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Asia Aquaculture Development Plan Drafted

A working guideline for a planned and systematic development of the aquaculture industry in the Asian Region has been drafted.

"The Asian Plan for Action for Aquaculture and Small Fishfarmer Development" as the document has been named, puts down in definite terms the strategies and activities that are proposed to be pursued — collectively, and in the spirit of cooperation and mutual reinforcement of programs — by the countries of Asia to turn the Region's vast aquaculture potential into economic reality, particularly for the small fishfarmer who, as the experts who participated in the drafting of the action plan had unanimously expressed, is the key to the successful implementation of the development strategy, but has generally been bypassed.

The underlying theme of the action plan is collaboration among countries. While consideration was made of national problems, limitations, potentials, and priorities, the need was stressed for regional cooperation and the setting up of a regional mechanism through which the recommendations embodied in the plan can be translated into action-oriented programs.

Recommendations

The action plan revolves around five industry development essentials: manpower, research, extension, data base, and credit.

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"Man should be the object and subject of development plans and strategies for aquaculture; aquaculture should only be the means of such development," Dr. D.L. Umali, FAO Assistant Director General for Asia and the Far East reminds participants to the Regional Workshop on Aquaculture Development Strategies for Asia.

Status of Aquaculture in Asia

Some 68 agricultural development experts which included 52 aquaculture planners, educators, credit specialists, economists, scientists and practitioners from 9 Asian countries (India, Bangladesh, Sri Lanka, Nepal, Thailand, Singapore, Indonesia, and the Philippines) including Japan and representatives of 10 regional and international agencies, institutions and programs met at the *Regional Workshop on Aquaculture Development Strategies for Asia* held in Manila on August 6-13 to assess the status of aquaculture in 8 Asian countries, identify industry requirements for development, and formulate an aquaculture

development action plan for the Asian Region.

Foremost among the problems identified is the low level of economic development in Asia, abetted by a fast increasing population and a gradually declining marine catch.

The experts also pointed out, as a hindrance to the introduction of new technologies and to rapid development, the traditional methods in aquaculture and the lack of trained manpower, especially in research and extension.

The situation in credit and financing, as seen by the participants, is that the credit programs have failed to match

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Aquaculture Development Needs for the 3rd World

What does it take to push the development of the industry in the third world countries?

Following is a sequel to the article in last month's issue of *Asian Aquaculture* entitled, "Aquaculture in Asia, Africa and Latin America," which reports on the findings, conclusions and recommendations of the FAO/UNDP — sponsored Consultation on Aid Requirements for Aquaculture Development held in Pontevedra, Spain in June, 1978.

The official delegates to the Pontevedra meet from the Philippines aside from SEAFDEC Aquaculture Department Executive Director Q.F. Miravite and AIA Director Joseph C. Madamba who had been previously mentioned, were Fisheries Industry Development Commission Executive Director Elizabeth Samson and Bureau of Fisheries and Aquatic Resources Assistant Director Juanito Malig. We regret having inadvertently failed to mention them.

Development Needs

Manpower

In the developing countries of Asia, highly-trained research personnel are at the moment urgently needed to accelerate technological development as well as provide the technical expertise for training programs. A new breed of aquaculture workers — the subject matter specialists — are equally needed. Subject matter specialists are basically researchers with training and expertise to design and implement adaptive studies for the verification of technology and the packaging of results of such technology verification studies.

Scientific personnel for basic and applied research and specialist services can be drawn from centers of higher learning and other established institutions.

Farmers and field operatives are generally self-taught individuals but they could greatly profit from short-term courses in specific techniques, especially when improvements or innovations have to be introduced.

Technology Generation

Technology generation will be primarily done but not confined to the regional

research center. Research priorities however will be based on an integrated regional aquaculture R & D program priority to be developed by the region's leading aquaculture planners and technical experts, and revised periodically.

Technology Verification/Packaging.

The prevailing tendency among developing countries is to provide strong emphasis on technology generation and to bypass or conduct in an unorganized manner technology verification. Research results, whether indigenous or borrowed, are often recommended for adoption without the benefit of verification as to their "workability" in a given country, production setting or farming system.

Results of technology verification will then be put together into a one-story package recommendation for producers with provision for updating

of recommended techniques or systems.

Dissemination/Utilization

A crucial stage in the technology transfer continuum is the stage when the producer makes a decision on whether to use or reject the technology. While verification will considerably reduce the decision risks, it is still necessary to find out the factors that motivate farmers to adopt innovations.

Information

Information flow is needed for research, training, and extension, the major supporting services. Although the types of information needed for each of these activities differ, a unified comprehensive gathering, processing and dissemination system is necessary to meet the needs of aquaculture development. A regional aquaculture research network could be utilized effectively for this purpose.

Asia Aquaculture Development Plan... *from p. 1*

Manpower

Upgrading

The consensus among the participants is that quality of manpower at all levels needs upgrading to adequately support research, development, and training programs in Asia. Training requirements, in terms of level and area of specialization for various manpower categories i.e. educators and trainors, researchers, extension workers, producers and administrators, have been specified to match the need of each country.

Cooperation

Areas of cooperation at the national, regional and international levels are recommended as follows: (1) research by undergraduate and postgraduate students in national research institutions under joint advisorship with university faculty; (2) appointment of scientists of research institutions as part-time faculty members, and vice-versa (3) exchange of expertise and information on manpower development; (4) establishment of consortium arrangements among universities and research institutions for postgraduate degrees and training in aquaculture and allied fields; and (5) support for training programs.

Emphasis is made on the idea of a consortium with the objective of enhancing and integrating aquaculture manpower development in the region in the spirit of complementation and mutual reinforcement of national programs. In this connection, a center to coordinate the program of the consortium is recommended to be chosen, such center preferably possessing an international character.

Accreditation

The need for accreditation among training institutions is seen as a vital aspect of training specialists. This will have to go hand in hand with the need for a review of curricula both for formal and non-formal training programs.

Data Center

The establishment of a regional data center has been proposed to provide the necessary data base for effective planning and implementation of a regional aquaculture education and training programs.

The function of the data center would
(Continued next page)

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be to keep an inventory of and classify information and data on manpower and training in the region, and provide services such as literature exchange, bibliography on specific topics, translation of documents, and publication of news bulletins.

It is suggested that a center be selected that will develop and operationalize an aquaculture documentation center to collect, analyze, store, and disseminate information.

Research/Extension/Data Base

A regional mechanism is recommended for establishment through which can be transferred aquaculture technology, appropriate to rural development, which is available within the region.

Priority and research gaps in aquaculture research and development were seen as crucial especially in the following areas: feeds and nutrition, pests and diseases, seedbank technology, aquaculture engineering, and data base. Recommendation has been made to set up a network for aquaculture research in the region to tie together national aquaculture development systems and regional programs in the spirit of complementation and mutual reinforcement of such programs. Each country would provide the appropriate technology in its area of expertise for transfer to the other countries in the region.

Credit

On the role and need for credit to spark aquaculture development, the following essential recommendations have been forwarded:

There is a need for an Asia-wide study of current policies and programs in aquaculture credit to be followed by the initiation of country-specific feasibility studies.

A survey and analysis should be undertaken of the economic and financial returns of different production systems to verify the bankability of aquaculture projects.

The heterogeneity of target clientele brings out the necessity of identifying where these prospective borrowers are, their socio-economic profiles, and the types of financing suited to their needs.

A program of action for providing adequate credit support to aquaculture development in Asia has been forwarded which would consist of the following components: (1) planning for aquaculture development to achieve a rapid and well-directed development, to achieve a (2) policy support to create a suitable investment climate to offset the negative factors affecting project viability; (3) risk mitigation in the form of insurance coverage to facilitate investment in aquaculture ventures; (4) establishment of an information system for proper guidance of policy making and planning on the one hand, and for producers and practitioners on the other, with the objective of making plans and policies jibe with the aquaculture industry's actual requirements; (5) build up of data base through pilot projects to generate the economic data base for investment decisions so as to provide a clearer idea of the risks involved before launching nationwide operations; (6) promotion of farm record keeping in support of statistical accuracy and information build-up; (7) project identification, formulation, and evaluation; (8) strengthening credit supervision and extension service; (9) promotion of inter- and intra-regional cooperation; and (10)

encouraging the operation of private consultancy groups.

Related Recommendations

Planning Cycle

It is felt that planning for regional and national aquaculture development should be institutionalized. In this connection, it has been suggested that a regional aquaculture planning cycle of four years and a national aquaculture planning of every two years would be desirable.

Meeting of Donors and Participants

The need was also expressed for a meeting among interested donor institutions and participating countries in order to rationalize various activities and initiatives being carried out for aquaculture research and development so that complementation and mutual reinforcement of programs may be achieved in the development of aquaculture in Asia.

Donors' Consortium

Finally, it is proposed that a consortium be established of donor institutions for fisheries and aquaculture research and development in Asia, to be spearheaded by an appropriate and capable international institution.



Some of the 41 U.S. Peace Corps Volunteer workers who underwent a technical pre-service training program at the SEAFDEC Aquaculture Department from 23 July to 17 August. The Volunteers have been assigned to work on various areas of fishery development in the Philippines. Their training was sponsored by the Bureau of Fisheries and Aquatic Resources and coordinated and handled by the Training Unit of the Asian Institute of Aquaculture, SEAFDEC, Aquaculture Department. Since 1974, similar training activities were jointly sponsored by the Department and the Bureau of Fisheries and Aquatic Resources, which provided support, and in cooperation with the private sector and other organizations. More than one thousand pond owners, pond technicians, extension workers, aquaculturists and agency observers have already undergone training under this arrangement.



Status and Prospects of and Development Strategies for Aquaculture in India, Bangladesh, Sri Lanka and Nepal*

India

India is vast — 3,268,100 square kilometers in area, and big with a population of about 600 million. Over a 10-year period (1961-70) the population grew at the rate of 24.8 percent. Four out of five live in the rural area. Per capita protein intake of Indians is 40 to 52 grams a day. Availability of fish from inland and marine sources for the entire population is only 4.13 kg. per capita. Of the total workers, 2.4 percent is engaged in livestock, forestry and fishing.

The value added by the fishing industry to the gross national product is a little less than 1 percent.

One percent of the population is dependent on fisheries for direct and ancillary employment. National Income from fisheries is around Rs. 3,610 million out of the total National Income from agriculture of about Rs. 274,760 million (US\$1 = Rs. 8.20).

Inland fisheries resources have a potential production of 10 million tons or 11 times the current production level of 0.93 million tons; marine resources potential is 7.5 million tons or about 5 times the present level of 1.61 million tons.

Five major problems face the Indian fishery industry: (1) rising operational cost (2) slow technological adoption/lack of adequate extension facilities/lack of resource information in the offshore and deep sea areas (3) inadequate credit facilities (4) inadequate marketing facilities and (5) inadequate trained technical manpower.

Strategies for Fishery Development

The Government has given top priority to agriculture in the Development Plan.

It includes crops, animal husbandry and fisheries. The strategy adopted is to double fish production in a period of 10 years and the approach, as far as inland fisheries is concerned, is to concentrate on small water areas relevant to the rural sector as the immediate priority in view of its amenability for controlled management. The inland fisheries development programs take priority because the industry is less capital intensive and directly benefits the larger sector of the population. The current approach is to take up integrated programs of development production through crop agriculture and animal husbandry linked with an effective processing and marketing packages. The immediate need is to improve the expertise of the fish farmer by exposing him to the new technological advances through extension and education. Mobilization of credit facilities has been initiated.

Development Plans

Inland fishery development is a State subject; therefore most of the development, administration and conservation plans are kept within the purview and the execution at the State level. The important inland fisheries schemes within the State Sector are:

1. Setting up of district level fish seed farms and block level nurseries.
2. Fisheries management and spawn production.
3. Development of fisheries in silted up water.
4. Assistance to fish culturists.
5. Development of reservoir fisheries.
6. Brackishwater fishfarming.
7. Culture of catfishes, air breathing fishes, pen and cage culture.
8. High altitude fisheries development.

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Bangladesh

The fishery of Bangladesh is among the nation's most important resources. An estimated 6 million (8%) of the country's population — about 78.7 million in 1976 — derive their livelihood directly or indirectly from fish capture, culture and fish trade. As a source of food the fisheries of the country provide about 80% of the animal protein intake. Inland fishery contributed to the foreign exchange earning amounting to US\$9.52 million in 1976.

The country has a vast inland fishery resource aggregating 5.2 million ha of rivers, streams and canals; estuaries and brackishwater; natural depressions; reservoirs; pond/tanks; and, well-watered paddy fields. Territorial waters extend 22.22 km from the coast line and occupy about 14,000 sq km. Besides this, the extensive 200 miles of economic zones in the Bay of Bengal is virtually unexploited.

About 90% of the total production of the country is contributed by inland fishery of which 9% is contributed by aquaculture.

The present annual fish production of the country is estimated to be 880,000 metric tons.

Andromoun river shad *Hilsa ilisha* — exported in 1974-75 to India — is the main species found in inland rivers constituting about 30% of total

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*From the country papers presented by delegates from these countries at the *Regional Workshop on Aquaculture Development Strategies for Asia*, sponsored by the Asian Institute of Aquaculture, SEAFDEC Aquaculture Department, held in Manila and Tibauan, Iloilo, Philippines on 7-12 August, 1978.

ch & Development Notes

Sri Lanka

A small country, Sri Lanka has an area of 65,500 square km. and a population of around 14 million more than three-fourths of which live in the rural areas.

The country's GNP in 1976 was around Rs. 11,537.9 million, to which agriculture, livestock and fisheries contributed 32.1 percent, while per capita income was Rs. 840.3, both at 1963 constant prices.

Agriculture employs 2.24 million or 56 percent of the total labor force of 4 million. In 1976, fisheries contributed Rs. 167.3 million or 1.4 percent of the GNP. The industry provides direct employment for about 58,000 or 2.4 percent of the labor force and ancillary activities for some 14,000 mostly connected with marine fishing. Some 1,000 persons are engaged in inland fishing.

It is the private sector that is mostly engaged in actual fishing with public sector participation confined mainly to the provision of infrastructure facilities.

Resources

Fresh water resources is around 344,000 acres while brackish water area comprises some 300,000 acres, a total inland fishery resource of 644,000 acres or around 290,000 hectares. While there is fairly high exploitation in the brackish water areas, exploitation of fresh water areas has been confined to large man-made reservoirs and to a few small tanks. Annual fish production from inland fisheries is estimated at 49,500 tons of which 46,300 would come from fresh waters.

Development Plans for Aquaculture

The national development policies envision self-sufficiency in food production, both in agriculture and fisheries. Rural community development projects get high priority and export-oriented industries are encouraged.

Except for the stocking of lake reservoirs and ponds with tilapia and common carp which introduced 25 years ago, there has been no significant development in the field of aquaculture. Yield from capture fisheries of inland and brackish waters average about 100 pounds per acre. To

raise production from the 600,000 acres of inland and brackish waters, the following short term development goals have been identified:

1. Intensified commercial exploitation of the large fresh water tank and villus and the deep brackish water lagoons and estuaries with the objective of converting the bulk of the catch into dried and smoked fish.
2. Raising the resource levels of the village tanks, up country tanks and reservoirs and small lagoons and swamps for harvesting by subsistence fishermen.
3. Introduction of fish culture in fresh water and brackish water tanks, lakes and ponds.

Development Requirements

It is estimated that the manpower requirements for actual fishing would increase from around 2,000 in 1978 to 4,260 by 1982. Manpower required in ancillary industries is estimated at one-third of the full time employment provided by inland fish production. A scientific staff of 8 research officers and 40 fish culturists and an auxillary technical and extension staff of 32 officers will be needed for the aquaculture program. Already, one research officer and 20 fish culturists are working.

A priority research area is the development of techniques for intensive aquaculture of the Chinese and Indian major carps as well as the adoption of technologies developed elsewhere in regard to these species. There is also a proposal to conduct studies leading to the development of farms suited to the tidal region prevalent in Sri Lanka and to develop a system for breeding and culture of the giant fresh water prawn, *Macrobrachium*.

Extension centers to be set up in different parts of the country will be used for the organization of demonstrations for new staff and prospective fish culturists.

Financing of inputs is expected to be undertaken by two State banks. The Ministry of Fisheries will act as an intermediary between the borrowers and the Banks.

Nepal

Nepal is a landlocked country 146,689 square kilometers in size situated between India and the People's Republic of China.

Physically, Nepal can be divided into three main geographical regions. At the extreme north is the Himalayan region which occupies 12.6 per cent of the total area of the country. The area is mostly covered with snow with mountains ranging from 4,876 meters to 8,839 meters. The middle ranges extended from 1,524 to 4,572 meters and is made up of agriculture lands, pastures and beautiful valleys. The Terai region covers 1,280 square kilometers of alluvial plain; the altitude does not exceed 254 meters from sea level. Its sub-tropical to tropical climate is favorable for aquaculture.

The annual population growth rate has steadily increased since 1961. It is estimated that by the end of the century Nepal's population will reach 23.10 million. The growth of Gross Domestic Product, both agricultural and non-agricultural, however, has fallen short of population growth.

Aquaculture. Nepal, being a landlocked country, totally depends on maximum use of its inland waters for the production of fish. Although fish culture is a new activity in the country, there is great potential for increased fish production through the expansion of aquaculture. Added to this is the fact that fish is acceptable to every level of the population.

The main rivers of the country are estimated to offer more than 400,000 ha and lakes about 5,000 ha. A preliminary feasibility study of the mid-ridge of one of the major river systems alone, the Gandak Basin, has shown an estimated additional reservoir of 44,785 ha while the river Karnali is expected to add another 24,200 ha. Besides these possibilities, numerous village ponds of over 5,000 ha constitute a major source for immediate aquaculture development.

High priority has been given by His Majesty's Government of Nepal to the
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R & D Notes

INDIA from page 4

Resources

The inland fishery resource of India comprise tanks and ponds, lakes and reservoirs, rivers and their tributaries, and mangrove swamps. Fishponds and tanks comprise some 1.6 million ha; lakes and reservoirs 2.4 million ha. Main rivers and their tributaries have a total length of some 27,000 km. while a network of canals and irrigation channels extend to over 112,000 km.

Problems

Advances in technology have not permeated to the farmer's level. Others are the small size of cultivable water bodies in individual or group holdings which limit aquaculture to nothing more than a cottage industry, reluctance on the part of collective farming to take risks in capital investments in enterprises where economic returns are not fully established, the land lease policies which do not permit aquaculture to be taken up on an assured long term basis, and the lack of credit facilities to launch aquaculture on a commercial scale.

Financing

Institutional credit for fisheries dit is provided to cover the cost of reclamation of derelict tanks or semi-derelict tanks as well as cost of inputs such as feeds, inorganic manure, supplementary feeds, and others.

Research Concerns

In inland aquaculture, the emphasis will be on the impact of newly evolved culture techniques on the long term production potential of aquatic biotopes. Further improvement in yield per unit area along with an integrated approach with recycling of organic wastes to raise fertility of cultivable waters will be continued. Main thrust in brackish-water and coastal aquaculture will be the development of low cost technology for intensive culture of suitable organisms in different ecological systems side by side with a survey of the seed resources and location of suitable sites for undertaking culture operations. To improve

Requirements

Manpower needed for the next ten years considering the research and development needs in the broad field of aquaculture is some 5,000 persons which would include research and teaching personnel, technical and managerial staff, engineers, economists, statisticians, and extension workers. In regard to facilities, the Freshwater Aquaculture Research and Training Complex being developed in Dhauli at a total estimated cost of Rs. 30 million will greatly help in answering the needs of the foreseeable future. Likewise, it is estimated that in the field of mariculture research, training and demonstration — for which a Center for Advanced Studies in Mariculture is also proposed to be established.

BANGLADESH

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inland production. The giant prawn *Macrobrachium rosenbergii* and the shrimp *Penaeus monodon* are the main species being exported. Frozen legs of frog (*Rana tigrina*) is another item of export. Frozen shrimps constitute 91% of the total fishery export in Bangladesh. Shrimp and other fish products are exported to Japan, U.K., U.S.A. and Europe.

Although fish culture is a very old practice in the country, the average current production per unit area is still very low. In fertilized ponds, a production of approximately 1625 kg per ha per yr has been obtained while in unfertilized ponds, the production does not exceed 600 kg per ha per yr. In oxbow lakes, the production is even lower, yielding only 400 kg per ha per yr.

Inland fisheries in Bangladesh faces the problem of overfishing due to the demands of its ever increasing population. The construction of flood control embankments and irrigation, use of pesticides, release of harmful effluents from industrial plants, etc. adversely affect production of fish in natural waters.

Because of this and to meet the acute shortage of animal protein in the country, the Government has directed an all out effort to develop aquaculture within a reasonably short period.

The effort is a combination of intensification of manpower development, labor-intensive programs and arrangements for assistance in providing credit

facilities to develop and integrated rural fish culture program. A notable labor-intensive program involves the reclamation of derelict water bodies in rural areas. Government-owned impoundments after development are assigned to the cooperatives formed by the landless of the locality.

Research and extension, on the other hand, are perceived to be most needed in the areas of freshwater and brackish-water fisheries, biological and limnological investigation of lakes and other inland water bodies, fish disease and control, water pollution and fish fertilization. Studies in brackishwater fish and shrimp farming are yet to be undertaken.

Bangladesh is focusing on production-oriented and problem-oriented training activities by increasing its extension workers and enhancing in-service staff development as well as conducting short-term training for fishermen. Formal training up to the Ph. D. level is being undertaken.

NEPAL

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development of aquaculture. The Five-Year Plan (1975-1980) envisages a production target of 5,240 tons of fish per year with the end in view of increasing per capita consumption of fish to 382 grams (from 218 grams) by 1980. This is to be achieved through intensification of fish culture in both the private and public sectors and by developing natural bodies of water, especially lakes and reservoirs.

To meet the targets set by the government, the following steps are planned:

1. Giving full government support to small as well as large scale fish production operations in the private sector.
2. Providing training to extension workers and private sector producers.
3. Carrying out production oriented studies by establishing new public sector demonstrations or experimental fish farms in potential areas of the country.
4. Disseminating the techniques developed for increased production.
5. Integrating fish culture with related animal husbandry like duck
6. Establishing infrastructures such as chilling and curing facilities
7. Providing adequate credit

Status of Aquaculture ...

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the socio-economic profiles and financing needs of the clientele, heterogeneous as they are, in the first place; that there appears to be a conflict between borrower and lender in respect of credit terms and conditions governing credit, owing mainly to the lack of viability criteria; and that thrusts of credit delivery are fragmented.

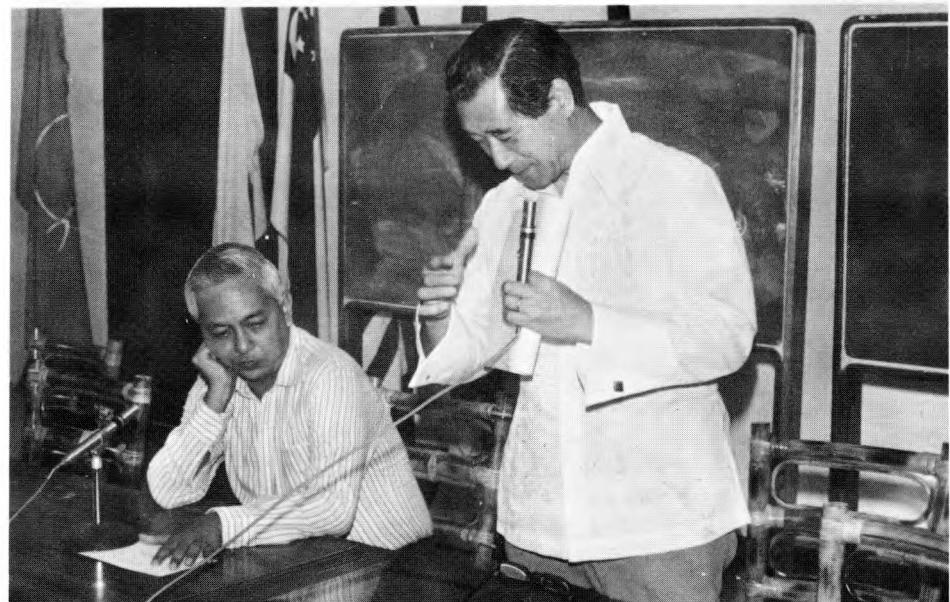
It was also observed that the lack of institutions at the grassroots seem to dominate the aquaculture industry, which confirms the opinion that there is no existing effective link between policy makers and the fish farmers.

Eight country papers (Nepal, India, Bangladesh, Sri Lanka, Singapore, Thailand, Indonesia, and the Philippines) and five resource papers were presented.

The resource papers were on the following topics:

Aquaculture Development in Asia: An Overview, discussed by Dr. T.V.R. Pillay, FAO Global Aquaculture Development Program Coordinator; *Aquaculture Development for the Rural Poor: Past, Present Trends and Future Considerations*, by Dr. Aida Librero, Philippine Council for Agriculture and Resources Research Socio-Economics Division Director; *Aquaculture Manpower Training Program for Asia*, by University of the Philippines College of Fisheries Dean Rogelio O. Juliano; *Aquaculture Research/Extension Programs for Asia*, by FAO Regional Fisheries Officer for Asia, Domingo D. Tapiador; and *Concepts for Change Agents in Rural Aquaculture Development*, by Dr. J.D. Drilon, Jr., PCARR Director General and Southeast Asian Center for Graduate Studies and Research in Agriculture (SEARCA) Director General.

The international and regional agencies and programs represented in the workshop were: FAO, UNDP, Asian Development Bank (ADB), U.S. Agency for International Development (USAID), International Center for Living Aquatic Resources Management (ICLARM), International Development Research Center (IDRC), FAO-UNDP South China Sea Fisheries Development and Coordinating Program, FAO Indo-Pacific Fishery Development Commission, SEARCA, and SEAFDEC. Progressive private fish farmers from the Philippines also participated.



Dr. Juichi Katoh (standing), principal lecturer of the recently concluded three-week workshop on fishpond engineering, wraps up the course while AIA Director J.C. Madamba listens. Thirty-two participants which included pond owners/operators, pond technicians, teachers of fishery schools, and government extension workers attended the course conducted at the SEAFDEC Aquaculture Department main station in Tigbauan, Iloilo and the experimental ponds in Leganes, also in Iloilo. This was the third fishpond engineering workshop conducted by the Department with Dr. Katoh as principal lecturer. Katoh-san is with the Laboratory of Environmental Science and Technology, Tokyo University of Fisheries.

Keynote

Keynote speaker was Dr. Dioscoro L. Umali, FAO Assistant Director General for Asia and the Far East.

Dr. Umali warned the delegates of the urgency to develop new productive capacities in the face of deteriorating per capita food production in most developing countries which, he said, is complicated by widespread poverty in the Region.

He said however that Asia has the potential and the budding capacity to launch what he termed a "blue revolution" or the intensified and sustained production of aquatic food resources which is equivalent to the "green revolution" in the production of grains, particularly paddy rice.

Positive Bias

Dr. Umali warned, however, of the need to avoid the mistake of considering fisheries and aquaculture as the object and subject of development.

"Man," he said, "should be the object and subject of development plans

and strategies for aquaculture." "Aquaculture should only be the means of effecting such development," Umali stated.

Taking the cudgels of the small fish-farmer, the FAO official appealed for a positive bias towards the rural poor. They should be directly involved in grass roots planning and evaluation of programs and projects for them, he said.

The workshop was sponsored by the Asian Institute of Aquaculture of the SEAFDEC Aquaculture Department in cooperation with the Food and Agriculture Organization, Southeast Asian Regional Center for Graduate Studies and Research in Agriculture, Indo-Pacific Fisheries Development Commission, South China Sea Programme/FAO/UNDP, Philippine Ministry of Natural Resources, Philippine Bureau of Fisheries and Aquatic Resources, Philippine Council for Agriculture and Resources Research, the Fisheries Research Society of the Philippines, and the Philippines' Technical Board for Agricultural Credit.

"Sugpo" Raised in Fresh Water Pens

The successful farming of the Jumbo Tiger Prawn or *sugpo* in freshwater pens at Laguna de Bay has been demonstrated at the Freshwater Fisheries Station of the SEAFDEC Aquaculture Department in Binangonan, Rizal, Philippines.

This was announced by Natural Resources Minister Jose J. Leido, Jr. during the commemorative rites marking the first year anniversary of the signing of Presidential Proclamation No. 1658 reserving 47 hectares at Binangonan, Rizal and initiating the establishing of the SEAFDEC Station on the site.

Leido said that the breakthrough is contained in a report submitted by the SEAFDEC to President Marcos through Director Felix Gonzales of the Bureau of Fisheries and Aquatic Resources and concurrently SEAFDEC Council of Directors Chairman, and Minister Leido. The research results are conclusive, according to the report.

The stocking density of the prawn fry cultured in the lake, which came from SEAFDEC hatcheries and nurseries in Iloilo, was gradually thinned out in the cages over a period of five months, with the final stocking rate of 35 harvestable prawns per square meter or around 350,000 per hectare. The prawns weighed from 40 to 50 grams each.

Interestingly, the lake-cultured *sugpo*, typically greenish black in color, turned golden brown upon harvest. This is expected to enhance the export value of the species.

Natural nutrients found in the lake were the primary course of fed for the *sugpo* although concentrated supplemental feed pellets —also extracted from raw materials in the lake— were fed to the prawn which registered a conversion

rate of 2 kilos of feed per kilo of prawn meat. The feed pellets were developed by SEAFDEC experts who said that the cost per kilo would range from about ₱2 to ₱3.

The SEAFDEC report to the President also contained an announcement on the remarkable gains obtained from the intensive culture of *tilapia* at the SEAFDEC fish cages also in Laguna de Bay. Results showed that a 200-square meter cage yielded one ton over a period of five months or a projected yield of 120 tons per hectare per year.

The *tilapia* were given supplemental feeds with raw materials also extracted from the lake and fed at 10% of its body weight everyday. The feeds cost ₱0.45 per kilo and the feed-meat ratio is 4 to 1.

These two aquaculture research and development advances, Leido said, definitely were another milestone in the drive to produce more protein foods and generate better income opportunities for the rural people. The technologies must be quickly brought down to the farmer's level, Leido urged the SEAFDEC aquaculture experts.

ADB Approves Assistance for Sumatra Fisheries Project

The Asian Development Bank has approved technical assistance to study and prepare a proposed high priority integrated fisheries development project for the island of Sumatra, Indonesia.

The first stage of the Bank's technical assistance — to be carried out under cost-sharing arrangements with FAO — will involve a comprehensive study of the fishery sector in the Sumatra Region, including a review of overall fisheries development in Indonesia.

This will include an examination of fisheries resources, practices, infrastructural facilities, marketing mechanisms, manpower needs and institutions. The first stage study will also look into appropriate institutional arrangements, particularly for the development of small-scale fisheries and identify potential projects — including the proposed Sumatra Fisheries project — and their relative priorities.

Based on the discussions of the findings of the first stage study between the Indonesian Government, the Bank and a six-man team of FAO experts who will carry out the study, the second stage of the Bank's technical assistance will be to prepare a feasibility study of an integrated fisheries development project in Sumatra aimed at the development of both marine and inland fisheries, as well as fish farming.

The Indonesian Government has accorded high priority to development of the fishery sector which, despite its potential and relatively production growth in recent years, is still at an early stage of development. The proposed project would help small-scale fishermen and fish farmers improve their socio-economic condition and provide employment opportunities, as well as increase fish production for domestic consumption.

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EDITORIAL ADVISERS

D.K. Villaluz Q.F. Miravite
R.S. Ignacio J.M. Garay
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T.G. Flores

EDITOR

Pedro B. Bueno

EDITORIAL ASSISTANT

Nick Primavera, Jr.



**Asian
Aquaculture**

P.O. Box 256
Iloilo City 5901, Philippines