REPORT TO DEPARTMENT OF FISHERIES

BANGKOK, THAILAND

BY

H. S. SWINGLE

ALABAMA POLYTECHNIC INSTITUTE

AUBURN, ALABAMA
Report to Department of Fisheries

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Alabama Polytechnic Institute

Auburn, Alabama

Following the Pacific Science Congress and at the request of Mr. Boon Indrambarya, Director-General of the Department of Fisheries of Thailand, I worked with the Department from December 1 to December 22, 1957. During this period I visited with the main office and the Bangkhen Fisheries Station at Bangkok, the fisheries Stations at Bung Barapet and at Chainat in central Thailand, with the Phayao and Chieng Mai Stations in the North, and with Udon Thani and Sakon Nakhon Fisheries Stations in the Northeast. I also visited the coastal area south of Bangkok near Chon Buri to observe the research being conducted on various invertebrates in the Gulf of Thailand. I was accompanied on all trips by Prda Karnasut, Chief of the Division of Inland Fisheries, and Chertchai Amatayakul, in charge of the Invertebrate Section. On the trip to Chainat and Bung Borapet, we were accompanied by Boon Indrambarya, Director-General of the Department. On the trip to the Northeast, we were accompanied by Ariya Sidhimunka. At each Station, the fisheries in that area and the Station facilities were observed; then the research, extension, and hatchery operations were discussed with the personnel in charge. Changes in procedures which appeared desirable to improve the fisheries programs were suggested and discussed by various members of the group. This report summarizes the results of these discussions.
The Chao Phrya River System is one of the great river systems of Asia, and is one of the most productive in the world from the standpoint of the amount of fish harvested annually. This great river is of extreme importance to Thailand as it furnished the waters which flood rice fields, produces great quantities of fishes within its complicated network of rivers, streams, swamps, and canals, and serves as an aquatic highway for the transportation of raw produce and manufactured goods. It also furnishes the supply of brood fishes that move out with the rising waters into the great overflow swamps, where they produce annually a fishery, which is harvested as the flood waters recede.

One dam, Chainat Dam, has already been constructed on this river to divert water into irrigation canals. Other dams are planned to control and utilize the water for irrigation. The effect of multiple dams on the river-fish populations is of great concern because thousands of people earn their livelihood as fishermen on these waters and the fish harvested are of great importance in supplementing the food supply.

Surveys on the Tombigbee River in Alabama, U. S. A., indicate that multiple low dams, of the type used to make a river navigable, cause some change in the species composition of the fish population and lower slightly the crop of fish per acre. High dams, such as those used for power, cause very great changes in the species composition. While the presence of one dam, such as Chainat, could hardly cause measurable changes in the river population, the construction of a series of dams would. In the Chao Phrya
River, observation appeared to indicate one other result of Chainat Dam. The river below was intensively fished by seining and by use of a wide variety of other gear. The deep impoundment above the dam appeared to be fished very little. This may be caused by changes in the population of fishes, but is probably due to the greater depth of the water, which makes seines and certain other types of gear less productive.

Phases of fisheries investigations which were believed desirable on the rivers were:

1. Surveys to determine the amount of fish caught and the number of fishermen earning their livelihood on certain sections of these rivers. This information was considered desirable for planning and for legislation. The manpower required and the cost would make an extensive survey impossible, but certain limited areas of most importance could be surveyed by district officers and Station personnel.

2. The effect of large dams such as Chainat upon river fish populations needed study. The personnel and equipment to conduct large-scale fish population surveys would not be available. The composition of the catch taken by seining and the success of spawning above and below the dam could be determined and would indicate if material changes in the fish population occurred.

Swamps

Many large swamps which are flooded as the rivers rise during the rainy season and which dry up during the dry season, hold water from 4 to
8 or more months and produce large crops of fish that are harvested as the waters recede. The rights to harvest these fish is sold by the government to the highest bidder. No information is available as to the catch per rei, the value of these fish, or the composition of the catch. At selected areas, such information could be obtained during the period that the fish were being harvested, as the fish are caught in nets or traps placed in channels which drain the swamps. Such information would be useful in establishing the value of fishing leases for various areas. It also appeared probable that small fishes of certain species might be obtained for stocking ponds or lakes as these swamps are being drained. Thus the knowledge of the species composition of the catch would be desirable, and the drainable swamps possibly could act as hatcheries for certain species at very little extra expense. Where one swamp above Ayuthaya was being drained, large numbers of fingerlings of Catlocarpio siamensis and certain rare aquarium fishes were included in the catch going to a processing plant to produce fish sauce. In some areas Leptobarbus fingerlings and possibly commercial quantities of Pangasius fingerlings might be readily obtained. These drainable swamps can furnish large quantities of fingerlings of various species which should be tested to determine their suitability for pond culture and for use in stocking irrigation reservoirs.

The drainable-swamp fisheries must be considered a most important resource. The principal cause of extreme variations in production over a period of years appears to be variations in the length of time the swamps remain flooded. A study of the effect of duration of flooding upon production is needed to determine methods of management. It appears that simple gate structures to regulate the length of time the swamps remain flooded could be used to increase and stabilize production.
Irrigation Reservoirs and Lakes

Irrigation reservoirs and lakes that cannot be drained present a different problem in management. In such bodies of water balanced populations must be established so that yearly harvests by fishing can be obtained. This will necessitate tests of various combinations of species of fishes and methods of stocking to determine how to get best results. Since the irrigation reservoirs are constructed on streams, the stream-fish populations influence the results. For example, in the reservoirs visited it appeared that stocking *Tilapia mossambica* gave excellent results, except where the snakehead fish, *Ophicephalus*, was present. If this is established by further investigations, then reservoirs built on streams containing *Ophicephalus* should not be stocked with *Tilapia* and other species must be found that can survive and produce large harvestable crops where the snakehead is present.

Irrigation reservoirs may be expected to be constructed in great numbers in the Northeast and in the North as these are the areas most in need of water. Research on their management is desirable. However, due to lack of personnel and the cost of extensive research on this problem, it appears best at present to undertake only limited research on the success of various methods of stocking. The following procedure is suggested:

1. Select irrigation reservoirs of various ages and sein them intensively to determine the species present and their relative abundance. For each species, the numbers and weights of fish of each inch-group should be recorded. This will establish the relative success of each species under a given condition and will enable making a more intelligent guess on methods of stocking new reservoirs.
2. Stock selected new reservoirs with mixtures of species considered desirable. At least 100 fish per hectare of each species selected should be used in these tests. These reservoirs should be checked by seining at least once each six months for several years to determine the rate of growth, the species composition of the entire fish population and the success of reproduction of each species. Periodic checks of the catch should be made to determine what fishermen were harvesting. Some of the species which could be included are:

- *Tilapia mossambica*
- *Pangasius*
- *Puntius javanicus*
- *P. laurinaudii*
- *Cyprinus carpio*
- *Clarias*
- *Catlocarpa siamensis*
- *Notopterus*
- *Leptobarbus*

The predatory snakehead *Ophicephalus* should be stocked in some reservoirs and omitted from others. Its use may be necessary to prevent overcrowding of some species. Attempts should be made to establish the freshwater shrimp, *Macrobrachium carcinus*, in these reservoirs. If successful, this would add a very important and valuable fishery.

3. When irrigation reservoirs are built in series on streams, it may be possible to arrange for them to be drained annually, or every 2 or 3 or 4 years. Periodic draining would increase fish production, but the most desirable interval between drainage would have to be determined by experimentation.
Klongs

The roadside klongs, a by-product of highway construction, are important in fisheries because of their intense utilization by large numbers of people. No information is available on their yield of fish and shrimp, and possibly little can be done to increase their productivity. However, in certain areas early restocking, stocking of more desirable or more productive species, and dams and gates to maintain water levels for more extended periods might prove desirable.

Ponds

The exact number of ponds constructed and operated for freshwater fish production in Thailand is unknown, but probably exceeds 10,000. In northern provinces served by the Chieng Mai and Phayao Fisheries Stations, there were 3,554 ponds. This is the area in which thousands of ponds could be easily constructed as water could be readily supplied by the network of irrigation canals and the soil is sufficiently tight to hold water.

In the Northeast, pond construction is a harder problem. The top soils are sandy loam, but are underlain by hardpan. Consequently, there would be considerable seepage through the top soil and dams would have to be more carefully constructed. However, the presence of a hardpan subsoil indicated that successful ponds could be built, where water was available. This area lacks an extensive irrigation canal system and much of the land is so flat that pond construction may be difficult. Provinces served by the Udon Thani and Sakon Nakhon Fisheries Stations have only approximately 1,600 ponds, and approximately 75 per cent of those near the former stations were reported to
dry up each year. It is possible, however, to raise very satisfactory annual crops of fish in such ponds. The Northeast is the area where ponds are very greatly needed for fish production to supplement the protein food supply and the possibilities in the area need more intensive study.

In most of the remainder of the country, ponds can be easily constructed and research by the Fisheries Department of Thailand has established that they can be extremely productive. Where and where more fish are needed than can be readily obtained in natural waters they usually can be most easily produced in ponds. For this reason, a vigorous program of pond fisheries research is needed. Also research in pond management is one of the principal means by which management techniques for other waters can be developed and tested. Problems for pond fisheries research should include:

1. The development of methods for culture of the freshwater shrimp, *Macrobrachium carcinus*, in ponds. This shrimp is of large size and is now harvested and sold in large amounts from rivers, klongs, swamps and ponds. Methods for spawning and culturing the young in ponds should be developed. The successful development of methods for commercial pondculture of this shrimp would be of very great importance and would probably result in its culture in ponds in suitable climates throughout the world.

2. The development of methods for spawning and culture of the catfish *Pangasius* in ponds. Preliminary tests by the Thailand Department of Fisheries indicate that this fish may be one of the most productive and efficient of all pondfishes. If this
can be established definitely, this species may become one of the principal pondfishes cultured in many countries. Because of its potential value, careful experimentation is needed to evaluate its worth, and to develop methods for its culture.

3. Testing the value of pondfishes of miscellaneous native species of fishes found in swamps and rivers. Probably more promising species of fishes for pondculture occur in Thailand than in any other country. It would be much more important to test these species than to import fish from other countries for testing. A few of those which appear promising are:

- **Leptobarbus**
- **Catlocarpio siamensis**
- **Pangasius Jaurnaudii**
- **Clarias**
- **Mystus nemurus**

4. Development of the most efficient methods of culture that can be used by pond owners in Thailand for the culture of the principal pondfishes now raised.

Fish raised in ponds must be sold in competition with fish taken from natural waters. If fish are fed, then they compete with chickens, ducks, hogs or humans for much of this food. Consequently, pondfish must be raised efficiently and at minimum cost to the pond owner. The experiments must be carefully planned, records must be kept of all feeds used, the fish produced must be accurately measured and weighed, and records of other essential costs kept so that methods of culture will be developed which pondowners can afford to use. For areas where feeding cannot be used, the number of fish to be stocked
for best production in unfertilized waters, in fertilized waters, and in manured waters should be determined. Each step in pond management which a pond owner must know for successful results should be studied in experimental ponds. At present such information is not available in Thailand for any of the species now cultured.

5. Problems requiring detailed basic research will be encountered as management research proceeds. As they arise, they should be written down. From such lists, the most important problems may be selected for research by Department Biologists and by students in Fisheries at Kasetsart University, or by biologists or chemists in this and other Universities.

**Rice Field-Fish Culture**

This could develop into a very important source of fish for food, but is practiced very little in Thailand at the present time. In areas where rice remains flooded for a sufficient length of time, research is needed to determine the best species of fish and the best species of rice to grow together, the rate of stocking, necessary changes in construction of levees, water depth and similar problems. Following this, demonstration rice paddy-fish culture tests should be established in cooperation with various villages to see if it will be accepted as a desirable procedure.

**Brackish-Water Pondculture**

Areas along the Northern part of the Gulf of Thailand furnish thousands
of acres suitable for brackish-water pond culture of shrimp and certain fishes. By appropriate research, it appears that methods of management could be readily developed to make this a profitable enterprise, especially for shrimp culture. Such a development would make usable for food production thousands of acres now idle. An experimental station on lands available to the Department at Bang Pu would be very desirable for this development. It could also develop methods for the culture of oysters, crabs, and mussels.
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Bangkhen Station at Bangkok

This station is located on the campus of Kasetsart University and there can serve as a center both for research for the Department and for the training of students in the school of Fisheries. The expansion of the University took over part of the land and experimental ponds belonging to the Bangkhen Station of the Department of Fisheries. At the present time the Station has 30 ponds, a well equipped laboratory, concrete tanks and other facilities for hatching and holding fish, workshops, and necessary equipment.

This Station, because of its location at the University and close to the main office of the Department of Fisheries, should be developed into the principal research station of the Department. There should be placed in charge a well-trained and effective research Fisheries Biologist, who is also a good organizer. In addition it should be staffed with at least 2 or 3 more well-trained Fisheries Biologists. To enable it to be an effective research Station, the number of experimental ponds should be increased to 100 as soon as possible. This will necessitate the University making available additional land for ponds to replace those it took over, or the Department purchasing suitable land as close to the present Station as possible. For proper management of the fisheries in Thailand, the Department of Fisheries must invest in adequate research to develop basic principles and management tools. The Bangkhen Station should be developed to serve this purpose for the freshwater fisheries. Most of the research
listed under "Ponds" should be conducted at this station. It should also devote space and facilities to selected phases of basic fisheries research conducted by its own staff, by students, or by cooperating specialists from the Universities. This would give the Department of Fisheries an outstanding research organization - providing it is staffed with well-trained men who "want to know".

**Bung Borapet Station**

This Station is located on Bung Borapet Reservoir. In addition to the Reservoir of 50,000 or more acres, the Station has 12 experimental ponds. Seven of these are of very little value for research as they are flooded at high water. The Station also has a well equipped laboratory, houses for laborers, boats, and other equipment.

The reservoir is created by dikes and gates which hold the water backed up into the swamp by the Chao Phrya and Nan Rivers. It is possible to open the gates and drain the reservoir. For the last 20 or more years, the Bung Borapet Reservoir has been operated as a fish "Sanctuary" and fishing has been prohibited on theory that the fish were needed to restock the rivers when they were at flood stage. Over a long period of years, a succession of biologists have investigated a variety of biological aspects of the reservoir and its fish population, little of which has been published. At present no research is being conducted at this Station. Sanctuaries for fish are to the best of modern knowledge totally unnecessary, especially in areas such as this. The Station exists at present with one man in charge, 2 assistants and 60 workmen and serves no purpose except to occasionally repair dams, cut grass and to guarantee that the fish die a natural death.
It is proposed that this Reservoir be operated on an experimental basis
to develop methods of managing this and other swamps and irrigation
reservoirs. It should be opened to fishing first and the catch measured
as accurately as possible. Then it should be drained and the fish harvested.
It should be then impounded successively for 1 year, 2 years, 3 years and
4 years. During these periods the catch should be measured, and the fish
harvested at each draining determined. Such information over a period of
years would yield information on the most productive methods of management.

Chainat Station

This Station was established at Chainat Dam on the Chao Phrya River
to study the effect of the dam on the river-fish populations. Many species
of fish congregate immediately below the dam and initially it was thought
necessary to transport them upstream for spawning. Seining, however,
showed that the same species of fishes were present above and below the
dam and they were reproducing successfully in both locations. Consequently,
the transportation of fish over the dam was shown to be unnecessary. Checks
on species composition of the populations and on the success of reproduction
of various species should be continued at least 1 more year, and then other
investigations in this area should be undertaken:

1. Krachang Culture of *Pangasiidae*.

No reliable information is available on production of *Pangasiidae* in the
floating river boxes, known as krachangs, although it is an extensive and
apparently profitable industry. It is suggested that the Biologist contact
some of those raising *Pangasiidae*, measure the krachangs, and measure and weigh
the fish as they are removed for sale.

No reliable information is available upon the most economical rates of feeding, the best kind of feed, or the amounts of various feeds required to produce a pound of catfish. Experimental krachangs could be set up on the river, and possibly in Bung Borapet Reservoir to find answers to these problems.

2. Survey of Fisheries Above and Below Chainat Dam.

Counts of fishermen, houseboats and krachangs per mile at intervals along the river would furnish statistics on the value of the fisheries in these areas.


It appeared that relatively few fishermen were fishing the impounded water above the dam. This could be due to less fish in the area, or to greater difficulties involved in fishing these deep waters. Possibly no oxygen is present in the deepest waters. Investigations might be undertaken to find where to fish and what methods of fishing gave best results.

Phaya (Chiang Rai) Station

This station is located below an impoundment on the Mae-Ing River which flows into the Mekong River. The impoundment was constructed and is operated by the Fisheries Department. It has an area of 10,000 reis (4,000 acres). No investigations are conducted on the fish population or catch in this impoundment. The Station has 25 experimental ponds with a total area of 11 reis largely devoted to raising fish for stocking ponds and reservoirs
in the surrounding area. Concrete tanks were also available for rearing fry and holding fish.

The principal fishes distributed were *Tilapia mossambica* and *Cyprinus carpio*. No records were kept on the production per rei for the hatchery ponds. These should be kept each year so that pond usage may be more intelligently planned. From a record of the number of fish delivered to ponds in the area over a period of several years, the future needs for fish can be forecast fairly reliably. Then if the average production per pond is known, the number of ponds necessary to produce the required number of fish can be allotted to each species. The remainder of the ponds can then be used for research. Studies could be made to determine rates of stocking necessary for best production in the farmer's ponds and how to manage them. It appears probable that in a few more years all the pond facilities at this station may have to be used to produce fish for stocking new ponds. Therefore, studies should be begun now on how to increase hatchery production of the principal species stocked in that area.

**Chieng Mai Station**

This is a small Station with 13 ponds, and with room for limited expansion. Since the land around Chieng Mai appeared especially suitable for pond construction, it is probable that all the available pond space at this Station will be required to produce fish for stocking new ponds and little space will be available for research.

At present, this Station is conducting much needed research on raising fish and rice together in the rice paddies. This work should be continued on an expanded scale. Principal recommendations for the Station area:
1. Expand the tests on raising fish and rice in paddies. Replicate each test 4 times because of variations in production in the check plots. Use only small fingerling fish (3 to 6 cm.) in stocking these experiments.

2. Expand these tests to cooperative experiments with village leaders in large rice fields, using both fingerling *Tilapia* and brood-sized *Tilapia* for stocking. Tests with carp should also be included.

3. Before additional ponds are built at the Station, draw up a plan for utilization of all the remaining area to prevent waste of space.

*Udon Thani Station*

This Station in the Northeast has 18 ponds with a total area of 7 ries, 8 concrete tanks and 2 nursery ponds. There is little or no room for expansion.

No records were kept on production of fish in hatchery ponds. Records should be kept to allow better planning of pond use and to develop methods for increasing production.

Experiments were being run on production of Chinese grass carp and silver carp in ponds with feeding and fertilization. No records were kept on the amount of duckweed and grass fed to these fish. The fertilizer used was recorded, but the amount of manure added was estimated. The necessity of weighing everything fed was emphasized at the Station.

Since pond space at this Station is limited, and since no experiments have been conducted in that area on the best rates of stocking *Tilapia*
mosambica or how to manage tilapia ponds, it appears that the space devoted to experiments with grass carp and silver carp would better be devoted to a study of tilapia culture. The Chinese carp are not cultured in this section, while Tilapia mossambica is the principal species raised in the Hatchery and stocked into farm ponds.

Sakon Nakhon Station

This Station is located in the Northeast on the edge of Hong Harn Lake, which is also operated by the Fisheries Department. The Station has 44 ponds with a total area of 12 reis, with room available for expansion. There are good laboratory facilities, office, and houses for personnel. This is the central office for the Northeast.

Most of the ponds were operated to produce fish for stocking. Fish were furnished for 4 provinces in Thailand and some were sent to Laos. Tilapia mossambica was the principal fish distributed, along with some carp and some Trichogaster. Seven other species were kept in ponds on the Stations, but were apparently not in definite experiments. Good records were kept on Station ponds and on ponds and reservoirs in the surrounding area. Some of this information needs to be worked up into articles which could be published in the fisheries monthly. A considerable number of ponds at the Station could be used to determine rates of stocking and managing ponds for Tilapia production as it is the principal pondfish in this area. All ponds on the Station should be managed to produce information as well as fish for stocking.

The research on irrigation reservoirs listed previously could best be handled from this Station.
**Brackish-Water Stations**

The brackish-water stations at Prachuap Kirikhan and at Phattalung on the Gulf of Thailand were not visited because of the remoteness of the Stations and a lack of time. The area for a proposed brackish-water Station at Bang Pu on the Gulf just below Bangkok was visited. It should be pointed out that the remoteness of the two present Stations makes their efficient supervision difficult and also makes it difficult to staff them with highly-trained personnel. Because of this, they should remain minor field Stations unless there are very convincing reasons for their expansion.

It appears that the development of a research station at Bang Pu for brackish-water pondculture would be very desirable. The Department has the land available, and it is in an area where a great brackish-water pondculture industry could be developed. It is near Bangkok and is on a paved road. Thus it is easily reached by car from the Main Office and from the Universities from which specialists and students may be obtained for research. This Station should have constructed about 100 experimental brackish-water ponds and should conduct research on:

1. Pondculture of shrimp. This could develop a large industry, producing shrimp for domestic consumption and for export.

2. Culture of brackish-water fishes - milkfish, sea basses, mullet, and similar species.

3. Oyster culture and mussel culture.

4. Basic studies on the fertilization of brackish-waters.

The operation of this Station should be in the Division of Inland Fisheries as it deals essentially with pondculture and the procedures are basically similar to freshwater pondculture.
THE CENTRAL OFFICE AT BANGKOK
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The administrative officers of the Department of Fisheries at Bangkok have as their primary duty the management of the public waters in such manner as to utilize, and improve the fisheries resources for the people of Thailand. This involves the making of decisions regarding a wide variety of fisheries problems. As it is impossible to make wise decisions without knowledge of the problems, a large technical staff has been developed whose primary purpose is to investigate these problems and their solution. Some of this staff is located in Bangkok and some at widely scattered field Stations. These men cannot find answers needed by the administrators until the administrator in charge assigns the problems to them for solution. This duty is that of the Chief of Inland Fisheries and the Chief of Marine Fisheries.

If the Chief of Inland Fisheries, for example, assigns to a field station for solution, the problem of "What Species of Fishes should be Stocked in Irrigation Reservoirs?", he must consider the training and ability of the men to whom the problem is assigned. If these men are well trained and experienced, they may draw up their own plan for the investigation; if not, a plan must be developed for them. In either case, the plan should be written up, discussed by qualified personnel in the Department, revised and then adopted. All those involved in carrying out the investigation should be encouraged to offer suggestions and criticisms, and should fully understand the importance of the problem. This is absolutely essential if an active research atmosphere is to be developed in the Department. An atmosphere in which a subordinate may politely disagree with his superior,
and both politely and openly discuss the problem until both are agreed on
the proper procedure, is necessary for the intellectual development of both
the subordinate and his superior officer. Besides, it results in more
effective research and saves making many a mistake.

Procedures to be followed should be standardized as much as possible
for use by all Stations so that results from various areas are comparable.
For example, if ponds are to be drained and the results reported to the
Main Office from Chiangmai and Bung Borapet, it is highly desirable that
both Stations measure and report the results in the same way. Sheets used
at the Alabama Polytechnic Institute to report such results are attached
as an example. Before adoption, sheets such as these should be examined,
criticized and revised by those who will use them. It is suggested that
key men be called in from the Field Stations to Bangkhen Station and that
recommended practices and sheets be tried out by the group and revised
to fit local needs.

In order to encourage and maintain among field station personnel the
"desire to know" which is absolutely necessary to do effective work,
frequent visits to the Stations must be made by the supervisor in charge.
Also, these men must be brought together annually at a central point, or
possibly Bangkhen one year, Bung Burapet another, etc. where they can
hear the latest development in their field, discuss problems and learn
new things. Without such stimulation, it is practically impossible for
men in isolated field stations to continue to be energetic and effective,
even in the solution of local problems which they should know best. The
men in the Department's field stations are good men, many inadequately
trained, but anxious and willing to learn. If led and helped, they can
accomplish much. If not led, they must retire into meaningless routine. These same problems exist in large organizations in all countries and must be solved by the administrators in charge.

Publications

The investigations conducted by the Thailand Department of Fisheries have resulted in much information of value not only to Thailand, but to other nations as well. For use at home the results must be reported in Thai, while for use elsewhere they should be reported in English. Unfortunately, most of the information is reported in neither way - it is filed unpublished. Workers must be encouraged and required to publish information of value - if they do not, there was no need of doing the work. To help prepare these papers and bulletins for publication, the Department should set up the office of Editor of Publications in charge of a person who knows the fisheries field and who can write both Thai and English well. He should have qualified assistants - a typist, or typists, who can type both languages, one or more assistants who know Thai and English grammar and the use of artists who can draw illustrations. He should have the responsibility of assisting the authors of papers in presenting their information effectively and accurately, and taking care of the details involved in editing and printing publications by the Department.
Conclusion

The Department of Fisheries in Thailand has exceptional opportunities for the development of both inland and brackish-water fisheries. Thailand has a large number of freshwater fishes and a freshwater shrimp which appear very promising for intensive culture in ponds and reservoirs. Certain of these may prove to be more productive and more efficient than species cultured elsewhere in ponds. Research in fisheries in Thailand can be very productive of information valuable not only to Thailand but to much of the rest of the world as well. The Department has a limited number of well-trained fisheries biologists - many more are needed. The Thailand Department of Fisheries with its present personnel and facilities has developed a sound basis for fisheries management in certain areas and has conducted some very creditable research in freshwaters and brackish-waters. The suggestions and criticisms submitted above are made with the hope that they will be valuable in furthering the program of the Department.

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H. S. Swingle
Professor in Fisheries Management and Fish Culturist in Charge of Research
Alabama Polytechnic Institute
Auburn, Alabama, U. S. A.