

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

TECHNICAL ADVISORY COMMITTEE

DRAFT

SUMMARY AND RECOMMENDATIONS

OF

TAC WORKING GROUP ON AQUACULTURE

Spoletto, Italy  
10-19 July 1973

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

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TERMS OF REFERENCE

- (i) summarize BRIEFLY the present importance of aquaculture, particularly as a means of increasing food production in developing countries, its future potential, and the way in which research might advance the achievement of this potential;
- (ii) identify the state of existing scientific progress related to aquaculture and the types of problems being encountered in extending the frontiers of knowledge through research;
- (iii) review current national and regional research programmes and identify objectives and areas of work that require reinforcement, defining the levels and type of support required;
- (iv) formulate, in as much detail as possible at this stage, the future framework considered necessary for national, regional and international research on aquaculture, together with related training and extension programmes and supporting services;
- (v) identify the priority elements under (iv) related to the needs of developing countries which might be sponsored through the Consultative Group on International Agricultural Research, in order to achieve a breakthrough; and determine their probable capital and recurrent costs - if possible over a five-year period;
- (vi) recommend action for the implementation of the proposed programme, whether through the Consultative Group or other bodies.

## SUMMARY AND RECOMMENDATIONS

### Summary

Aquaculture makes a significantly large contribution to the food supplies of developing countries. It now contributes about 5-6 million metric tons of finfish and shellfish, equivalent to 12 percent of the annual world catch used for direct human consumption, or four percent of the world's animal protein supply (milk excluded), and its importance in the nutrition of certain countries, especially landlocked ones, is greater than the magnitude of production suggests. Its considerable importance in integrated rural development is indicated by the increasing impact of the industry in developing countries and by recent results of development programmes.

The future potential for an increased production of protein food by aquaculture is very large. While capture fisheries for food fish are not expected to double their present tonnage (45 MMT) means can already be identified to prompt a ten-fold increase in aquaculture production. Even greater increases are possible if certain imaginative but unproved techniques (e.g. artificial upwelling of deep water) can be developed.

Unlike capture fisheries production which is dependent to a large degree on uncontrollable natural variables, the limitations on production in aquaculture are directly related to inputs.

The total area presently under fish culture is not accurately known but is believed to be of the order of 3 to 4 million ha. It is estimated that this area could be increased to about  $30 \times 10^6$  ha. This expansion together with a progressive application of improved techniques

developed through scientific research could raise the present level of about 5 MMT production to 50 MMT by the year 2000.

The realization of a significant proportion of these large potential increases in aquaculture production will depend upon the solution of certain problems through biological and other scientific research. Ongoing research does not now solve the problems at a pace which is desirable, and which would be possible if the effort were reinforced strongly by coordinated planning and financial assistance. Other constraints (e.g. lack of development policies and programmes in aquaculture, pollution control, site competition) also restrict expansion of aquaculture but with only even their partial resolution significant advances could be made through research. The technical problems amenable to solution through research are identified in the report and are summarized below.

### Recommendations

#### (a) Research Priorities

The Group recommends as the most effective way to reinforce present research efforts strong concentration on limited scientific problems of importance and urgency applied to a small number of species groups judged to hold the greatest expansion potential. These are carps, catfish, tilapia, milkfish, mullets and shrimps. The Group concluded that the highest priority for the most fruitful new research effort lies in the fields of reproductive physiology and selective breeding. The Group also noted that a strong priority exists in the

realm of food and feeding, an area of aquaculture whose implementation is relatively less amenable to centralisation. High priority research is also required in disease and the broad spectrum of water quality problems related to the cultural animal and its aquatic environment.

(b) Research Organization

In considering the framework necessary for rapid achievement of research objectives as identified above, the Working Group recognized the following realities:

- (1) the intensive inter-disciplinary nature of the required research effort;
- (2) the financial and technical inadequacy of existing national centres in developing countries for this purpose without infusion of outside assistance, and
- (3) the differences that exist in various regions of the world in respect of ecological conditions, species available for culture and socio-economic situations.

The Group recommended the development of one or more regional centres, with multidisciplinary expertise and facilities to undertake the long-term intensive research required. These centres should serve as lead institutions to a network of selected national laboratories which should be strengthened to enhance their ability to do other aspects of research.

If such a network of research institutions is established the Group recommends that a high-level international coordinating group associated with an international agency like FAO, which has the global

responsibility for development of aquaculture, be established to provide effective guidance and coordination for such a global effort.

A supplementary approach worthy of consideration by TAC, and in no way in conflict with the global recommendations formulated by this Group, is the infusion of funds into identifiable on-going research projects of aquacultural importance in the developing countries. This approach has a high likelihood to demonstrate soon to funding agencies the high pay-off potential of aquacultural research. It could therefore demonstrate the basis for wider and more complete support. The examples below are by no means exhaustive and in any order of priority and are offered as elucidation:

- (i) to attach to the African Livestock Development Centre a tilapia breeding and management unit;
- (ii) seed and feed production in on-going Indian Carp research;
- (iii) seed survival research in an area where mullet is of great importance such as North Africa and the Near East.
- (iv) controlled reproduction and seed production of milkfish in Asia.

To have the most concentrated impact on aquaculture development the Group agreed that it would be desirable to apply all the research on the priorities previously stated in one or more places simultaneously. A lesser but still noticeable improvement could be achieved by carrying out high priority research in the regions where they would bear the greatest fruit when undertaken singly, in pairs or in groups. A task force would be necessary to determine arrangements and sites.

These could be new centres or existing centres strengthened for this purpose. The Group looks with favour on the establishment of a network of existing national research 'centres of excellence' as national cooperating outposts of the regional centre(s) to investigate problems of a local nature within the region(s). The Group recognized both advantages and disadvantages in allocating such functions to existing institutions, but recommended that this matter be more closely studied in consultations within the regions.

The Group recommended that a technical task force be appointed, consisting of recognized international experts in the field to have as one of its functions the selection of site(s) mentioned here.

(c) Training Extension Programmes

The Group recommended that the regional centre(s) should offer short-term training in highly specialized technical subjects related to aquaculture for scientific personnel (research and technical staff) of national institutions. Training of field personnel, particularly extension workers, as well as short-term courses for farmers should be organized in national centres. Long-term degree education in specialized fields for aquaculture research should initially be universities or other institutes in developed countries, especially those that have active exchange or cooperative programmes with developing countries. Later the advanced training should be transferred to appropriate national universities.

(d) Information Dissemination

The Group further recommended that the highly sophisticated and complex function of information collection, storage and retrieval as well as the preparation of text books, manuals and extension material, should be undertaken in a central unit associated with an international organization which is active in both this field and in aquaculture development.

The Working Group was charged under its terms of reference with a number of tasks. These were fulfilled to the extent possible, but the request to estimate the cost of the various alternative methods of implementing the recommendations was deferred. This should be an important responsibility of the task force suggested above.

Suggestions for Implementation

The Working Group convened by TAC herewith submits its report. If TAC decides on the basis of it to support aquaculture research, the Group urges:

- (1) the appointment of a task force to perform the several functions mentioned above, that is to spell out the details of the research programme, including the determination of support levels required.
- (2) The Working Group further requests that TAC call to the attention of other pertinent agencies aspects of the suggested aquaculture development programme. For example the Group was appraised of UNDP's interest in the training component.