SYMPOSIUM ON COASTAL AQUACULTURE

A seven day Symposium on coastal Acuqcuture was organised by the Cochin based Marine Biological Association of India in Cochin from 12th to 18th January 1980.

The symposium was inaugurated by Mr. K. C. Abraham, Governor of Andhra Pradesh on 12th January. Dr. E. G. Silas, Director, Central Marine Fisheries Research Institute in his capacity as the President of the Marine Biological Association and General Convener of the Symposium welcomed the large number of participants and invitees. Dr. Raghu Prasad, Vice-President of the Association and Asst. Director General (Fisheries) Indian Council of Agriculture Research outlined briefly the activities of the Association. Highlighting the importance of aquaculture, Dr. Prasad informed the gathering of the technological advances achieved in recent years. Felicitatory speeches were delivered by Mr. K. Balachandran, Mayor of Cochin and Mr. Philippose Thomas District Collector of Ernakulam. Dr. P. V. Ramachandran Nair, Secretary of the Association proposed a vote of thanks.

Inaugurating the symposium, Mr. K. C. Abraham said:

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"I am doubly happy to be here this morning; happy that I am amidst the august company of scientists, technologists, educationists and administrators drawn from the different parts of the country and outside and happy that I am in the midst of most familiar surroundings which are exuding Nature's Wealth. When I utter the words "Natures Wealth", I am nostalgically reminded of my intimacy with the sea where "the wild white horses are at play" on the surface. Beneath this surface, to unfathomable depth, bounteous Nature treasures its wealth, ready to be purveyed to the mankind. It is for man to harness this treasure to the benefit of one and all. It is in this context, pursuit of Aquaculture acquires considerable importance.

2. Inquistitive and interrogative as one is, one is inclined to ask what benefits such a pursuit confer on the society. To find a answer to this thought provoking question, one will have to look not at the sea but at the land upon which man lives and multiplies. With population multiplying with march of time, the need for food for sustenance increases simultaneously. In an effort to meet this increasing need larger and larger areas of land are brought under the plough. Incessant research is carried on to the increase the productivity of land. This has resulted in the replacement of conventional varieties of seeds by high yielding varieties. Irrigation potential is being exploited to the maximum with a view to eonverting dry lands into wet lands and increasing

agricultural production. These efforts are not without constraints and, production also cannot increase limitlessly. Man should therefore, turn to other resources to meet his demands. Nature which has endowed man with fertile lands, again comes to his rescue by providing plentiful resources in water, in rivers, lakes and oceans. Aquaculture is the Golden Key which can open the coffers of oceans and rivers for man to enjoy and prosper.

3. Man has been exploiting land to the fullest extent resulting in gradual depletion of its ferility. Food produced by land is becoming less and less nutritive. Studies have revealed that food from land is deficient in proteins. Malnutrition is the cause of many dreadful diseases. To a person suffering from such diseases, life is listless and burdensome. He will not be able to play his part in the world and contribute his mite to the welfare of the society. Instead, he becomes a pain in the neck of the society. Such a situation should be averted, by gearing human efforts towards securing protein rich food. Nature again offers man a helping hand by making available to him protein rich food in the vast stretches of sea. Aquaculture enables man to have access to this highly nutritive sea food.

4. It is time that attention is bestowed on the study of coastal resources. "Full many a gem of purest ray serene, the dark unfathomed caves of the ocean bear". It is reported that some of the world's most abundant fishing grounds yield an annual harvest of 10 billion dollars. May I digress a little from the subject to remark that as the world grows short of fossil fuels attention is being focussed increasingly on the oil and natural gas resources of oceans. Already about 20 per cent of the world's oil comes from off shore wells and this figure is likely to shoot up in the coming decades as the energy squeeze tightens. A recent U. N. study puts the amount of oil in the continential margins at a staggering 2,272 billion barrels. There is also coal and iron, tin, limestone, sulphur, barium ore and diamonds, resources which yield a few hundred million dollars annually on a global basis. What an enormous wealth the sea stores underneath its surface!

5. The question arises whether man has taken full advantage of these hidden resources for his betterment. The answer is in the negative undoubtedly. Restricting statistics to aquaculture it is estimated that out of 440 million hectares of coastal wet land in the world. only 3 to 4 million hectares are presently used for culture purposes. In India there are about 2 million hectares of estuaries and brackish water areas potentially suited for aquaculture. Of these, only 5,000 hectares in Kerala and 20,000 hectares in West Bengal are utilised for traditional brackrishwater fish and prawn culture. Presently, over 60 countries in the world have focussed their attention on acquculture producing six million tonnes annually valued at 2.5 billion dollars which constitute about 8 percent of the total world fish production. Figures justify the observation that in the field of aquaculture utilization is a small percentage of the available resources. Now that it is admitted that man should turn to sea to fill up the gap in production of nutritive food the question troubling man's mind is how to make maximum use of these resources? What measures should be

taken up to achieve this objective? There is no better forum than this intellectual gathering to discuss the question threadbare, deliberate upon it and offer concrete and constructive suggestions which can be implemented and the rewards reaped.

6. Notwithstanding the fact that I am remotely competent to comment on this highly technical subject, I like this opportunity to express my, — a layman's—views on the subject. Aquaculture as understood by a non-technical person is farming of animals and plants in aquatic media. It can be considered as a branch of animal husbandry if the latter term is used to include both the rearing of domestic animals and the harvesting and management of wild game. Fish culture is the most important aspect of aquaculture. Fish culture can be broadly divided into the following sectors:

1. Growing fish for consumption
2. Stocking fish in open waters
3. Improvement of the habitat
4. Regulation of fishing for best yield.

Fish for consumption can be grown adopting one of the following methods: (1) Pond culture in temperate climate (2) Tropical pond culture and (3) Brackish water pond culture.

7. Rivers offer plenty of scope for pond fish culture. In China, along the YANGTZE River there exist 1,800 shallow flood-plain lakes covering eight million acres which are controlled to varying degrees for fish rearing. An intensive investigation of other major rivers the world over is called for with the object of expanding pond fish culture. A rapidly developing branch of tropical and warm temperate fish culture is the use of rice fields for growing fish! Most rice paddles produce a few wild fish, grown from fry brought in with the irrigation water. By suitable stocking and fertilising, large yields can be obtained from various crops. The potential fish production of the world's rice fields is enormous. Even though this Symposium is only on "Coasta. Aquaculture" advantage can be taken of the experience of experts to discuss all aspects of aquaculture without confining it to the coastal areas, so that a clear picture on the prospects of acquaculture will emerge, faciliting formulation of comprehensive schemes.

8. Brackishwater pond culture has immense potentialities in marshy and river delta areas. Most of the fishes used in this technique are of marine origin; they breed in the sea but the young seek brackish or even fresh water. In southern France, along the upper Adriatic Coast of Italy, in India, Indonesia, the Philippines and Japan, there is ample scope for conversion of river deltas into such fish rearing establishments. How best this area can be enlarged and the annual catch increased are issues which can be discussed at length at this Symposium.

9. There is much scope for additional improvements in hatchery techniques. Experiments were conducted with cohoes at Minter Creek in Washington. It has found that native stream reared smolts produced 5 to 15 times as many adult fish as pond-reared smolts of the same stock, Improved diets or other changes should gradually eliminate this differential. It is gathered that transplanted fingerlings do not return to a stream nearly as successfully as fingerlings of the native stock even when the two are similarly reared and

similarly treated. The causes and full implications of the phenomenon are not known clearly - have the missing fish gone some where else or have they perished?

10. Introduction of new species into the existing breed with the intention of improving growth offers ample opportunities for research and development. Success can be measured with reference to the variety and abundance of the native fish farms and an equation established.

11. Changes in lakes and streams and construction of fish passes and screens are some of the methods adopted in improving the habitat of fish. But to any mind, the most important method is the one pertaining to reduction of mortality from predation. There are numerous kinds of animals which compete with man in consuming useful fish. Quite often predators attack usable fish concentrated in limited areas. For example, sea lions may follow a trawler and take salmon off the line; grey seals can very skilfully rob pond nets, an abundance of dog-fish makes trawling difficult, kingfishers and herons gorge on trouts from unprotected ponds and so on. Methods should be so chosen that they do away with the predators without killing fish. Sometimes, it appears, treatment of water with a poison in the correct concentration kills the young predators without harming fish. Different kinds of predators may require different methods of treatment under different conditions. A thorough study is necessary for arriving at methods for different situations. This Symposium can serve as an eye opener for tackling this problem exhaustively by offering valuable suggestions which could be experimented with.

12. Yet another important aspect of fish culture is the framing of regulations to obtain best yields. The objectives of the regulations should be two-fold: (1) to make best use of a stock of fish already in existence and (2) to provide a maximum supply of future recruits. An indepth study of the problems pertaining to exploitation and yield is necessary in order to frame appropriate regulations. These problems no doubt are numerous. For instance, during the cycle, the individual fish may become large enough to be useful to a man. However, if the year class is still increasing in bulk it may be desirable to wait and begin harvesting when a larger total weight is available. But, harvesting should not be delayed too long or the year class will have passed into the declining phase. The question that arises for consideration is when should the fish be harvested? What are the factors relevant to best exploitation of the existing stock? Likewise in order to have adequate recruits year after year, the spawning stock must not be allowed to become too small. The question is how small is too small? Can a spawning stock be too large? In view of little understood variability in survival of fish eggs what should be done about in maintaining a spawning stock? What absolute number of spawdners in each stock will give the best average yield? It is for all of you who are assembled here to ponder over these and allied questions, exchange ideas and offer prgmatic suggestions for maximum yield.

13. While accent should be placed on aquaculture for increasing the production of sea foods, we should take care that the existing stock is not depleted by indiscriminate fishing and irrational fishing methods. Sea is no doubt bounteous but not without limits. As

indiscriminate sinking of wells will deplete ground water resources, so is the case with the resources of the sea, Between 1951 and 1971 the global fish catch quadrupled. But many stocks have been depleted by overfishing. Scientists report that there have been drastic decline in the catches of certain species of herring, cod, sardines and salmon. It is for the experts who are present here to highlight the hazards of over-fishing and enlighten those who have taken fishing as an occupation, on these aspects of fishing. They may do well to prepare lucid, concise handouts couched in non-teachnical terms for the benefit of one and all.

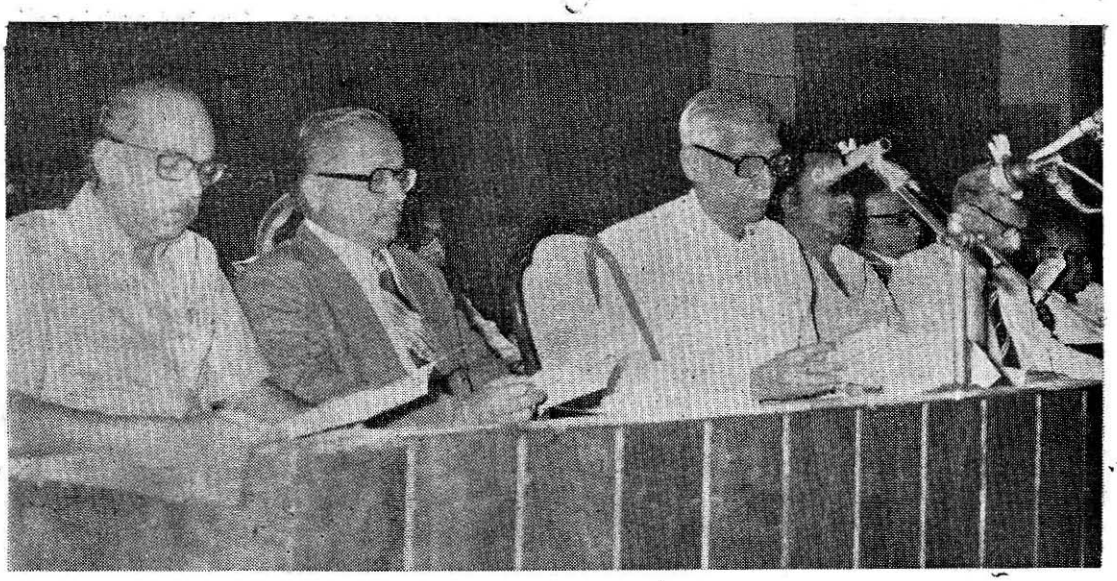
14. While on this subject, ones should take note of the problem of pollution caused by rapid industrialisation. The Baltic, Mediterranean and Caspian Seas already are so polluted that marine life is severely threatened. Many scientists fear that if such onslaughts continue unabated, the oceans' regenerative capacity will be eventually destroyed. Sea is being used as a global garbage dump for a variety of human ana industrial wastes with scant regard for the effect on the oceans' ecological system. Eagerness to exploit natural resources should be equipoised with the need to maintain the ecosystem. The intellectual gathering here will be rendering a yeoman service to the maintenance of ecological balance in the seas by bringing to surface these hard truths and impressing upon the society the need to save the ocean from disaster.

15. Harnessing of coastal resources in the best possible manner will kindle economic activity and catalyse industrial growth. New ventures based on sea foods will germinate offering ample employment opportunities. Such a situation will go a long way in soiving the problem of unemployment. The industrial activities in this new direction will open vistas for trade and commerce,

16. Despite the fact that the deliberations will be at a high level of specialisation, we should not forget that the ultimate aim is to benefit the society as a whole and fisherman-an economically and socially backward person occupying a bottom rung in the economic and social ladder, in particular. Measures formulated and methods suggested should be economical and easy of acceptance by the professional fisherman. The experts assembled here will function as friends, philosophers and guides to them, encourage and advice them and make sure rhat the path is well laid for betterment of the community. In this manner we should try to achieve the economic and social objectives behind our national policies.

17. I understand that scientific research in aquaculture has commenced only some sixty years ago. The period has been marked by considerable growth of technological advancements in different culture systems. Some of the developed and developing countries in the world have been significantiy benefited by the different systems. Happily in our country there is already a vast reservoir of information on aquacultre arising out of pioneering research undertaken by several organisations. The question before us is how best we can employ the available modern techniques in aquaculture not only to put available knowledge to immediate use in important channels, but also to encourage and nourish further investigations.

18. It is a wonderful thing that scientists, technicians experts, administrators and planners have come together



Mr. K. C. Abraham, Governor, Andhra Pradesh delivering the inaugural address To the right of the Governor are Philipose Thomas (Collector, Ernakulam Dist) and Dr. E. G. Silas while to his left are Mr. K. Balachandran (Mayor, Cochin) Dr. Raghu Prasad and Dr. S. Jones.

in this forum. I hope that this get-together will iron out the obstructions to the horizontal flows of information. It is only through occasions such as these the progress in different branches of specialisation and the efforts of administrators can be welded, and moulded into a common effort aimed at obtaining basic and lasting benefits for mankind.

I have great pleasure in inaugurating the Sympasium and in wishing your deliberations all success."

The symposium was organised in 12 main sessions, 7 sectional sessions and a plenary session. 322 papers contributed by scientists, technologists and specialists from different countries formed the material for discussions.

Dr. Patrik Sorgeloos of Artemia Reference Centre, State University Ghent, Belgium, Dr. Anand Prakash of Department of Environment, Canada and Mr. Madhavan Nayar of M/s. Cochin Co. (P) Ltd. delivered special lectures on "Recent developments in Artemia culture", "Blue Mussel industry" and 'strategy for coastal aquaculture development' respectively. In the evening of 14th an informational film on "Tilapia Culture' by Mr. Biene of Tilapia International Foundation, Belgium and another film on 'Mariculture' by the C. M. F. R. I. were shown for the benefit of the participants.

As a part of the symposium an exhibition on coastal aquaculture was arranged in the premises on the University of Cochin. The Central Institute of Fisheries Technology, Cochin, Central Institute of Fisheries Education. Bombay Central Marine Fisheries Research Institute, Cochin, Marine Products Export Development Authority, Cochin. Integrated Fisheries Project, Cochin, Department of Fisheries, Kerala State, Kerala Fisheries Corporation and M/s. Diwan Trades, Bombay, participated in the exhibition. ●