

Report of the ICES Working Group on Mariculture
(1st Meeting)
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1. INTRODUCTION

The first meeting of this Working Group was convened by Prof. Dr. K. Tiews, May 5-7, 1975, at Bundesforschungsanstalt für Fischerei in Hamburg. In welcoming the members, Dr. Tiews hoped that the deliberations of this first meeting to address itself to mariculture would provide needed direction to ICES and its member countries regarding this challenging but somewhat uncertain field of endeavour. A special welcome was extended to Dr. Korringa, Chairman of the Fisheries Improvement Committee, who was attending as an observer. Dr. Bligh was elected Rapporteur. The list of participants is given as App. 1, the meeting Agenda as App. 2.

2. OBJECTS OF WORKING GROUP

The terms of reference for the Working Group as set forth in the resolutions passed at the 62nd Statutory Meeting of ICES (C. Res. 1974/2:12) was reviewed and endorsed by the meeting. These are:

- (i) a Working Group on Mariculture, consisting of not more than one representative of each country, should be established with Professor K. Tiews as Convenor. It should initially work by correspondence and, if necessary, meet in Hamburg on 5-7 May 1975, to collect information about relevant activities in the member countries, and to suggest fields in which there could be fruitful international scientific collaboration, and should report to the 63rd Statutory Meeting;
- (ii) one session should be set aside at the meeting for consideration of the Working Group's Report and other papers on mariculture submitted to the meeting.

It was agreed, however, that it may be desirable at some future meetings to invite specialists to speak on selected topics but that official representation should be restricted to one person per country. There was general consensus that a special session of the Fisheries Improvement Committee should be devoted to mariculture at the forthcoming 63rd Statutory Meeting in Montreal (Recommendation 1).

Dr. D. Møller expressed gratitude on behalf of Dr. Egidius and himself that their proposal to ICES had catalyzed the establishment of this Working Group.

The adage that the globe's oceans are nature's bread basket for the hungry peoples of the world is being seriously challenged today. Considering the rapidity with which conventional fish stocks are declining throughout the world, the Working Group concluded that an ever-increasing emphasis ought to be placed on the importance of aquaculture as a means of meeting some of the world demand for foods. In this regard, the production potential of the coastal and brackish waters of the ICES area alone is very substantial. In view of the world situation in which available supplies of fish protein appear to be declining, the Working Group considered that mariculture may warrant greater recognition in future international activities of ICES.

3. DEFINITION OF MARICULTURE

Mariculture was defined as the managed production for commerce or recreation of marine organisms involving intensive and comprehensive husbandry of plants or animals in a marine environment wherein population densities may be much greater than in the wild. In such ventures, private ownership or tenure with legal control and protection is possible and individual organisms may either be set free to grow in a natural environment (restocking operation) or grown to marketable size in a controlled environment (farming operation).

4. STATUS OF MARICULTURE

The national reports on government and private research activities in the field of mariculture submitted to the Working Group were largely standardized. The following countries submitted written reports: Belgium, Canada, Denmark, France, Federal Republic of Germany, Netherlands, Norway, Poland, Portugal, Sweden, United Kingdom and the USA. The reports were rather comprehensive and provided a useful source of information. They are compiled in meeting Doc. C.M. 1975/ E:6. In most countries mariculture is in its infancy and a greater input of science and technology is necessary for the orderly development of commercial mariculture. It was agreed that research effort related to mariculture was inadequate on the whole, although there are already now some 300 scientists, 300 technicians and 50 technical aids engaged in mariculture research in those ICES-member countries having so far reported. Much discussion centered around the following major problems confronting mariculture and the need for cooperative research and experimental development (Recommendation 2).

5. MAJOR RESEARCH PROBLEMS

Fish health was highlighted as one of the most critical aspects in mariculture since inadequate diets or improper disease control measures can destroy any mariculture operation. Prerequisite to the development of formulated feeds for optimum growth and performance is the need to define the nutritional requirements of important mariculture species. The special problem of culturing living food organisms on a continuous basis for certain mariculture species, possibly using treated sewage, is an area warranting further study. Research leading to effective disease prevention and control, and the further development of diagnostic techniques, is of paramount importance to the further development of mariculture in all countries. In addition, the ever-increasing

problem of coastal pollution is a threat to mariculture organisms as well as the possibility of contamination and the potential hazards to human health. In this regard, questions on viral contamination and the effectiveness of current depuration methods remain unanswered.

Most countries had experienced failures in mariculture (or aquaculture) even though many of the ingredients for successful operations appeared to be available. It was agreed that mariculture required a multidisciplined approach since it was complex and highly dependent on science and technology, and many of the costs had yet to be worked out. It was felt that government leadership was essential and that attention should be focused on all three of the following steps:

- (1) Biological research to fully understand the organisms themselves, including reproduction, diseases, nutrition, etc.
- (2) Pilot mariculture projects to develop systems technology for controlled rearing, production projections, etc.
- (3) Industrial trials of a size to provide economic assessment, market potential, training, etc.

The multidisciplined approach to these areas would include the need for engineering studies on the use of heated effluent, heat exchangers, pumping and filtration systems, antifouling agents, and other matters related to controlled marine ponds and enclosures.

It was stressed that the economic factors of mariculture had been neglected and that any products would have to compete successfully with natural fishery products.

The legal requirements for mariculture have yet to be defined in most ICES countries. These involve the legal rights of the mariculturist and protection of his investment, zoning policies, and enforced control on diseases and on the introduction of non-indigenous species. A full understanding of the criteria for mariculture site selection is important as well as pollution control measures to protect selected areas for mariculture.

Although the biological base for mariculture is possibly the best developed, we still have limited knowledge related to controlled reproduction in species such as mullets, milkfish, eels and salmonids. Research efforts on genetics and selective breeding also appear to be quite inadequate.

Hatcheries are expected to play a very significant role in future mariculture operations.

6. FUTURE ACTIVITIES AND COOPERATION

The Working Group generally felt that the foremost need in mariculture at this time was not necessarily for cooperative projects but rather for communication. To this end it was concluded that the Working Group should meet annually in a different member country each year. This would provide an opportunity for representatives to visit key research, development, and mariculture facilities. Furthermore, there was much interest in holding symposia or workshops, possibly in conjunction with annual meetings, to deal in depth with selected topics and involving invited specialists to review key subjects of high interest and priority (Recommendation 3). The objective of these sessions would be to encourage the free exchange of information, to minimize duplication of efforts, and to foster a variety of cooperative projects among the member countries.

To further facilitate the exchange of information, it was proposed that a bibliography of mariculture publications by the member countries of ICES be prepared annually through the auspices of the Fisheries Improvement Committee (Recommendation 4).

Although E.I.F.A.C. and F.A.O. have up to now dealt primarily with freshwater species and aquaculture, effective avenues of communication should be established with these agencies to promote cooperation, joint symposia and discussion, and the exchange of information of common interest.

7. RECOMMENDATIONS

1. The Working Group on Mariculture supports the proposal (C. Res. 1974 /2:12) that a session of the Fisheries Improvement Committee be set aside for presentation of papers on mariculture at the forthcoming 63rd Statutory Meeting of ICES in Montreal. Furthermore to enable joint participation by the Anadromous and Catadromous and the Shellfish and Benthos Committees, it recommends that the timing of this session be scheduled to avoid conflicting sessions of these Committees.
2. The Working Group on Mariculture recommends that member countries of ICES endeavour to intensify their mariculture research efforts with priority in the following areas:
 - (i) nutritional requirements of species of importance to mariculture, the development of optimal formulated feeds and further examine new sources of natural feeds;
 - (ii) controlled reproduction in species of importance to mariculture;
 - (iii) disease control, prevention, and diagnosis;
 - (iv) selective breeding and genetics related to mariculture organisms;
 - (v) the multidisciplined development of mariculture technology including economics and systems designed for ponds, other enclosures and the use of heated effluents;
 - (vi) water and environmental quality requirements related to mariculture;
 - (vii) assess the effectiveness and the need for further development of artificial enhancement of selected resources through stocking programs.
3. It was generally agreed that the initial meeting of the Working Group on Mariculture had been extremely stimulating and it was recommended that further meetings be held to discuss in greater detail special subjects on mariculture as : the development of

optimal formulated feeds; current knowledge related to controlled reproduction of mariculture organisms; the mechanics of mariculture systems. Furthermore, it was recommended that future meetings be held preferably in member countries with major mariculture programs and may involve invited specialists.

There was general agreement that the next meeting of the Working Group on Mariculture be held in July, 1976, at Hamburg, with special emphasis on fish farming with formulated feeds.

4. As a first step toward greater international cooperation in mariculture research, it was recommended that a bibliography on mariculture research be separately prepared annually under the auspices of the Fisheries Improvement Committee.

Appendix 1

List of members of the Working Group on Mariculture

Belgium: Prof. Dr. G. Persoone, Director, Laboratorium voor Biologisch Onderzoek van Milieuverontreiniging, Josef Plateaustraat, 22, B 9000 Gent

Canada : Dr. E.G. Bligh (Rapporteur), Director, Fisheries Research Laboratory, Fisheries and Marine Service, Department of the Environment, P.O. Box 429, Halifax, Nova Scotia

Denmark: Mr. Erik Hoffmann, Danmarks Fiskeri-og Havundersøgelses Charlottenlund Slot, 2920 Charlottenlund

France: Mr. Jacques Le Noan, Chef du Department "Ressources Vivantes", Centre National pour l'Exploitation des Oceans, 39, Avenue d'Iena, 75116 Paris

Germany, Federal Republic of:

Prof. Dr. K. Tiews (Convenor)
Director, Institut für Küsten- und Binnenfischerei der Bundesforschungsanstalt für Fischerei, Palmallee 9
2 Hamburg 50

Ireland: Dr. Alec Gibson, Department of Agriculture and Fisheries, Agriculture House, Dublin 2

Netherlands:

Dr. S. J. de Groot, Rijksinstituut voor Visserijonderzoek Haringkade 1, IJmuiden

Norway: Dr. Dag Møller, Institute of Marine Research, P.O. Box 2906, 5011 Bergen

Poland: Prof. Dr. Józef Wiktor, Morski Instytut Rybacki, Gdynia

Portugal: Mr. Rui Cachola, Licenciado em Ciências Biológicas, Investigador do Instituto de Biologia Marítima, Rua do Compromisso, 21-1.0, Faro

Sweden: Mr. Bo Holmberg, Royal Board of Fisheries, Fack, S-403, 40 Göteborg 2

United Kingdom:

Dr. P.R. Walne¹⁾, Ministry of Agriculture, Fisheries and Food, Fisheries Experiment Station, Benarth Road, Conwy Gwynedd

USA: Dr. Carl Sindermann, Director, Middle Atlantic Coastal Fisheries Center, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, P.O. Box 428, Highlands, New Jersey

Observer: Prof. Dr. P. Korrington, Director, Rijksinstituut voor Visserijonderzoek, Haringkade 1, IJmuiden
(as Chairman of the Fisheries Improvement Committee)

1) Did not attend the 1st meeting of the Working Group

Appendix 2

Meeting of the Working Group on Mariculture

5 - 7 May 1975
(0930 hrs) at

Bundesforschungsanstalt für Fischerei
2 Hamburg 50, Palmaille 9
Federal Republic of Germany

A g e n d a

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1. Welcome, Adoption of Agenda and Appointment of Rapporteur.
2. Presentation of Working Group Members.
3. Objectives of Working Group.
4. Review of National Reports on Governmental and Private Research Activities in the Field of Mariculture.
5. Review of the Co-operative Research Program in the Field of Aquaculture of EIFAC and Other Organizations.
6. Report of the First Session of the ACMRR/JABO Working Party on Aquaculture, Rome, Italy, 17-23 May 1972.
7. Review of the Present Status, Problems and Constraints in Mariculture in the ICES Member Countries.
8. Major Problems for Research.
9. High Priority Problems for Research.
10. Is There a Need for Co-operative Research and If So, How Should it be Organized?
11. Fields for Fruitful International Collaborations.
12. Adequacy of Mariculture Research in ICES Member Countries.
13. Suggestions for Contributions on Mariculture to be Submitted to the 63rd Statutory Meeting of ICES in Montreal.
14. Future Activities of the Working Group.
15. Recommendations.
16. Other Business.
17. Closure.