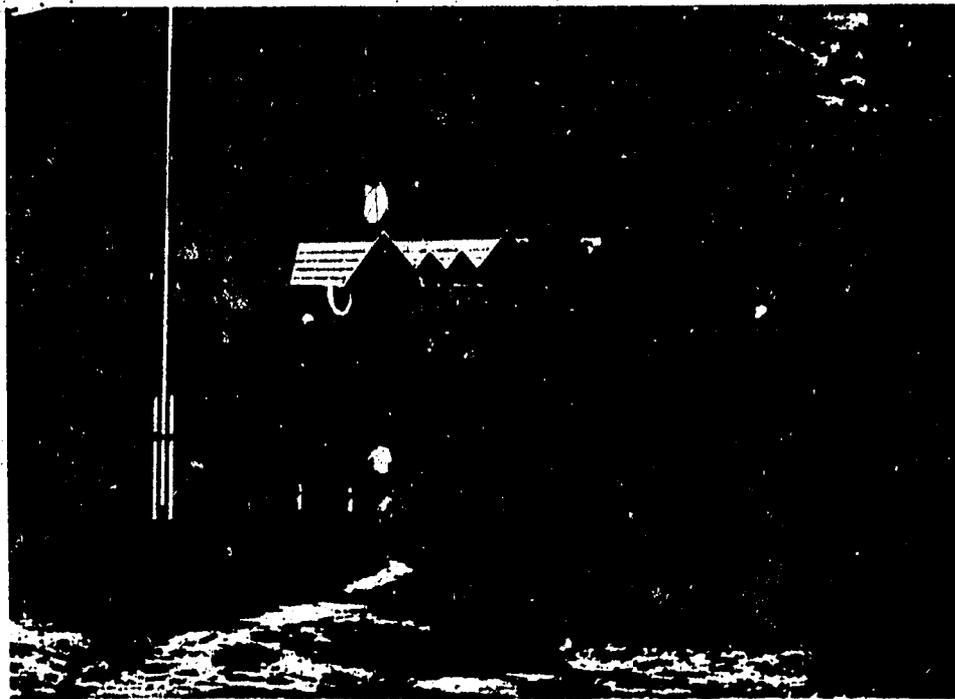


Figure 21. View of Royal Watershed Development project headquarters and office building, north Thailand.

organization that covered all aspects of the work ranging from forestry itself to road building and even the construction of small hydroelectric plants.

The Director lamented that watershed research in general and forest hydrology especially did not receive the necessary financial support required for an effective program. Operational activities have top priority and research received the left-overs, if any. Although the Division has several well-qualified, well-trained men in the top positions, there is a dearth of trained people for the magnitude of work needed. This circumstance, plus a serious lack of equipment has resulted in sub-standard hydrological research.

RECOMMENDATIONS

Background

To paraphrase the statement of a major conservation group: "There are no fixed solutions to complex problems, only intelligent choices." Thus, there are a number of options that can be offered to use the research experience and ongoing operations in the ASEAN countries to alleviate degradation in upland watersheds. The option selected by an individual will necessarily be based on his previous background and experience, within the recognized constraints.

The present investigational team, who spent over 4 weeks studying ASEAN watershed conservation problems and ways to best organize coordinated research efforts, did not always agree in every respect but did reach agreement in the major aspects. We realize there is no plan that will meet all ASEAN needs for each individual country; and that any plan adopted will have some objectional side effects. We offer a plan that includes trade offs, but which we believe, optimizes limited resources and people. Also, we realize that the proposal will probably require some modification as unforeseen events occur and conditions change. Too, available personnel may require minor adjustments. Ideally, the technical people should be assigned to fit the research needs; however, the ideal seldom occurs and the needs and priorities must sometime be changed, but never compromised, to suit available personnel. Even the best strategy may be negated by poor staffing and bad tactics.

We fully recognize that the sponsoring group was composed largely of forestry specialists within the ASEAN Coordinating Group for Forestry, and that forestry research must have a high priority. We also realize that the subject watersheds to be investigated are composed of forested areas and non-forested areas, both of which have serious soil and water

conservation needs that must be met. The non-forested areas are by definition mathematically the complement of forested areas. The non-forested areas are comprised almost entirely of rangelands or farm lands, both of which must also be given high research priority. Priority assessments for each land-use component will be judged differently by each country in accord with the land usage prevalent in that country's watersheds. We believe that the proposed Research Center must give approximately equal attention to all types of land use, or potential land use, for upland watersheds.

Further, it is our considered opinion that the special or unique needs of individual ASEAN countries should be considered separately and, when justified, dealt with under bilateral arrangements with each nation.

Organization and Function of Proposed ASEAN Center

A regional center should be established at an acceptable location within the ASEAN countries to be known as "The ASEAN Center for Development of Watershed Conservation Research and Management."

The functions of the Center should include: collecting, appraising, and disseminating all available research knowledge judged relevant to ASEAN upland watersheds; collaborating and cooperating with ASEAN watershed researchers; training mid-echelon scientists and technicians; and preparing, promoting, and disseminating guidelines and information that will assist other research and extension units in working with landowners and farmers.

The Center would operate under the aegis of ASEAN COFAP. It should be headed by a Center Director, who would be aided and guided by a program steering committee, selected by the ASEAN coordinating group, and the AID-ASEAN liaison representative serving as an ex officio member. The Director should be provided with an administrative assistant with the needed staff and clerical help to assure a smooth flow of detailed operations.

The Center should have five branches under the direct line supervision of the Director. Branch A would be the Forestry Watershed Management Research Group, Branch B the Range and Pastureland Management Research Group, Branch C the Farm Water-Control Management Research Group, Branch D the Socio-economic Research Group, and Branch E the Training, Extension, and Technology Packaging Group.

The Director should be a mature respected scientist familiar with all aspects of watershed conservation research with a proven record as an able administrator. Above all he should be a diplomat. The four technical branches: Forest Management, Rangeland Management, Farm Water

Management, and Socio-Economic group should each be staffed by a minimum of two Collaborating Scientists, a senior scientist and an associate scientist. Each should complement the other in background and experience to fully cover their subject research field. These job assignments should be viewed as staff specialists who collaborate, advise, and assist other national watershed conservation research and management groups working on site oriented research throughout the Asian Region. Staff specialists in Branches A, B, and C should be familiar with modern acceptable conservation methods and practices, and be up-to-date on research concepts, techniques, design, instrumentation, and data analyses.

Specialists in Branch D--Socio-economics--must be familiar with the demographic, religious, and economic conditions, as well as the governmental and educational structures, and even the social mores, of the individual countries involved. Such knowledge is essential for a watershed conservation and management program to succeed, given the varied nature and vicissitudes of problems and attitudes that exist among the southeast Asian populations.

Branch E--the Training, Extension, and Technology packaging group will have a major responsibility for the ultimate success or failure of the subject Center. They must be able to materially assist the specialists in each technical branch to convey and exchange the latest research findings and conservation practices with their technical peers in the other countries. They must develop economical and pragmatic ways to train mid- and lower-echelon technicians in modern research and conservation methods, especially the installation, operation, and care of technical instruments and hydrologic installations. Most important, they must adopt practical approaches to extend recommended conservation

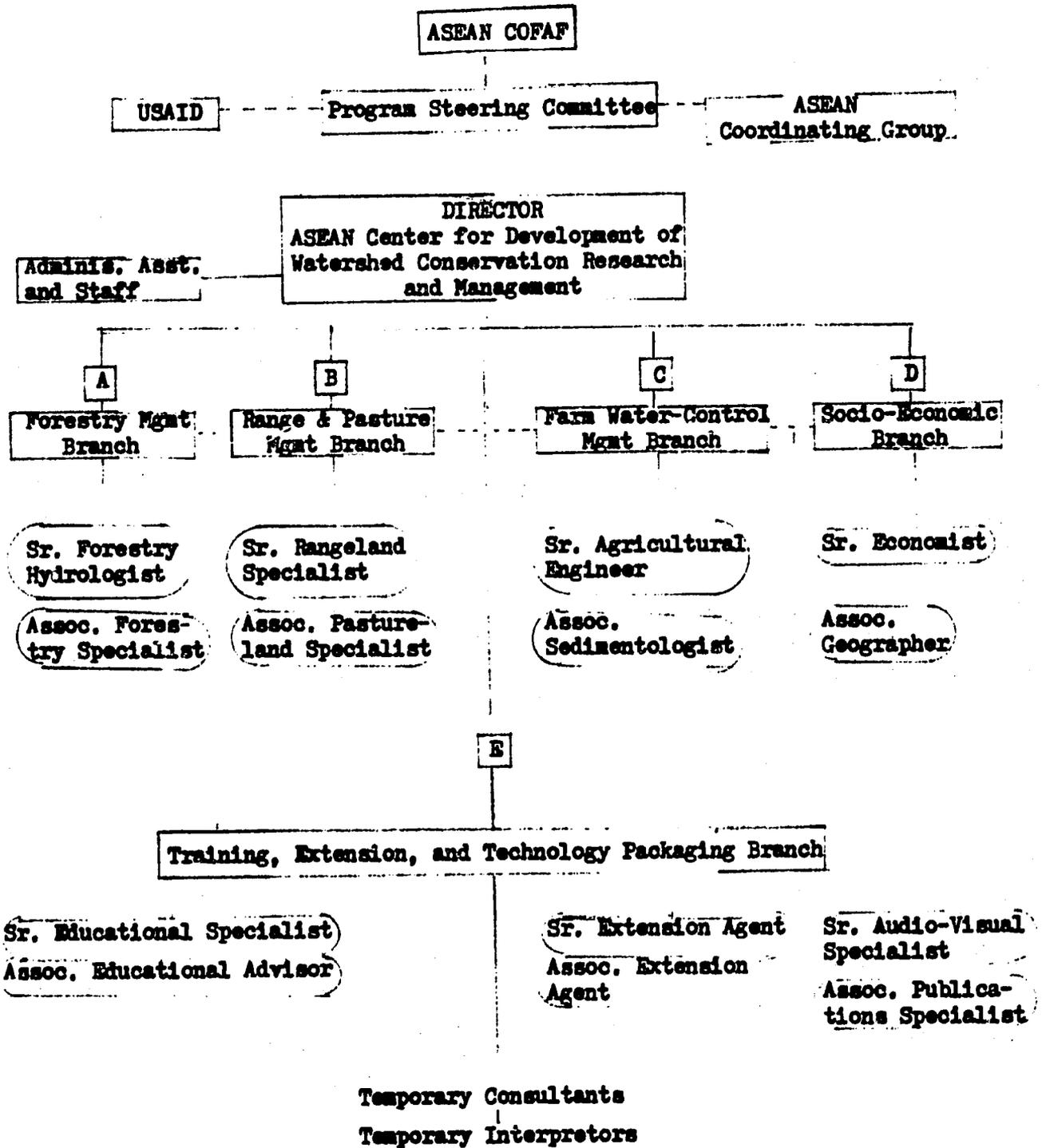
and management practices that will be environmentally and economically beneficial to the smaller land owners and farmers as well as to the holders of large land tracts, be they government or private lands. This will be a tremendous task considering the diverse and widespread nature of the audience. There should be six well-trained specialists in Branch E, a senior specialist and an associate specialist in each of the three major sections within the branch. They will require the necessary authority, and financial support for hiring consultants, visual-aid specialists, writers, and interpreters. Funds for seminars, honorariums, and travel will be needed. Modern equipment that can be used in the preparation of educational programs recorded on cassettes, which would be available for TV broadcasting, or viewing on portable wide-screen units at group meetings are essential equipment. The audio portion of the cassettes would be translated into the various languages required.

The technical branches A through C will need to acquire limited quantities of scientific apparatus to be used on site for demonstrational and training use. Examples of such apparatus include Coshocton sediment samplers, split aliquot samplers, double-ring infiltrometers, type FA sprinkling infiltrometers, the different types of rain gauges, evaporation pans, water stage recorders, weirs, measuring flumes, etc. Handbooks on the selection, calibration, care and repair of hydrological and meteorological equipment, such as those published by the U. S. Agricultural Research Service, U. S. Soil Conservation Service, U. S. Forest Service, U. S. Geological Survey, U. S. Bureau of Reclamation, U. S. Corps of Engineers, should be selected by the technical branches for purchase and distribution by Branch E. Although the scientists in the technical branches will not be expected to do on-site research of the "break through" type, they will be charged with investigations or

observations that will establish the boundary limits, or parameters, of conservation practices within given edaphic, topographic and climatic ranges; for example, establishing terrace spacing standards for soils with different infiltration rates, or for selection of proper plants species for different soil, altitude, rainfall, and exposure conditions.

Following is a schematic diagram for the proposed ASEAN Center for the Development of Watershed Conservation Research and Management.

**SCHEMATIC DIAGRAM OF
PROPOSED ORGANIZATION AND PROGRAM STRUCTURE FOR:
THE ASEAN CENTER FOR THE DEVELOPMENT OF
WATERSHED CONSERVATION RESEARCH AND MANAGEMENT (ACDWCRM)**



NOTE: Senior and Associate positions are interchangeable depending upon qualifications.

Proposed Budget

A tentative budget has been prepared based on salary, equipment, housing (rentals), utilities, maintenance, travel, and miscellaneous costs that would prevail in fiscal year 1979-80 for similar watershed conservation research centers in the U.S.A.

Salaries are based on equivalent G.S. grades in U.S.D.A. Centers.

<u>Office of the Director</u>	<u>Grade</u>	<u>Annual Salary</u>	<u>No. Persons</u>	<u>Cost</u>
Center Director	GS 14	37,000	1	\$37,000
Secretary typist	GS 7 or 9	16,000	1	16,000
Administrative Asst.	GS 11	22,000	1	22,000
Clerks	GS 7 or 9	16,000	3	48,000
Clerk-typists	GS 4 or 5	11,000	3	<u>33,000</u>
				\$156,000
 <u>Branch Personnel</u>				
Sr. Scientists	GS 12	31,000	7	217,000
Assoc. Scientists	GS 11	22,000	7	154,000
Clerk-typists	GS 4	11,000	3	33,000
Mechanic Technician	GS 4	11,000	1	11,000
Laborers	GS 2	8,000	3	<u>24,000</u>
				<u>439,000</u>
Total Salary Costs				\$595,000
Rent, Utilities, Travel, Supplies, Equipment,				
Honorariums, Consultants, etc.				630,000
Contingencies (Approximately 10%)				<u>120,000</u>
				<u>* \$1,345,000</u>

*In U.S.A. dollars

Salary scales in the two southeast Asian countries considered as outstanding candidates for the location of the subject center are lower than those of the U.S.A. and would likely be approximately 80% + 10% of those given in the foregoing table. The cost of equipment, supplies, materials, travel, consultants, and contingencies will be at least equal to U. S. costs. Thus a reasonable estimate of annual expenses for the Asian center would be:

Salaries, \$476,000; supplies, etc., \$630,000; and contingencies, \$120,000, for a total of \$1,226,000. The host nation could and should be expected to share approximately 25% of this cost by furnishing local labor, housing, lands, utilities, and maintenance in kind, in lieu of cash, amounting to an equivalent of \$306,500. Thus, the estimated annual cost to AID would be \$919,500, or a total estimated AID 5-year cost of approximately \$4,597,500.

These costs contain neither a currency fluctuation nor an inflation factor. If feasible, such variations should be adjusted on a year to year basis. If not feasible, a 10% increase each year for inflation cost is suggested.

CONCLUSION

At the end of our field trip we returned to Manila for a wrap-up session where we were joined by Don Melville, AID/ASEAN liaison representative. In attendance were representatives from the Malaysian, Indonesian, and Thai Embassies; the Philippine Ministries of Foreign Affairs, and Natural Resources, Bureau of Forestry Development, Forest Research Institute, and the University of the Philippines College of Forestry.

This meeting was opened by the chairman giving a review of past efforts to secure coordination of ASEAN watershed research aided by financial assistance from the U. S. Government. Mr. Melville then followed with an explanation of AID's ASEAN policy and procedures and gave a status report on the proposed Regional Center's situation. Our team was requested to summarize its observations, findings, and recommendations. Mr. Williams gave an opening statement, and I followed giving the more technical aspects. I explained that we found many common elements to exist in the makeup of watershed characteristics, and many common conservation problems among the countries visited, but in observing watershed conditions from country to country it was as if one were looking into a kaleidoscope, which contains the same essential elements of colored glass but presents everchanging patterns as the tube is rotated. Our impressions and perceptions of watershed problems and research approaches in each country were given in brief, and our recommendation for the establishment of one Regional ASEAN Center for the development of watershed conservation and management was submitted together with the proposed functions and organizational structure as heretofore described. The need for cooperation was stressed together with my opinion that financial aid for supplementing research peculiar to the needs of individual countries should be

approached on a one to one, or bilateral, basis. We recited that either Malaysia or the Philippines appear to be capable of hosting the proposed center. However, we reiterated that final decisions on location and organization of the center, within the guidelines for financial aid stated earlier by Mr. Melville, were ASEAN's responsibility.

In his comments affirming the requisites of the Philippines as best suited for location of the center, Dr. Pollisco, Director, Forest Research Division, R. P., suggested that the socio-economic research branch assignments might be handled as a part of the work of each of the other technical branches, and that the inclusion of an associate or assistant director to coordinate research activities outside the host country be considered. I defended the proposed organizational pattern restating our opinion that each branch should maintain close ties each with the other but that the socio-economic branch's endeavor should have equal rank with the other branches. I expressed my reservations as to the wisdom of operating with an Associate Director in lieu of an Administrative Assistant. I explained that I had directed several research centers and areas, trying both schemes, and that I believed the latter type operation was better suited for the proposed regional center as we visualize its purpose and scope. I explained that I thought that line authority for the Director should be confined to direction of the Regional Project, which I view strictly as a service organization for the ASEAN countries. Project employees should collaborate with other research workers, but refrain from attempts to direct their activities. Since associate directors are usually seen as the alter ego of the Director, then attempts to "coordinate" other research studies except at the expressed invitation of the other ASEAN directors could be interpreted as hierarchism. I opined that

the ASEAN participants should be the architects for design of the organization and that a line-type structure was an option, but that my experience dictated the recommendation of a staff-type service structure.

In conclusion it was our impression that the team's presentation and recommendations were well received and that the ASEAN representatives were in general accord with them.

A very strong presentation was made by the Philippine officials for establishment of the center in the Philippines instead of Malaysia as previously planned. The Chairman of the session presented a cogent appeal in his closing statement, which he requested be included in our report. My recording and interpretation of his statement is attached as an addendum.

ADDENDUM

Closing statement of the Chairman of the "wrap-up" session at
Manila, R. P., October 13, 1980:

Now, I just want it on record, and this is for the report of our two friends from America, that we think that we have major problems on watersheds in the Philippines. To support this position I say that in the Philippines alone we have roughly 5 million ha of watersheds that are denuded, or closely to that, and every year an additional 65 thousand ha are denuded either due to fire, or due to illegal logging, added to these 5 million ha already devastated; and this 5 million ha plus the 65 thousand ha yearly is both composed of forested and non-forested areas that includes the rangelands. And out of this more than 5 million ha, immediately, we have to do something, or have to rehabilitate roughly 1.2 or 1.4 million ha, which we consider very critical. And to top it all, we have as of our survey of 1979, roughly 300 thousand families of shifting cultivators residing within these watersheds, and if you estimate that each family has a number of roughly 4 to 5, then you have to contend with 800 thousand people residing within these watersheds; so that is how grave the problem is, and how real the problem is. And, not only that, gentlemen, we multiply our population at the rate of 2.7 or 2.9 percent a year, and right now we have roughly 23 million -- (correction) -- 49 already, and by the year 2000 we expect it to be around 85 million minimum, or a maximum of 100 million people with so little land to occupy. So, this in a nutshell, is the real problem on the watersheds; how easy can we get out these 800 thousand people from our watersheds. The national policy is one of compassion. Our old law would send to prison anyone who entered our forest. This law was adopted as early as 1916 or 1917, but

we got rid of it in 1973 because we realized that we were convinced that that law was ineffectual, because as fast as we sent a kainginer to prison, after so many sentences from 6 mo. to 6 yrs., he went back to the forest and repeated the same process of his slash and burn. So the President, after martial law was declared in 1972, adopted a more compassionate policy on this matter. And instead of sending these people to prison the President gave them amnesty and allowed them to stay in the forest under certain conditions to manage them, and that is the function of my agency with support of the people in the upper . . . (?) as well as in the research agencies of forestry. How well we can manage them is something that we have yet to answer ourselves. We have the manpower; we have the experience, but do we have enough funds, that is one question. We are still fighting our brothers from the south in order to bring them to the point of the law, and we spend millions of pesos every day to bring them to the points of the law. We have other development projects that are all intended to satisfy the eleven basic needs of the Filipino, and I'd like to name a few of them, if I could. One, of course, is to maintain our ecological balance, to generate power for the needs of the people, housing, for food, for water, for mobility, for health services, educational services, for recreation, these are some of our eleven needs. So we have to spread out our little funding to pursue projects that will satisfy all of these needs of man, and forestry is only one of them, and our pocket is only so deep, so what do we need? We need some financial assistance; we need more technology, we need more experts; while we have our own, we have not closed our eyes to the fact that we are not an island and therefore any extra assistance that we can get from rich nations like America, then we would say thank you. And, to convince our friends from America that "siteing" the project in the Philippines would give some

significant results of support from the government. I would like to inform you gentlemen that there are more or less one or two national policies that would partly justify the "siteing" of that project in the Philippines, and the first policy I would like to cite is the national policy to provide electricity or electric power to every municipality numbering a total of 1,500, roughly, individuals. And how do you provide this electric power? By asking or by quoting every hydro-power project in every town, but without the watersheds to provide water for these projects in the municipality, how would we realize the national policies. At present, several agencies including the agency that I head, Forestry Research Institute, the College, the National Electrification Administration, and National Power Corporation, and other water resources agencies are putting their resources together to realize this project. But I think it is not enough. Again, I must say that any outside assistance that is made available to us, it would be most welcome. And to complement this national policy is another similar project to establish the hydro-power dams in certain selected areas, and right now we have ongoing projects, one in . . . (?), that is in . . . (?) resort; the Iale of . . . (?); the watersheds . . . (?) are in need of more attention and management. We have one in Pantabaaan; we have another in Madre (?), and another in Chico; we have one in . . . (?), and then we have one in Mindiano, somewhere in the Lake . . . (?) watersheds, and we have the . . . (?) valley watershed project. We have several other watershed projects that are all intended to provide some irrigational power to our poor people. And to pursue these projects I would like to repeat what my colleagues have already said that we are convinced we have the necessary expertise capabilities to start this watershed reservation center project. And of course it will be complemented by outside expertise that may be coming. In ability alone we have roughly

ten; in the college we have roughly three; and in the FORI, as my colleague has said, he has about twelve, so that makes twenty-five conservation experts that can work all the time on this popular project, but besides that we have a continuing program to develop the national leaders of our forest service and our forestry experts including engineers and hydraulic engineers, civil engineers, agriculturalists, and this is supported not only by national funds but also funds coming from certain foreign institutions for our foresters to pursue a doctorate degree or master's degree in forest resources management or watershed management. So, gentlemen, this, in brief, is an added justification to site the center for the conservation and development of watersheds office in the Philippines. I wish that this would be entered in your report. I wish that finally ASEAN forestry group would be able to finally agree on this particular point, and that means between Malaysia and the Philippines. I'm sure that that would not be any quarrel because Malaysia, like the people of Thailand and Singapore, are our good friends, and we're working closely together. Thank you very much.