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INDIAN COUNCIL OF AGRICULTURAL RESEARCH

SYMPOSIUM ON COASTAL AQUACULTURE

12-18 JANUARY 1980

BACKGROUND

Aquaculture, though ancient in origin, has emerged as a recognised industry only during the last decade. While highly advanced and sophisticated technologies have been evolved for the capture of fishes, agriculture and livestock development, man has until recently neglected the farming of aquatic animals and plants. Faced by the challenges of providing food for the ever growing human population, shrinking land area for production, and of huge investments required to realise even marginal increase in fish production from the seas, he has now turned his attention to farming of aquatic organisms.

The near shore sea, the bays and lagoons, the estuaries and mangroves, the backwaters and the brackishwater lakes are well-known for their fishery resources. These ecosystems, having distinct biological and environmental features are naturally evolved as nursery grounds for several organisms of marine and fresh water origin. With these endowments, and possessing characteristic physiography, nutrient rich soil and productive waters, this region constitutes an ideal base for coastal aquaculture.

Traditional brackishwater fish culture in the coastal zone is prevalent at present in several countries like India, Bangladesh, Philippines, Malaysia, Singapore and Indonesia. The practice as followed in India involves mere trapping of juveniles of fishes and prawns brought in by the incoming tidal currents in the low-lying fields adjacent to the estuaries and backwaters, and holding them for a short period before harvesting. As the operation is carried out on unorganised and unscientific lines and without any management or husbandry principles, the production from this practice has been found to be very low and consequently, it has remained only at a subsistence level. Further, coastal aquaculture is practised on a limited scale, confined to

a small extent of the vast water area available in these countries. Nevertheless, the role of coastal aquaculture for augmenting protein food production, improving rural economy and providing large-scale employment opportunities has been well recognised. In view of these most of the maritime countries are making efforts to develop this sector and it has rightly been assigned high priority in the development programme of these nations.

Pioneering researches carried out on coastal aquaculture in different countries have provided a wide technological base for several systems of culture. Proven techniques on the culture of various species of finfishes, crustaceans, molluscs and seaweeds are now available. Considerable information is also available on open sea farming and oceanic farming. The scientific coastal aquaculture operation not only endeavour to employ the modern techniques of culture, but also envisages effective use of a wide range of farming ecosystem integrating crop, livestock and fish. Thus the coastal aquaculture is emerging as a multi-disciplinary science. Several aspects such as selection of species, survey and location of sites, construction of farms, controlled breeding and seed production, feed development, culture operation, monitoring of stocked species, control of diseases, maintenance of water quality, manipulation of environment, harvesting, processing, and marketing are involved in the modern technology of coastal aquaculture. Besides, socio-economics also play a vital role in the development of this sector.

Several research and development organisations as well as universities in India and abroad are now engaged in intensive research on various aspects of coastal aquaculture. These research efforts have considerably advanced our knowledge. While the general technology of culture developed in various countries

is similar it is becoming increasingly clear that adoptable techniques are location-specific. Recent investigations carried out in India have shown that the growth rate of several cultivable organisms such as prawns, mussels and seaweeds are so fast that they reach harvestable size within three to four months after stocking and that by following simple indigenous techniques they could be cultivated in different types of eco-systems. In developing countries, greater emphasis has now been laid on low-cost technologies so that they could be taken up by the small and marginal farmers without much investment.

Following global awareness on aquaculture and increasing research and developmental efforts put in this field, several symposia, seminars, workshops and conferences have been organised at national, regional and international levels with a view to review the state of the art of aquaculture, to identify constraints and problems and to formulate strategies for further development. However, in such multi-disciplined symposia, the coastal aquaculture has not received the desired attention. The first symposium exclusively on coastal aquaculture was held in 1970 in Bangkok organised by the Food and Agriculture Organisation of the United Nations in conjunction with the 14th Session of the Indo-Pacific Fisheries Council. Since then, extensive information has accumulated and considerable progress has been achieved in the field both at scientific/technical and developmental levels. The results of field experiments, demonstration and pilot projects have indicated that the coastal aquaculture is at a take-off phase in many countries. It is felt that the time is opportune at this juncture to take stock of its present status and to plan ahead. On these premises, it is proposed to hold a SYMPOSIUM ON COASTAL AQUACULTURE in January 1980.

OBJECTIVES

The main objective of the Symposium is to promote and develop coastal aquaculture by disseminating the knowledge and experience gained and modern technologies developed among the scientists, technicians, extension workers, administrators, planners, farmers and industrialist, through:

- (a) a review of the present status of coastal aquaculture;
- (b) discussions on the technologies of culture of various organisms in different types of ecosystems in the coastal zone as well as on the technologies of harvesting, processing, marketing and utilisation of the produce;
- (c) identification of the major inputs required for research, developmental, educational and training programmes for rapid development of coastal aquaculture leading to the establishment of an organised industry;
- (d) production intensification by integrated crop-livestock-fish farming technologies;
- (e) an assessment of the social, economic and legal aspects deriving from the development of coastal aquaculture; and
- (f) linkages, co-ordination and communication among the national and international organisations involved in research, development and promotion of coastal aquaculture.

SCOPE

The Symposium will consider all scientific and technical aspects of ecosystems, breeding, rearing, propagation and culture of finfishes, crustaceans, molluscs, seaweeds and other organisms in the coastal and contiguous water areas, fish diseases, nutrition, farm engineering, harvesting, post-harvest technologies and marketing. The Symposium will also deal with developmental aspects such as planning, organisation, socio-economics, legal, manpower requirements, training and industry relating to coastal aquaculture.

VENUE

The Symposium will be held at Cochin, a famous coastal city in Kerala State in South India. Cochin is one of the important centres of fishing activities in the country. Besides serving as an industrial base for the fishing and connected industries, the low-lying fields adjoining the backwaters of Cochin support an

age-old practice of brackishwater fish culture. The headquarters of the Central Marine Fisheries Research Institute, Central Institute of Fisheries Technology, FAO/UNDP Pelagic Fishery Project, Central Institute of Fisheries Nautical Engineering and Training, Integrated Fisheries Project, Marine Products Export Development Authority, University of Cochin, Kerala Fisheries Corporation and State Fisheries Organisation are located here.

DATES

The Symposium will be held for 7 days from 12th to 18th January, 1980.

SPONSORING AGENCY

The Symposium is being organised by the Marine Biological Association of India. The Marine Biological Association of India was founded in 1958 and has the rich experience of successfully organising and conducting the following symposia at international levels.

1. Symposium on Scombroid Fishes 1962
2. Symposium on Crustacea 1965
3. Symposium on Mollusca 1968
4. Symposium on Corals and Coral Reefs 1970
5. Symposium on Indian Ocean and Adjacent Seas—Their Origin, Science and Resources 1971

The present SYMPOSIUM ON COASTAL AQUACULTURE is the sixth in the symposia series of the Marine Biological Association of India. The official organ of the Association is the *Journal of the Marine Biological Association of India*.

TECHNICAL SESSIONS

TECHNICAL SESSION I: REVIEW OF THE PRESENT STATUS OF COASTAL AQUACULTURE

Global, regional, national and system-wise reviews on coastal aquaculture.

TECHNICAL SESSION II: CULTURE ECOSYSTEMS IN THE COASTAL ZONE

Types, extent, and environmental characteristics of presently utilized ecosystems and potential areas.

TECHNICAL SESSION III : SITE SELECTION AND FARM ENGINEERING

Technical and administrative criteria for selection of sites for different culture systems—design, layout, material input, construction of farms - construction of hatcheries - open sea farm engineering.

TECHNICAL SESSION IV: REPRODUCTION AND INDUCED BREEDING

Reproductive physiology of finfishes and shell fishes - growth and reproduction through physiological control - endocrine control on growth, maturation and spawning - techniques of induced breeding, maturation and rematuration - reproduction in marine algae.

TECHNICAL SESSION V: SEED PRODUCTION AND TRANSPORTATION

Seed requirements - natural seed resources, abundance, methods of collection - hatchery production of seed - techniques, constraints, economic viability - transportation and transplantation.

TECHNICAL SESSION VI: TECHNIQUES OF CULTURE FOR:

- (a) FINFISHES
- (b) CRUSTACEANS
- (c) MOLLUSCS
- (d) SEAWEEDS AND ALGAE
- (e) OTHER ORGANISMS
- (f) POLYCULTURE

Traditional practices, modern techniques - low-cost technology - identification of bottle-necks and research input needed - harvesting technology for different systems. Live food organisms for larval rearing and forage for adults.

TECHNICAL SESSION VII: FINFISH AND SHELLFISH NUTRITION

Nutritional requirements and metabolism of cultivable marine organisms - ecological energetics and food conversion efficiencies - conventional and new resources of protein for feeds - feed formulations and assessment of their nutritive value - manufacture of feed and economics.

TECHNICAL SESSION VIII: GENETIC RESOURCES

Germplasm of cultivable organisms - germplasm conservation - upgradation of stocks - interspecific hybridization to synthesize new breeds - genetic manipulation for monosex culture - genetic improvement of cultivated organisms.

TECHNICAL SESSION IX: FISH AND SHELLFISH DISEASES AND CONTROL

Parasites, their life-histories and host specificity - effects of pathogenic organisms on the growth and reproduction of cultivable organisms - histopathological investigations - diagnosis and control of diseases - immunological and prophylactic measures in cultivated aquatic organisms.

TECHNICAL SESSION X: COASTAL AQUACULTURE AND ENVIRONMENTAL MANAGEMENT

Sources and types of environmental damage to the culture areas - effect of pollution on the survival, growth and reproduction of cultivable organisms - bioassay experiments on such organisms - developments in the environmental monitoring technology - legal and social aspects of control systems.

TECHNICAL SESSION XI: POST-HARVEST TECHNOLOGY AND UTILIZATION

Purification - quality control - processing - development of low cost products - transportation and marketing.

TECHNICAL SESSION XII: INTEGRATED CROP - LIVESTOCK - FISH FARMING

Synergy of bio-systems - Techniques of integrated crop-livestock-fish farming - blending culture and capture fisheries.

TECHNICAL SESSION XIII: ECONOMIC VIABILITY OF COASTAL AQUACULTURE SYSTEMS

Economics of different culture systems - case studies on pilot plants and commercial plants - Financial resources - credit facilities.

TECHNICAL SESSION XIV: IMPACT OF COASTAL AQUACULTURE ON SOCIO-ECONOMIC AND RURAL DEVELOPMENT

Present status of social, economical and nutritional standards of fishermen and fish farmers - role of aquaculture in raising this standard.

TECHNICAL SESSION XV: LEGAL ASPECTS OF COASTAL AQUACULTURE

Legal measures available in different countries - ownership, licensing, and leasing policies - legal aspects of pollution prevention and control - legal aspects of joint ventures.

TECHNICAL SESSION XVI: MANPOWER AND TRAINING IN COASTAL AQUACULTURE

Assessment of research, technical, managerial operative and extension personnel for development of aquaculture - training facilities available at national, regional and international organizations and future requirements.

TECHNICAL SESSION XVII: EXTENSION

Transfer of technology, extension techniques - methods and media.

TECHNICAL SESSION XVIII: CO-OPERATIVE PROGRAMMES AMONG NATIONAL AND INTERNATIONAL AGENCIES FOR COASTAL AQUACULTURE RESEARCH AND DEVELOPMENT

Existing arrangements and facilities for co-operative and collaborative research programmes - constraints - identification of productive and beneficial areas for collaboration.

TECHNICAL SESSION XIX: STRATEGIES FOR FUTURE COASTAL AQUACULTURE DEVELOPMENT

National policies and planning for the development of coastal aquaculture - identification of priorities - R & D programmes - Integrated Fisheries Development Programmes.

EXCURSIONS

Excursions to centres of fisheries and aquaculture interest around Cochin will be arranged during/after the Symposium. Visits to places of historical and tourist interest can also be arranged on request.

REGISTRATION

Intending participants are required to pre-register their names by returning the attached "Notice of participation" to enable the Symposium Office to make prior arrangements. Those desirous of presenting papers for the Technical Sessions are requested to give the Title(s) of the paper(s). Registration of participants will be done at the Symposium venue on 11th and 12th January, 1980. A registration fee of Rs. 25/- will be charged for participants from India and U. S. \$20 or its equivalent for those from abroad. Members of the Marine Biological Association of India with a standing of atleast 3 years (1977 through 1979) are exempted from the registration fee.

FINANCE

The Association will finance in the organisation and conduct of the symposium, printing of Abstracts of papers and publication of the Proceedings. Costs of travel, accommodation, boarding, tourist excursions and other expenditure will have to be borne by the participants themselves or by their sponsoring organisation.

LANGUAGES

The official language of the Symposium is English. However, papers in French, German and Spanish with summaries in English will be accepted.

PAPERS FOR THE SYMPOSIUM

The Symposium will accept review, status and experience papers. Review and status papers will be invited from specialists in the various fields of coastal aquaculture. The experience papers should contain recent unpublished informations. All papers will be screened by an Editorial Committee and only those considered relevant and suitable for the Symposium will be accepted.

ABSTRACT

The Abstract(s) of the paper(s) (in duplicate) to be contributed to the Symposium must reach the General Convener latest by 30th June 1979. Each abstract should not exceed 500 words. Since the abstracts of the accepted papers are to be distributed to the participants at the time of registration, extreme care may be taken in the preparation of abstracts to make it self-contained by including the salient results of studies.

PAPERS

The full papers in the final form (in duplicate) must reach the General Convener by 31st October 1979. The review/status papers shall not ordinarily exceed 30 pages typed double space and the experience papers, 20 typed pages. Authors are requested to follow the guidelines given on next page while preparing the manuscripts of the papers for the symposium.

GUIDELINES FOR THE PREPARATION OF MANUSCRIPTS

Manuscripts should be type-written on one side in double space throughout on foolscap paper leaving 4 cm margin and submitted in duplicate. MS should not exceed 30 typewritten pages including Tables and Figures in respect of review papers and 20 pages in case of experience papers. Before submitting the MS the authors should check whether there are inconsistencies among the Tables and Figures and the text or within the text. Both Tables and graphs illustrating the same point will not be accepted. As a rule, foot notes should be avoided except when they are used to credit Institution contribution series number and unpublished material. In Tables, subscript/superscript numerals should denote footnotes which should be explained below the concerned Table, with first line indented.

Acknowledgement should be made preferably in the 'Introduction' in a separate paragraph. Underscore only when *italics* are intended as in the address under the author(s) name (s), scientific names and source of publication in literature citation at the end of the paper. Material and methods, when given should be limited to what scientists need in understanding the design of the study and in judging whether the data obtained are adequate. The relative importance of the headings should be shown by their position on the page and by proper use of the capitals and lower case. When Greek symbols or unusual signs which normally cannot be typed are used, they should be written out quite legibly and made easy to differentiate. Similarly, complex mathematical equations should also be clearly written out if they cannot be typed fully. Double space should be left above and below the lines that have equations and formulae with superscript and subscript. All measurements should be given in the metric system only.

The Title of the MS should be brief but should be typed wholly in capitals. This is followed by the author(s) name(s) with initials preceding the surname. No periods follow the Title or the author(s) name(s). The address of the author(s) given below the name(s) should be underscored with no period at the end. Titles with scientific names must contain a common identifying term, e.g. '.....The copepod *Temora turbinata* (Dana).....'.

Abstract should be double spaced starting on the Title page leaving 5 cm margin. It should not be a summary of work done, but should highlight the salient points and recapitulate the findings and conclusions.

Citation of literature should have author(s), year, title, name of journal, volume, number and inclusive pages. Abbreviations of the names of the Journals should be according to the 'World list of Scientific Periodicals'. In the text, the references should be cited thus: Fogg (1952); Schaefer and Marr (1948) with author(s) name(s) followed by the year of publication in parenthesis.

Tables when given should not contain bulky data and should be given on separate sheets and their position in the text indicated suitably. Each Table should be numbered with Arabic numerals (e. g. Table 3) and should have a brief heading which is underscored.

Drawings or illustrations should be made in Indian ink on white Bristol board or good quality tracing paper or on co-ordinate paper with blue grids and normally be twice that of the final printed size. The size of the printed area is 18 x 12.5 cm and this will be the maximum size for a full page figure with legend. Figures should be numbered in Arabic numerals and indicated in the text thus: Fig. 1 and should have the Figure number, legend, author and abbreviated title of the paper or note on the back. Photographs or Photomicrographs for reproduction must be clear and show good contrast and must be free of clip markings and cracks. Prints must be in glossy glazed paper and of a size not smaller than 8.0 x 5.5 cm. When photographs are grouped as one plate, they should be trimmed and mounted with no space between those in the group as intended for final reproduction. Each photo of such a group should be lettered with a block letter (A, B, C, etc.) and in the text indicated thus: Plate IA. Such notations on text-figures should be given as a, b, c, etc. Type-written lettering on figures is not acceptable. Also, legends for figures should be written on a separate sheet headed 'Captions for illustrations' at the end of the manuscript. Scale of the magnification of *camera lucida* drawings should be indicated beside the drawing itself.

All Correspondences should be addressed to:

THE GENERAL CONVENER,
SYMPOSIUM ON COASTAL AQUACULTURE,
THE MARINE BIOLOGICAL ASSOCIATION OF INDIA,
POST BOX No. 1244,
COCHIN 682 011.
KRRALA, INDIA.

SYMPOSIUM ON COASTAL AQUACULTURE

12 — 18 JANUARY 1980

MARINE BIOLOGICAL ASSOCIATION OF INDIA

P. B. No. 1244

COCHIN-682 011, INDIA

NOTICE OF PARTICIPATION

(This form should be returned to the General Convener of the Symposium)

Name: Dr., Prof., Mr., Mrs., Miss.

(IN BLOCK LETTERS)

Position:

Organisation:

Mailing Address:

Telephone No:

Telegraphic Address:

Title(s) of paper(s) proposed to be contributed to the symposium:

| No. | Author (s) | Title of Paper |
|------------|-------------------|-----------------------|
| 1. | | |
| 2. | | |
| 3. | | |

Propose to personally attend the symposium: Yes/No

Signature

To

**The General Convener,
Symposium on Coastal Aquaculture,
Marine Biological Association of India,
Post Box No. 1244,
COCHIN-682 011.
Kerala, India.**