"Aquatic Resources"

Role played by NARA

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The National Aquatic Resources Research and Development Agency (NARA) is a multi disciplinary research and technological organization functioning under the Ministry of Fisheries and Aquatic Resources Development. The major objectives of the Agency is to promote and conduct research activities towards identification, management, development, control and conservation of Aquatic Resources of Sri Lanka, both living and non-living in Marine and Freshwater.

NARA has established activities in the fields of Marine Biological Resources, Inland Aquatic Resources and Acquaculture, Post Harvest Technology, Oceanography and Hydrography, Fishing Technology, Marine and Freshwater Environmental studies, Fisheries Socio-economic and Marketing.

NARA is the only research institution in Sri Lanka which has within its mandate the task of conducting research to provide scientific information for decisions to be taken on integrated coastal resources management.

Research on environment and natural resources in the coastal zone requires a multidisciplinary approach where the research divisions of NARA are capable of undertaking.

NARA at present has a total of 40 research scientists in various disciplines. It is again a relatively young research organisation with many young research scientists and there is need to further improve NARA's capabilities in undertaking cross cutting research.

As far as most of our coastal fisheries are concerned, what is now needed is appropriate management based on data on landings and catch per unit effort which is of crucial importance to efficient management. As coastal stocks reach critical sustainable production levels, good catch and landing data become extremely important to meet over exploitation and to solve problems. NARA for the past 10-12 years has given high priority for collecting information around the country for two major fish groups; small pelagics and large pelagics. Small pelagics include small fish varieties living in the coastal water column and surface waters (Eg. mostly Sardines - Salaya, Hurulla etc.) - where as large pelagics include fast swimming big fish species such as Tunas, Sharks and Bill fish.

Research made on Bio-Socioeconomic assessment of the small pelagic fisheries has provided several alternate management options needed for the reduction of the number of fishing boasts, recommending minimum mesh sizes to prevent catching of juveniles, prohibition of catching some fish species carrying eggs. Other studies conducted on sensitive habitats such as coral reefs has resulted in the restriction on export of fish species and the establishment of marine sanctuaries.

The lack of accurate information on the offshore resources has been a major constraint in the development of offshore fisheries. Fisheries resource survey launched by NARA under the funding of ADB to collect information on the migratory pattern and spatial distribution of large pelagics (Tuna, Shark, Bill fish) within the Exclusive Economic Zone of Sri Lanka will provide sufficient information for the management of migratory large pelagic resources.

One area where future development is possible is the demersal fisheries or the fish living close to the sea bottom (Eg. Groupers). Larval and Juvenile stages of some demersal finfish species and shell fish species enter lagoons to complete a part of their life cycles. Subadults move to the sea and get the shelter in coral reef areas, muddy bottom areas, rocky bottom areas, in the continental she or even move to deeper water on continental slope. NARA is now developing fishing methods suitable to harvest these valuable under - exploited resources.

Inland Aquatic Resources and Aquaculture Division is vested with the responsibility of management and sustainable utilization of inland water bodies and the development of new aquaculture technologies, environmental assessments and management of inland aquatic habitats in the country.

The main research and development programmes cover, Environmental Assessment and Management in aquaculture development, verification of culture technologies for shrimp, molluscs and brackishwater fish, and Artemia (Brine Shrimp). Regional research centers at Negombo and Kalpitiya will cover experiments on crab fattening and sea cucumber culture techniques. Research programmes on disease control, effluent treatment in shrimp farming systems, breeding of endemic ornamental fish species are also given high priority.

Another priority area is the ornamental fish industry, which has a great economic, social and ecological significance. Surveys on target species, coral reef habitats for marine ornamental fish and streams in hinterland for fresh water ornamental fish are now under way to provide baseline data and to assess exploitation rates. Such surveys, together with the monitoring of catches and export statistics should provide the basis for developing management strategies. During the last 03 year period, NARA has trained 500 - 600 people in the area of ornamnetal fish culture and breeding.

In Sir Lanka a significant potential exists for sea farming and aquaculture. Haphazard development of aquaculture which is confined to the north - west coast of Sri Lanka has created major problems in the coastal area. The main issues regarding shrimp farming are the reduction of water quality (for farming and drinking) spreading of diseases, conflicts with

traditional fisheries and users of wetlands. NARA is heavily involved in finding a solution to control the spreading of white spot disease among shrimp farms which has affected the industry adversely.

In the recent past, brackishwater shrimp culture industry has expanded very rapidly. Large extents of land has been converted into shrimp farms. According to statistics available 933 Mt. of shrimp were exported in 1992 and 958 Mt. in 1993 Although the difference is 23 Mt. large number of new shrimp farms were developed during this period. If the production does not increase with the expansion of the farming area, it indicates that the maximum carrying capacity of the environment has been reached and it further shows that future expansion in this area is not viable.

Research conducted by the environment studies division involve agricultural input to the inland and coastal water bodies, accumulation of heavy metals in aquatic fauna and flora, pesticides and agrochemical accumulation in fresh water fish, and effects of industrial activities on water quality. Evaluation of environmental impact assessment reports and technical evaluation reports for major development projects are also conducted by this division.

Institute of Post Harvest Technology conducts research to ascertain and improve post harvest technology applicable to the aquatic resources. The introduction of new products, both food items and support products from locally available under-utilized or unutilized low valued fish (trash fish), molluscs and seaweed using appropriate technologies.

NARA researchers are now trying to pass on their research findings to the industry to produce both nutritious and low cost consumable items, convenient fast food and other products. Researchers of the Post Harvest Technology Division is also trying to find ways and means of using small pelagic fatty fish and waste to extract oil for food and feed purposes while developing technologies for producing food for farm shrimp and fresh water fish using locally available raw materials thus introducing methods of self employment.

National Hydrographic Office of NARA conducts detailed hydrographic surveys of inshore, near shore and offshore waters, up to the outer limit of our Exclusive Economic Zone, as well as of inland water bodies. These survey results are used in the production of nautical charts and fisheries charts, which will be used for educational research, management and navigational purposes.

Research work of Oceanography division of NARA mainly covers oceanographic parameters in coastal waters and logoons. These include monitoring sea level changes, current measurements, wave action, tides and salinity levels. Steps are being taken to set up a National Oceanographic Data Center (NODC) in NARA.

Fishing Gear Technology is a science which is not highly developed in Sri Lanka. As it is not a subject covered by Sri Lankan universitites, it has become difficult to find qualified researchers to develop this division. Recent activities of this division include the successful demonstration of inshore Fish Aggregation Devices (FADs) and shelter areas called "CASITAs" for spiny lobsters.

The research vessel "SAYURI" recently commissioned is now engaged in Oceanographic and Hydrographic activities in our waters. This vessel was given to NARA under GTZ funding and recently was able to produce the first updated map "Entry to Colombo Harbour" based on the recent surveys.

without feeding the fish. Natural fertilization of these tanks due to grazing cattle and decaying vegetation enrich the water leading to the formation of fish food organisms.

Farming of freshwater prawns in ponds either under monoculture or polyculture along with fish will increase income of the pond fish farmer. Prawns can also be stocked in seasonal village tanks. Back yard hatcheries will be established in coastal areas for the production of freshwater prawn seed.

Coastal aquaculture and sea farming

Farming of high value fish and prawn species in coastal areas and in marine waters on pilot scale will be undertaken and private sector investment in these fields will be promoted. Already about 2,400 ha. of shrimp farms have been established in the North Western Province, by the private sector. About 24,000 ha. of lands suitable for coastal aquaculture are available in the country. There is considerable potential for crab farming. Culture of molluscs, marine fish species and sea weeds in coastal areas for export will generate alternative employment for coastal communities in addition to bringing much needed foreign exchange to the country.

Training and extension

The Aquaculture Development Division will undertake training and extension programmes for popularization of aquaculture in the country. The farmers, fishermen and government officers will be given training in seed production, freshwater fish farming, sea farming management and regulation of inland fisheries. Action will be taken to set up 12 regional aquaculture extension centres in different parts of the country. These centres will be headed by a regional aquaculture extension officer who will be in charge of training, extension, regulation, management and development of aquaculture in inland and coastal areas.

The method of collection of statistical data on inland fisheries and aquaculture will be improved. The national aquaculture and inland fishery production will be from reservoirs, lagoons and aquaculture farms. Species-wise collection of production statistics from different aquaculture systems will be introduced. The shrimp farms will be closely monitored in collaboration with the private sector, with a view to establish a data base on their distribution and production.

A programme for management of aquaculture environment has been already launched with the assistance of FAO. Proliferation of unauthorised shrimp farms and discharge of farm effluent water to the environment without treatment will lead to production losses due to diseases. While action will be taken to create awareness on environmental issues, the disease diagnostic facilities will be strengthened and made available to the farmers.

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population but in real terms it may be double or even greater, if it is based only on the country's non-vegetarian population. However, the proportion of non-vegetarians is steadily increasing in the urban areas and a significant increase in demand and price of fish is already evident.

Overcoming the constraints in the supply of fish, meeting the domestic demand, increasing exports and increasing the contribution by the fisheries sector to the GDP, depend on attention given to major issues such as the following:

(a) Considering the prevailing political will, economic conditions and the achievements in the area of fisheries management in this region, it is more likely that the progress in the developments referred to above may get closer to the goal, between 2005 and 2010. More efforts than those until now will be required to attain that target and to sustain it. These efforts should focus on reorganization unification, collaboration and strengthening of the various fisheries and fishery related units, creation of new units, engaging in specific development and management oriented research, planning of the development programmes in their entirety (not piece-meal), establishing revising legislation, to enable it to adopt new approaches to rational development of aquaculture, protection of environments, integrated coastal management as well as community-based management/co-management.

(b) Changes in the traditional fish-eating habits and in the demand for selected species and creation of demand for new fish species and new fish products from the resources of non-traditional fish/shellfish species that are available, must be achieved. The demand and preference for freshwater species should be increased to equal that for marine species, as in the ASEAN region. This would also involve extension work for popularisation of cooking recipes ideal for freshwater species.

(c) The accelerated implementation of liberalisation of trade and deregulation policies in the SAARC countries will facilitate and significantly expand fish trade within the region. A collective approach within the sub-region, will be favourable for exporting to other sub-regions, certain kinds of fish and fish products for which there is very strong competition from many nations outside this sub-region.

(d) Measures to increase private sector involvement in the development of offshore/ oceanic fisheries, in brackish- water aquaculture, mariculture, proce- ssing and marketing of fish and fish products, including exports and imports.

(e) Amendments to the NARA Act to strengthen its structure and function as a fisheries management oriented research institution as well as to strengthen co-ordinated fisheries research capabilities of the divisions within NARA and also among the institutions - NARA, Universities and other organisations, conducting fisheries related research, in Sri Lanka. Approval of national level fisheries research programmes for each subsector, for execution by all the national institutions engaged in fisheries related research. This is to ensure implementation of fisheries research projects according to the priorities of the industry, specialities available in each institution and to avoid/reduce duplication and waste of scarce financial and skilled manpower resources (Sivasubramaniam, 1995).

(f) Though responsibility for the protection of the aquatic environment, conservation of water and the life in them, prevention of pollution by domestic and industrial wastes and maintenance of the quality of such environment rests with the National Environment Authority, it is vital that very stringent regulations providing for very severe punishment for offences, should be made under the relevant provision in the Fisheries and Aquatic Resources Act of 1996. This is essential, and important for smooth and efficient management, development and expansion of fisheries activities, without interruptions due to limitations in the regulatory mechanisms that are external to the fisheries ministry.

(g) Regulation of private sector investments, should be stringent enough to prevent offences such as damaging the environment, breach of foreign exchange regulations and most importantly, failure to maintain the expected quality standards which erode the confidence of importing nations. All the coastal nations in this region, except Maldives, have been listed for exporting bad quality fish products to the United States of America.

The private sector should be the main partner to contribute to the development of capital intensive subssectors in fisheries. With the need for better shore facilities for multiday fishing boats and for maintaining the quality of exported fish items, the infrastructure facilities have to improved and expanded. Since the States cannot afford to provide funds for more of these facilities and their continued maintenance, the private sector owners of offshore fishing craft, must pay rental for the use of existing harbours and other facilities provided by the State.

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