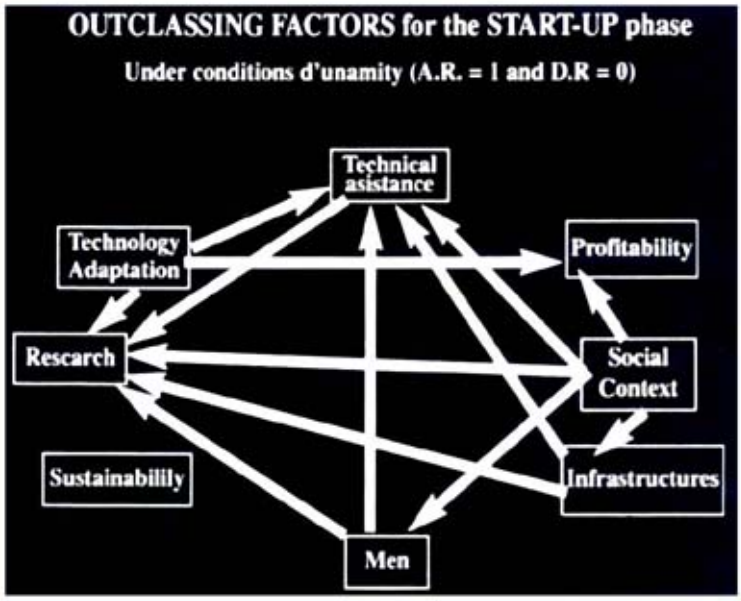
M E D R A P II

MEDITERRANEAN REGIONAL AQUACULTURE PROJECT

22

NETWORKS CONSTITUTION SEMINAR ON TECHNOLOGY OF AQUACULTURE IN THE MEDITERRANEAN «TECAM» AND SOCIO-ECONOMIC AND LEGAL ASPECTS OF AQUACULTURE IN THE MEDITERRANEAN «SELAM»

Tunis, May 19-21 1993



MEDRAP II

RAB/89/005-RER/87/009

FIELD DOCUMENT

93/22

NETWORKS CONSTITUTION SEMINAR ON TECHNOLOGY OF AQUACULTURE IN THE MEDITERRANEAN «TECAM» AND SOCIO-ECONOMIC AND LEGAL ASPECTS OF AQUACULTURE IN THE MEDITERRANEAN «SELAM»

Tunis, May 19–21 1993

United Nations Development Programme

Food and Agriculture Organisation of the United Nations

Edited by MEDRAP II Regional Center
Tunis - Tunisia

Preparation of this Document

This document is one of a series of documents prepared during the course of the Project identified in the title page. The conclusions and recommendations given were considered appropriate at the time it was prepared. They may be modified in the light of further knowledge gained at subsequent stages of the Project.

The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organisation of the United Nations concerning the legal status of any country, territory, city of area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The opinions expressed by the Authors in this document are not necessarily those of FAO or the Governments of the participating countries.

Abstract

The seminar on the constitution of the “Technology of Aquaculture” and the “Socio-Economic and Legal Aspects of Aquaculture” Networks was held in accordance with the recommendations of the Steering Committee meeting of Tirana, on May 19–21, 1993.

Based on the Networks Documents, elaborated by a consultant as a framework for discussions, the implementation of both networks was examined.

On the matter of the Technology of Aquaculture, it was emphasised that one of the limiting factors of aquaculture development was the lack of adapted tools. It was explained the procedure followed by a French institution in approaching the technological developments and it was recommended a) to identify and classify the needs, b) evaluate technical and economical feasibility, c) choose industrial partners, d) look for financial sources and e) contribute to promotion.

While initiating the Socio-Economic and Legal Aspects of Aquaculture, it was emphasised the recency and growing importance of this subject area. It was agreed that the first priority should be the economic framework for management and marketing in aquaculture, secondly the strategy for the integration of aquaculture, and lastly the legal framework and regulation of aquaculture.

During the discussions on the objectives and activities of both networks, it was agreed that the TECAM and SELAM shall utilise the existing technologies after identifying and classifying the needs in the meetings of their Coordination Committees.

In discussing the prerequisites for the establishment of the networks, it was reviewed the national input for a proper functioning of the networks.

Finally, the meeting decided that the TECAM and SELAM activities, approved by the Steering Committee, would be implemented by MEDRAP II during 1993, considered as Phase I of the Networks implementation.

Acknowledgements

The Editor would like to thank the Tunisian Authorities, namely H.E. the Secretary of State, Mr. Mongi Safra, who emphasized by his presence the full support of the Tunisian Gouvernment to the Project; and the National Coordinator, Mr. Bechir Tritar for the remarkable help and assistance he had provided for the organisation of the Seminar.

The Editor would like also to thank the Representatives of the Coordinating Institution, namely Mr. Mustapha Lasram for accepting to assume the TECAM and SELAM activities, the Resident Representatives of FAO and UNDP in Tunis, the participants of the Member Countries and the invited experts for their contribution.

Note from the reviser

The revision and publication of this document could only be done a long time after the closure of the project. This has led to some difficulties in finalising the documents and implementing corrections, because authors and contributors as well as some of the original material of tries were no longer available.

Therefore contributions from participants and session papers annexed to most of the documents were left in their original form. No language corrections were introduced, the content was not modified and left under their respective authors' responsibility.

Considering the above, we hope that the reader will understand that a standard of publication could not be maintained on a level as high as we would have liked it to be.

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AGENDA

Wednesday 19

9:00	- Opening Session
	- Welcome Speeches
	- Designation of Officials
	- Adoption of the agenda
9:45	- Experience of CIHEAM in networking Research and Training at regional scale By Mr. M. Valls
10:00	- Position and possible role of CIHEAM in the implementation of the networks. by Mr. M. Lasram
	- Discussions
10:30	**Coffee Break**
11:00	**- MAIN OUTLINES OF TECAM AND SELAM:**
	Organisation and Operating mechanisms by Mr. O. Ledoux and Mr. M. Belkhir
	Discussions
	- Review and adoption of relevant contents of Chapters A and B.
13:00	**Lunch**
15:00	**TECAM NETWORK: OBJECTIVES AND ACTIVITIES**
	- Technology of Aquaculture By Mr. A.M. Feuga (CEA/IFREMER)
	Discussions
16:00	- Scope of the proposed network activities By Mr. Ledoux and Mr. Belkhir
	Discussions
16:30	**Coffee Break**
17:00	- Review and adoption of relevant contents of Chapters C and D.

Thursday 20

9:00	**SELAM NETWORK: OBJECTIVES AND ACTIVITIES**
	- Socio-economic and legal aspects of Aquaculture By Mr. J. Young (Stirling University)
	Discussions
10:15	**Coffee Break**
10:45	- Scope of the Proposed network activities By Mr. Ledoux and Mr. Belkhir Discussions
	Discussions
	- Review and adoption of relevant contents of Chapters C and D.
13:00	**Lunch**
15:00	**- INSTITUTIONS' INPUTS AND BUDGET COMMITMENTS**

By Mr. Ledoux and Mr. Belkhir

General Discussions

15:45 **TECAM BUDGET:**

- Presentation
  By Mr. Ledoux and Mr. Belkhir

  Discussions

16:30 **Coffee Break**

17:00 **SELAM BUDGET:**

- Presentation
  By Mr. Ledoux and Mr. Belkhir

  Discussions

17:45 - Review and adoption of chapters E, F, G and H

Friday 21

10:00 - **FINAL REPORT**: conclusions and recommendations

- General discussions and adoption

13:00 Adjournment of the seminar

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SEMINAR REPORT

1) The above seminar was held in accordance with the recommendations of the third session of the Steering Committee (Tirana, December 1992) Annex I, with the objective to discuss the constitution of the Technology of Aquaculture in the Mediterranean Network (TECAM) and the Socio-Economic and Legal Aspects of Aquaculture in the Mediterranean Network (SELAM).

2) The seminar was attended by representative from MEDRAP II member countries: Algeria, Bulgaria, Croatia, Cyprus, Egypt, Lebanon, Lybia, Malta, Morocco, Portugal, Tunisia and Turkey and from the Associated Countries: Greece as well as representatives of FAO, CIHEAM. The list of participants is added in annex.

3) The session was opened by His Excellency, Mr. Mongi Safra, the Secretary of State, who welcomed all present and emphasised the need to cooperate to preserve the resources in the Mediterranean Region through the promotion of Aquaculture. He added that this seminar which deals with all the aspects regarding the development of aquaculture will help cement the constitution of TECAM and SELAM Networks. He wished the meeting much success.

Earlier Mr. Tritar, Tunisian National Coordinator, Mr. H. Akrout, MEDRAP II Project Coordinator, FAO Permanent Representative in Tunisia, Mr. Amouri, and the UNDP Res. Rep. Mr. C.H. Larsimont welcomed all participants and invited all countries to cooperate on a self-reliance basis.

4) The meeting elected:

-	Chair	:	Mr. M. Lasram, CIHEAM General Secretary
-	Vice-chair	:	Mrs. S.A.M. Nasser, Egypt
-	Rapporteurs	:	
a)	TECAM	:	Mr. G. Georgiou, Cyprus
			Ms. A. Casha, Malta
b)	SELAM	:	Mr. J. Jug-Dujakovic, Croatia
			Mr.A.Abouhala, Morocco
	BUDGETS	:	Mr. U.Y.Kesici, Turkey
			Mr.Ruano, Portugal

5) The proposed agenda was adopted.

6) Mr. Valls, Director of CIHEAM, Saragoza, Spoke on the experience of CIHEAM in networking research and training at regional scale giving explanations on the structure and functionning mechanisms of the organisation. Mr. Lasram, explained the position and the possible role of CIHEAM in the implementation of the networks.

7) During the discussion which followed, a point was raised on the participation in the Network of countries not members of CIHEAM. It was stressed that there is no restriction on countries which are members of the TECAM and SELAM but not members of CIHEAM. The CIHEAM organisation already has relations with institutes in non-member countries. It was emphasised that all members of TECAM and SELAM will be equally treated and the whole system in any case will

be under the GFCM Coordination, to which all MEDRAP Countries are also members. It was added that the Networks will deal directly with the institutions and scientists and/or researcher and the Management Board will designate the national institution to be the vis-a-vis. However, this will not limit the activities of other institutions in the same country to be involved in the Networks.

8) In introducing the working document prepared by MEDRAP II to facilitate the discussion and to provide a framework for the constitution of the Networks, Mr. O. Ledoux highlighted the main outlines of TECAM and SELAM, explaining the general organisation and the operating mecanisms of the Networks proposed. The presentation was generally accepted by the meeting and during the discussion which followed. Several changes and suggestions were introduced to these items. The Meeting recognised that the formal establishment of the two Networks will require the approval of the Governing Bodies of the interested parties. During the meeting of these bodies additional changes may be made. It was also accepted by the meeting that there will be a single Management Board for both Networks.

9) Mr. A. Muller-Feuga initiating the discussion on TECAM, spoke on the Technology of Aquaculture and emphasized that one of the limiting factors of aquaculture development is the lack of adapted tools. He explained the procedure followed by his institution in approaching the technological developments in aquaculture. He recommended a) to identify and classify the needs, b) evaluate technical and economical feasibility c) choose industrial partners, d) look for financial sources and e) contribute to promotion. During the discussion, it was agreed that the TECAM and SELAM shall utilise the existing technologies after identifying and classifying the needs in the meeting of their Management Board.

10) In discussing the TECAM objectives, outputs and activities included in this working document, which had been generated from previous documentation of the MEDRAP project, the meeting noted that they could be grouped into three major categories. The three categories identified are:

- Production bottlenecks
- Optimisation of production
- Activities for a sustainable development in the future.

The meeting further noted that a hierarchy of priority areas had also been suggested in past documents pointing out diversification as the highest priority followed by pathology and nutrition. These views led to a new text of the document and are reflected in the enclosed final version. The activities included under the five adopted objectives of the Network were considered not exhaustive but a general framework open to future additions and changes.
Due to the extensive list of activities, the implementation of which will require considerable resources, it was accepted that for the preparation of annual workplans, a selection will be made from this list by expert working groups for consideration and approval by the Management Board of the Networks.

11) Mr. J. young initiated the discussions on SELAM Network, by a presentation on Socio-economic and Legal Aspects of Aquaculture. He emphasised the recent and growing importance of this subject area within aquaculture. Dealing firstly with the legal aspects of aquaculture, he stressed that the legal frameworks for

aquaculture vary between countries. The key points to be considered are; the basic legal needs of aquaculture development; legal aspects of land use; legal aspects of water use and environmental considerations.

In respect of the socio-economic aspects of aquaculture parallels were drawn with agriculture and capture fisheries. Objectives for aquaculture were considered and the socio-economic implications of the development and adoption of aquaculture were appraised.

Subsequently, factors pertaining to sustaining aquaculture were identified to include small-scale characteristics, marketing phenomena and environmental issues.

12) Discussions followed on the document provided by MEDRAP on SELAM objectives. It was noted that the SELAM programme would tend to reflect the diverse circumstances of individual countries. A number of points were discussed; the submitted objectives were modified, agreed and priority, as shown in Annex I. The first priority should be the economic framework for management and marketing in aquaculture; secondly, the strategy for the integration of aquaculture, and lastly the legal framework and regulation of aquaculture.

In respect of the first Objective, it was determined that the marketing function should become more pro-active. This would be facilitated by the incorporation of marketing information systems. the second objective should evaluate and determine project and training programme needs. The third objective demanded comparative assessment of the legal frameworks in member countries.

It was concluded that a programme of training and research projects should be established with regard to the interaction and interdependence of socio-economic phenomena.

13) In discussing in the prerequisites for the establishment of the Networks, the meeting requested the inclusion of the establishment of the GFCM Sub-Committee on Aquaculture in addition to those indicated in the Working Document.
In relation to the inputs to be provided by the various institutions it was requested that FAO allocates funds to allow a proper functioning of the GFCM Aquaculture Sub-Committee and to participate in activities related to the work of the Management Board. It was also highlighted that in addition to facilities and personnel, the institutions participating in the Networks should also provide the necessary information and financing for jointly agreed activities.

Taking into consideration that the first phase of the Network will conclude at the end of 1993, the meeting suggested that a joint evaluation report, prepared by MEDRAP II, CIHEAM and FAO be prepared at the end of Phase II, coinciding with the termination of MEDRAP II. The meeting also decided that activities related to the Networks, and accepted by the last Steering Committee, would be implemented by MEDRAP II during 1993, representing the Phase I of the Networks.

Due to the uncertainty in predicting funding available for Phase III (after the closure of MEDRAP II) the meeting decided to include an indicative figure of what it would cost to maintain the same number of activities as foreseen for the MEDRAP contribution to Phase II.

The indicative budgets discussed for Phase I and II were accepted by the meeting as the contribution which could be allocated for TECAM and SELAM activities by MEDRAP II. It was understood that additional contribution from the participating institutions, CIHEAM and donors could be added at a later stage.

RECOMMENDATIONS

1) The role and the structure of the Management Board of the Network need further clarification.

2) To define the role of National Institutions and determine their involvement in the Networks's activities.

3) The role of Activity Coordinators should be clearly defined in the future.

MEDRAP II

NETWORKS DOCUMENT

Networks Titles and Symbols	- Technology of Aquaculture in the Mediterranean (TECAM) and, - Social, Economic and Legal Aspects of Aquaculture in the Mediterranean (SELAM)
Source of Support and Finance	Multiple (on-going UNDP/FAO, CIHEAM, Participating Institutions, Donors…)
Implementing Party	FAO/MEDRAP II and CIHEAM
Duration	1st Phase : 1993 2nd Phase : 1994 3rd Phase : perennial
Estimated starting date	April 1993

NETWORKS ON TECHNOLOGY OF AQUACULTURE IN THE MEDITERRANEAN, (TECAM)
AND
SOCIAL, ECONOMIC AND LEGAL ASPECT OF AQUACULTURE IN THE MEDITERRANEAN (SELAM)

FOREWORD

In the elaboration of this document, the following previous existing sources have been considered:

- Project Document RAB/83/016-RER/83/001, 1984, (MEDRAP PhaseI).
- Report on Socio-Economic Aspects of Aquaculture Development in the Mediterranean Countries held in Tunisia (November 1985).
- Project Document RAB/89/005/A01/12 - RER/89/009/F/01/12, 1990. (MEDRAP Phase II).
- Report on the Steering Committee Meeting, 1st session, held in Tunis (April 1991)
- Report on Diversification of Aquaculture Production Workshop held in Malta (July 1991)
- Report on Aquaculture Research Subnetworking Seminar held in Cyprus (October 1991)
- Report of the Seminar on Planification held in Algiers, (June, 1992)
- "Third Phase of the Mediterranean Aquaculture Cooperation", *ad hoc* Committee report, (June 1992).
- MEDRAP II proposed future organisational structure, activities and budget, report of a consultancy to MEDRAP II by Z.H. Shehadeh, July 1992.
- Report of the MEDRAP II Network Steering Committee held in Tirana, (December 1992).

CONTENTS

A. BACKGROUND

1. Description of Aquaculture Sector

The Mediterranean region presents the following characteristics:

- Total population of 364 million (1985, World Bank).
- Total consumption of fishery products:5 140 000 t.
- Net deficit in fishery products consumption is around 1 200 000 t, that is closed to 3.4 Kg per capita per year.
- Most part the natural fisheries are not at their upper limit of exploitation.
- Most of the countries involved in a process of rapid development of aquaculture, backed by the demand of the regional market for high quality sea-products, by the need to make the best use of certain coastal areas and at last by the need to create employments in these areas.
- Regional aquaculture production estimated at a rounded yearly average of 700 000 t.

2. Mediterranean Aquaculture Cooperation

Common concerns and interests (needs, priorities, problems and opportunities) between the Mediterranean countries have provided basic reasons to start a regional programme, under the name of MEDRAP, Mediterranean Regional Aquaculture Development Project, funded by UNDP, to help countries to become more self-supporting in their ability to train and manage human resources for aquaculture development support, in their capability for the supply of essential physical inputs for aquaculture and in their ability to supply good fish products to the consumer.

After two preparatory phase over the years 1979 (RER/78/004) and 1980–1983 (RER/7/004 and RAB /79/033) during which the activities and priorities of the Mediterranean countries have been reviewed and a programme of activities selected, the projects RAB/83/016 and RER/83/001 have been decided, with FAO as the implementing agency.

Total contribution of UNDP for these projects, implemented over the years 1984–1986 has been over 1 400 000 USD. In addition Italy has contributed with important funds (3 000 000 USD) and permanent experts, as well as, to a lesser extent, France (around 250 000 USD in trust funds, experts and kind) and Spain (around 50 000 USD in kind). Tunisia as hosting country for the headquarters (Institut National Scientifique et Technique pour l'Oceanographie et les Peches) has contributed for an amount estimated at 50 000 TND. Other participating countries (Algeria, Cyprus, Egypt, Greece, Malta, Marocco, Portugal, Syria, Turkey, Yougoslavia) have also contributed in kind at their national level.

During this phase, now called MEDRAP I, the stategy has been:

- to select pilot projects in each country: Nador lagoon in Marocco, El Kaia (lake Mellah and Oubeira) in Algeria, Monastir in Tunisia, Raswa in Egypt, Latakia in Syria, Beymelek lagoon in Turkey, Paphos in Cyprus, Kyparissi in Greece, Rovinj (Limsky Kanal) and Dubrovnik (Ston) in Yougoslavia, Mistra in Malta, Olean (Faro) in Portugal,

- to organize training session in the participating countries (6 sessions on applied hydrobiology, aquaculture and environment, pathology, nutrition, 6 sessions on aquaculture technology, 1 session on socio-economics aspects, 3 study tours),

- to provide technical assistance to the pilot projects from a small permanent team, to the training session with consultants from the region and to the national administrations for the formulation of aquaculture development plans when relevant.

At the end of MEDRAP I, Italy was considering an increase in its involvment in a regional project, under the name of AQUAMED, which would have been a continuation, giving special emphasize to the information aspect.

This project never began, and UNDP thus decided to finance (RAB: 1 830 000 USD, RER: 400 000 USD) a second phase of MEDRAP for the “Promotion of aquaculture development through the establishment of a permanent mechanism for cooperation/ coordination in the Mediterranean region. The project aims at the creation of networks of regional aquaculture development institutions together with the strengthening of such institutions and aquaculture inputs supply industry”.

The strategy of MEDRAP II in supporting aquaculture development is the establishment of a permanent regional mechanism, conceived as a complement to national efforts and intended to mobilize regional capabilities and financial resources.

The MEDRAP II Project Document has initially foreseen the establishment of the following specific regional networks:

- *Research*
- *Training*
- *Extension*
- *Production*

During its first session, the Network Steering Committee decided to add the Information System Network.

In Research field, some specific sub-networks have been created and others are planned to be constituted with focal points in selected countries:

Lagoon Management, in Morocco

Environmental aspects of Aquaculture, in Tunisia

Diversification of Production, in Cyprus

Pathology, in Malta

Nutrition, in Portugal

Freshwater Culture, in Egypt

A project core team at the MEDRAP Coordination Centre, together with national staff in four subregions (see paragraph 4.1), supported by FAO Headquarters, the Associated Countries and consultants, organize the activities, by using the facilities, personnel and equipment available. The main activities for the year 1993 are presented in Page 16A.

The various MEDRAP activities and the national priorities led to the amendment of the initial options regarding the Networks. The following networks have been retained for a permanent regional cooperation:

GLOBAL ACTIVITY PROGRAM 1993

PERIOD	ACTIVITY	VENUE	PARTICIPANTS	RESPONSIBLE PARTY	EXPERTS
APRIL 1–2	Seminar on Constitution of "Information System" Network (SIPAM) Review and adoption of the Project Document	TUNISIA	- Representatives of member and associated countries - Representatives of concerned organisations and institutions	MEDRAP PC in collaboration with Tunisian N C and F A O	Consultant from FAO. notably for the elaboration of the project document
May 10 – 21	Training course on Advanced technics in Mediterranean marine hatcheries	TUNISIA	- Selected by CIHEAM	CIHEAM + INSTOP (TUNISIA) in collabo. with MEDRAP	
May 19 – 20 – 21	Seminar on Constitution of "Technology and Economics"Networks Review and adoption of the Project Documents	TUNISIA	- 2 Representatives of member and associated countries (1 expert in technology and 1 in economics) - Representatives of concerned organisations and institutions	MEDRAP PC in collaboration with CIHEAM	Consultant notably. for the elaboration of the project document
May 26 – 28	Participation to World Aquaculture 93 (Congresso y Exposicion	SPAIN	- 2 Repre. / country	PC in collaboration with Europ. Aqua. Soc.(EAS) Spanish Fish Farm Ass.World Aqua. Soc. (WAS)etc…	
JUNE 14 – 15	Seminar on Constitution of "Aquaculture and Environment" Network (PAP/RAC) Review and adoption of the Project Document	GREECE	- Representatives of member and associated countries - Representatives of concerned organisations and institutions	MEDRAP PC in collaboration with PAP/RAC	Consultant.notably for the elaboration of the project document
POSTPONED TO	- Workshop on Fresh water culture	EGYPT	- Expert or researcher in fresh water culture from	PC + NC Egypt	Consultant.if necessary

SEPTEMBER	- Constitution of the Subnetwork on fresh water culture		member and associated countries		
JUNE 23 – 24 – 25	Workshop on Aquaculture engineering and off shore culture	FRANCE	- Engineer or Aquaculturist from member and associated countries	Fresh N C in collaboration with MEDRAP PC	
CANCELLED	Training course on Bact. diagnosis in Mediterranean marine aquaculture industry	SPAIN or PORTUGAL	- Members of the Subnetworks on pathology	Subnetwork Coordinator on pathology in collab. with Global Fish disease information exchange and diaçnosis system (FAO)(GCP/INT/526/JPN) PC to follow up	
OCTOBER 19 – 21	- workshop on Food Production and Feeding Technics	PORTUGAL	- Expert or researcher in the field of Nutrition from member and associated countries	PC + NC Portugal	consultant if necessary
NOVEMBER 3–4–5	STEERING COMMITTEE MEETING	LEBANON	- NCs + SRCs - UNDP + FAO - EEC - PAP/RAC - CIHEAM - SIPAM	PC + NC Lebanon	

- *Technology*: to promote mainly the Research and Training activities related to Aquaculture technology,
- *social, Economic and Legal Aspects of Aquaculture*: to develop activities on the economic, marketing, financial, and planning aspects,
- *Environmental Aspects of Aquaculture Management*: to support the programmes related to aquaculture and environment.
- *Information*: to develop a system of collecting, processing, storing and reporting of data and information.

3. Institutional framework

3.1. MEDRAP II Structure

- **National Coordinators** : in each participating country, there is an overall focal point of national coordination activities in aquaculture development. With a view to coordinate action within the country and between the Project and the participating countries, the Governments have each appointed a National Project Coordinator who is a member of the Network Steering Committee.

- **Network Steering Committee** : overall responsibility for decision-making concerning common action under the Project is vested in the Network Steering Committee, who meet periodically, at least once a year, and in which all concerned parties including members and associated countries participate in addition to UNDP and FAO.

- **Project Coordination Center** : is located in Tunis and provides overall coordination, secretarial and information services to the member and associated countries. Because of the diversity of subjects and long range difficulties, the participating countries are grouped into four sub-regions and sub-centres.

- **Subregional Centers :** for each sub-regional centre, a sub-regional coordinator is designated to ensure the promotion, the organisation, the management and the follow-up of the Project's activities. The subregional Centers are located in:

+ Algiers for the subregion of Algeria, Morocco Tunisia and Portugal;
+ Tripoli for Lybia, Egypt and Malta;
+ Nicosia for Cyprus, Lebanon and Syria;
+ Dubrovnik for Croatia, Turkey, Bulgaria and Albania.

3.2. The organisation of the Mediterranean Aquaculture Networks

Taking in account the need of a mechanism to link permanent activities of the regional programme with those funded by donors though other channels and a focal point for external assistance to regional activities, and after review by an ad hoc committee, it has been confirmed that the best way towards perennity, at the end of MEDRAP II, was to relay on the existing institutions, namely General Fisheries Council for the Mediterranean (GFCM), Mediterranean Action Plan /Priority Action programme/Regional Activity Centre (MAP-PAP/RAC) and Centre International des Hautes Etudes Agronomiques pour la Mediterranee (CIHEAM), who undertake to support the Networks and coordinate their activities. (a detailed presentation of these organizations is given in annex 1).

At the third session of the Steering committee (Tirana, December 1992), the following recommendations concerning the future structure of the Mediterranean Cooperation in Aquaculture were adopted:

a) The GFCM will ensure the General Coordination of the future activities and will have to establish a Committee on Aquaculture for the purpose.

b) The PAP/RAC should carry out the aquaculture and Environment Network activities.

c) The CIHEAM will be in charge of the Technology Network and the Economics Network.

d) The Tunisian Government will host the SIPAM Network which will operate under the GFCM Secretariat.

Thus the organisational framework consists of:

- General Coordinating Body: The GFCM, through it permanent overall coordinating mechanism, will allow all the parties involved in the cooperation, to be regularly in consultation. In addition and when relevant, the GFCM will be assigned the task of collecting the funds available from Donors to support the activities of the Networks.

- Coordinating Unit: GFCM Secretariat.

- Network Coordinators:

  + CIHEAM: to coordinate the Networks on:

    - Technology of Aquaculture in the Mediterranean (TECAM) and,
    - Social, Economic and Legal Aspects of Aquaculture in the Mediterranean (SELAM).

  + MAP/PAP/RAC: to coordinate the Network on:

    - Environmental Aspects of Aquaculture Management in the Mediterranean (EAM)

  + TUNISIA: to host the Network on:

    - System of Information for the Promotion of Aquaculture in the Mediterranean (SIPAM)

- Sub-Committee on Aquaculture: to be established as an Advisory Committee under the GFCM. Members of the Sub-Committee on Aquaculture are all member countries representatives, along with FAO, the Network Coordinators and delegates from other Organisations/Institutions concerned. The Sub-Committee on Aquaculture will hold, at least, one regular session each year.

The networks are complementary. Each network coordinator nominate a representative who will be the operational correspondent with GFCM and other networks.

This framework is presented in figure 1.

INSTITUTIONAL FRAMEWORK

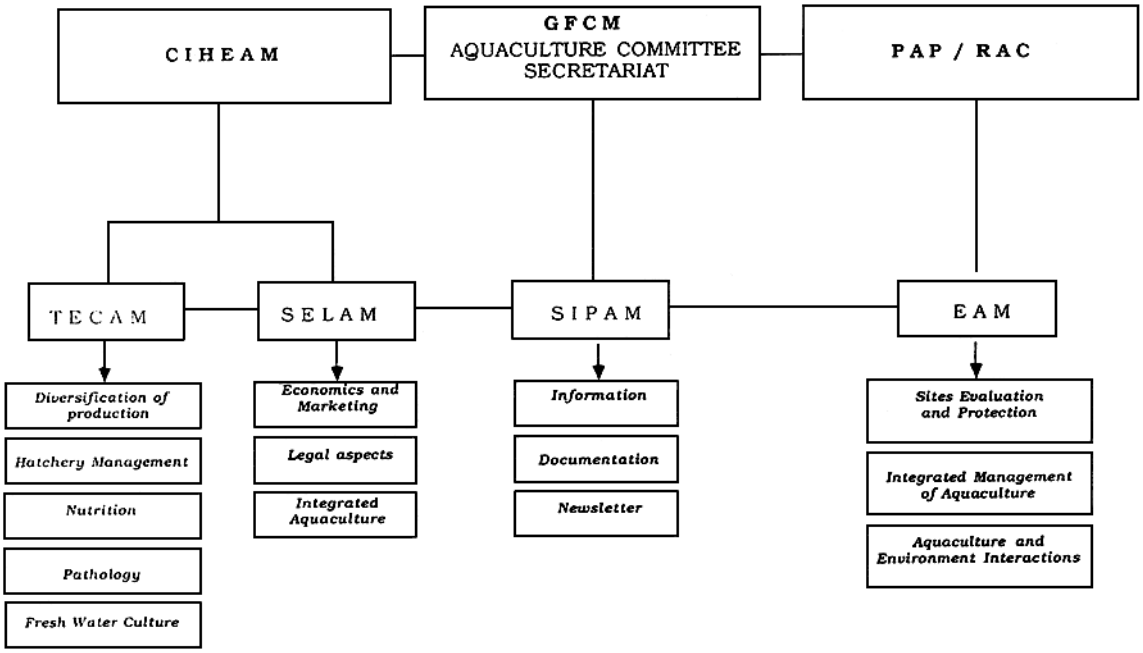

Figure 1

B. NETWORK JUSTIFICATION

CIHEAM has considerable experience in the planning, execution and monitoring of cooperative research networks in the Mediterranean area, as well as in the development of post-graduate training curricula.

CIHEAM is more than competent to gradually promote aquaculture technology within an appropriate socio-economic framework, and to coordinate networks in charge of aquaculture development.

1. Needs for integrated development of aquaculture:

The technical success of aquaculture has brought the sector much attention and has attracted a great deal of private and public investments. Scientific and technical progress have expanded significantly over recent years.

It is in the direct interest of aquaculturists to be more receptive to newer aquaculture systems, technical, inputs and effective management.

This document encompass two networks:

(a) the Technology of Aquaculture (TECAM) will deal with the biological and technical basis, and

(b) the Social, Economic, and Legal Aspects (SELAM) will concern the socio-economic environment of aquaculture. Both Networks will allow the transfer of knowledge and the dissemination of outputs resulting from the various development activities.

2. Expected Results:

a) A currently running, self-sufficient and permanent, networks for a sustainable development of aquaculture within the socio-economic context of the Mediterranean Region.

b) the promotion of adapted technologies for fry production, aquaculture engineering, fish food technology, feeding technics, pathology, fish farm management, etc…

c) the set up of guidelines and data base on products' specifications, quality control, fish pathology (diagnosis technics, disease control), farm management, etc…

d) the set up of Market Information Systems to favour aquaculture products' outlets.

e) the elaboration of socio-economic and legal framework and data base for the promotion of aquaculture within the development of national plans.

3. Target Beneficiaries:

1) Public and private investors, producers, researchers, economists, managers, who are concerned by the technical, socio-economical and legal aspects of aquaculture.

2) Scientists and administrators involved in planning and promoting of aquaculture development at national and regional levels.

4. Strategy and institutional arrangements:

i. The Regional Centre of TECAM and SELAM Networks will be located at CIHEAM/Mediterranean Agronomic Institute of Sarragoza and will be responsible for coordination of activities in the field of the Networks.

The Regional Centre may assign temporary or permanent specific activities to some national institutions to support the activities of the Networks.

In this respect, and since four specific activities related to TECAM network were identified in the research field (see para 2 - Mediterranean Aquaculture Cooperation): Diversification of production, in Cyprus, Pathology, in Malta, Nutrition, in Portugal, and Freshwater culture, in Egypt, the Regional Centre should involve the national institutions concerned in Cyprus, in Malta, in Portugal and in Egypt, in the implementation of these activities.

ii. Each Network will be developped in 3 phases:

- **a first phase**, to elaborate the Networks' strategy and to start-up the respective programmes.
- **a second and third phase**, to develop the activities and to set up the relevant guidelines and to collect the data base.

iii. During the first phase of TECAM and SELAM, the concerned institutions from MEDRAP Member and Associated Countries may participate in the activities of each Network. From the second phase, any of those institutions, and any other institutions or persons from the Mediterranean countries, interested to support the networks and to benefit from their services and/or activities, should notify the Network Manager (CIHEAM) of their willingness to be associated to participate in the Networks' activities.

From each Mediterranean Country, one institution called the National Institution will be selected by the Management Board as the vis-a-vis of each Network.

iv. TECAM and SELAM will be managed:

- by MEDRAP, with the support of CIHEAM, at their first phase,
- by CIHEAM, with the support of MEDRAP, at their second phase,
- by CIHEAM, as Network Manager, and their respective Management Boards, at their third phase.

The Management Board of both Networks will be composed of:

a) On a permanent basis:

- The Representative (s) of each National Institution
- The Representative of the Coordinating Unit (GFCM Secretariat)
- The Network Manager

b) When needed:

- The Representatives of the other Network Coordinators (MAPPAP/RAC, SIPAM)
- Representatives of any other institutions invited

The Management Board of both Networks will hold a meeting at least once every other year.

C. OBJECTIVES AND ACTIVITIES

Several meetings and seminars during MEDRAP I and II have allowed the identification of activities according to priorities selected among the countries' needs, to be developped in both Networks (TECAM and SELAM).

Three main priorities in the fields of Research and Training, related to TECAM Network were identified (see enclosed tables 1 and 2, pages 23 A and 23 B):

- Diversification
- Pathology
- Nutrition

The main priorities related to SELAM Network, notably identified in the Seminar on Planification of Aquaculture Development held in Algiers on June 1992, are as follows:

- Marketing
- Integration of Aquaculture in development plans
- Legislation

The objectives and activities of TECAM and SELAM Networks presented in annexes 2 and 3, are basically proposed as a general framework. They are not definitive and may be subject to further proposals.

The diversification of production, the hatchery management, nutrition requirements and feed production, reduction of pathological hazards, and freshwater culture constitute the main items developped in the annexed proposed activities of TECAM.

The Economic framework for management and marketing in Aquaculture, the Strategy for integrated aquaculture and the Legal framework and regulation of aquaculture constitute the main items developped in the annexed proposed activities of SELAM.

A first analysis of these activities shows that they could be grouped into three main blocks:

- production bottlenecks,
- optimisation of production,
- and activities for a sustainable development in the future,

that could help when list of work plan activities will be produced for consideration by the Management Board.

Table 1: Synthesis of Aquaculture Research Priorities in the MEDRAP II Region, based on on-going and Planned Research Activities

RESEARCH AREA	MEDRAP II ZONES*				MEDRAP II REGION (All zones)
	I	II	III	IV	
1. Diversification of Species and Technology	4(100)	2(67)	1(33)	4(100)	11(79)
2. Breeding/Hatchery Management	2(50)	1(33)	2(67)	1(25)	6(43)
3. Nutrition	2(50)	-	3(100)	3(75)	8(57)
4. Pathology	4(100)	-	2(67)	2(50)	8(57)
5. Offshore Aquaculture	-	-	-	2(50)	2(14)
6. Environmental Aspects of Aquaculture	3(50)	2(67)	-	2(50)	7(50)
7. Lagoon Ecosystems	1(25)	-	-	3(75)	4(29)
8. Genetics	1(25)	-	2(67)	-	3(21)

* Number of countries with on-going and/or planned activities in each research area. Numbers in parenthesis=percent of total number of countries

Source of data: MEDRAP II. 1991. Seminar on Aquaculture Research Sub-Networking. Nicosia, Cyprus, 22–25 October 1991.

Table 2: Synthesis of Training Priorities in the MEDRAP II Region

TRAINING AREA	MEDRAP II ZONES*				MEDRAP II REGION (all zones)
	I	II	III	IV	
Pathology	3(75)	3(100)	2(67)	1(25)	9(64)
Nutrition/Feed Technology	2(50)	3(100)	1(33)	2(50)	8(57)
Breeding/Hatchery Technology	2(50)	2(67)	1(33)	2(50)	7(50)
Farm Management	1(25)	2(67)	1(33)	1(25)	5(36)
Planning	1(25)	2(67)	1(33)	1(25)	5(36)
Production Technology	1(25)	1(33)	1(33)	2(50)	5(36)
Environment	2(50)	3(100)	-	-	5(36)
Marketing/Financial Analysis	1(25)	2(67)	-	-	3(21)
Engineering	-	2(67)	(1(33)	-	3(21)
Genetics	1(25)	-	-	1(25)	2(14)

* Number of countries with interest in the topic. Numbers in parenthesis = percent of total countries

Source of data: MEDRAP II, 1991. Aquaculture Training in the Mediterranean. MEDRAP II Seminar, Montpellier, 11–14 September, 1991.

Due to the considerable volume of work which would result from the implementation of all the activities with limited available funds, a selection has to be undertaken in order to sort out a limited number of activities to be implemented as the first step in the development of the networks.

In addition, as the degree of their complexity is variable, some activities require heavy means in finance and in time, and others are relatively easy to implement. Thus, another classification should be considered:

- activities to the implemented with existing funds and,
- activities applying additional external funds.

Taking in account the priorities and the balanced repartition hereabove mentioned, Workgroups of concerned experts should prepare a selection of activities to be presented to the Management. Board.

The Management Board and the Coordination Unit of TECAM and SELAM will ensure the concretisation of the activities for which funds are available. They will proceed, with the support of GFCM, when relevant, to seek additional funds for the implementation of the remaining foreseen activities.

D. INSTITUTIONS INPUTS

1. CIHEAM will provide, for the Regional Centre, the basic necessary operation facilities, administrative personnel and funds to support the activities of both Networks.

2. The National Institutions associated to the Network activities will provide the necessary facilities professional staff, information and funds for jointly agreed activities.

3. FAO should allocate funds to allow the proper functioning of the GFCM Aquaculture Sub-Committee, if and when established by the Council, and its participation in activities related to the work of the Management Board.

E. REVIEWS, REPORTING AND EVALUATION

An evaluation report should be prepared, after completion of Phase II, by MEDRAP in concert with CIHEAM and FAO. the report will be submitted to the TECAM and SELAM Management Board.

F. BUDGET

1. Proposed Budget basis

The proposed estimated budget for each network has been calculated on the following basis:

- Lump sums for items: Missions, Consultants, Reports and Publications.
- Cost basis for the following activities:

I. For first phase (1993):

a) One Seminar:

30,000 × 1 = 30,000 $

b) Two Workshops and working group meetings:

30,000 × 2 = 60,000 $

Total estimation = 90,000 $

II. For second phase (1994)

a) Two Seminars, Workshops or Training Session

30,000 × 2 = 60,000 $

b) Three working group meetings

10,000 × 3 = 30,000 $

Total estimation = 90,000 $.

III. For third phase (annual budget)

Due to the uncertaincy in predicting funding available for Phase III (after the closure of MEDRAP II) an indicative figure has been calculated of what it would cost to maintain the same number of activities as foreseen for the MEDRAP contribution to Phase II.

a) Two Seminars, Workshops or Training Sessions

40,000 × 2 = 80,000 $

b) Three Working group meetings

10,000 × 3 = 30,000 $

Total estimation = 110,000 $.

Proposed Budget Table

ITEMS	Phase 1 1993 (7 months)	Phase 2 1994	Phase 3 (annual)
MISSIONS			
- Mangt Board Meetings	10000	10000	10000
- Evaluation Group	5000		
- Others	8000	8000	10000
CONSULTANTS	3000	10000	12000
ACTIVITIES: SEMINARS, WORKSHOPS TRAINING, ETC…	90000	90000	110000
REPORTS AND PUBLICATIONS	2000	5000	8000
TOTAL	**118000**	**123000**	**142000**

N. B.: The contributions of CIHEAM and National Institutions for facilities, administrative support, and necessary professional staff and equipment will be evaluated at a later stage.

2. SOURCE OF FUNDS FOR:

1) Phase 1: MEDRAP II
2) Phase 2: CIHEAM, MEDRAP, and DONORS
3) Phase 3: Participating Institutions supported by CIHEAM and Donors

ANNEXES

ANNEXE 1
ORGANISATIONAL STRUCTURE OF GFCM, CIHEAM, MAP-PAP/RAC (Z.H. SHEHADEH, 1992)

The General Fisheries Council of the Mediterranean (GFCM)

The GFCM has been in existence for about 40 years and is coordinated by the FAO. Membership includes all countries of the Mediterranean rim as well as those bordering the Black Sea. (Therefore, all current member countries of MEDRAP are represented in the Council.) A modest membership fee is paid by all country members in support of the Secretariat.

The organizational structure includes the Council, the Secretariat and the Fisheries Management Committee. The Council is the governing body and is constituted by one representative of each country, FAO, associates and observers. The Secretariat is provided and supported by FAO; it receives technical support from various technical divisions of FAO's Fisheries Department. The Secretariat is responsible for carrying out activities approved by the Council and for the planning of all meetings of the Council, its Executive Committee and the Fisheries Management Committee. The Fisheries Management Committee is an advisory technical body to the Council. It convenes *Ad Hoc* working groups and expert consultations to deal with matters referred to it by the Council. Many of these activities are supported by external donors through the efforts of the Secretariat. At present, the GFCM does not include an aquaculture committee, but it can be established with the Council's approval.

The GFCM had been active in promoting research cooperation in aquaculture in the Mediterranean through the Cooperative Programme of Research on Aquaculture (COPRAC). The COPRAC was discontinued largely due to the lack of an action programme to underpin the meetings of researcher workers, and because of the development of regional aquaculture activities through MEDRAP I, which was coordinated by the FAO/UNDP Aquaculture development and Coordination Programme (ADCP). Unfortunately, the ADCP replaced rather than strengthened, for GFCM's role in aquaculture research and development in the region. As a result, the opportunity to create a permanent coordination mechanism under the GFCM was temporarily lost and MEDRAP activities were continued as a fixed-term field activity under MEDRAPII.

The Rules of Procedure of the GFCM permits to undertake activities in order "*to encourage, recommend, coordinate and, as appropriate, undertake research and development activities, including cooperative projects in the area of fisheries (includes aquaculture) and the protection of marine resources*" (Article III, Agreement and Rules of Procedure of the General Fisheries Council of the Mediterranean, as amended on 23 May 1963; FAO, 1977. Basic Texts, Volume III, Fascicle 7).

The GFCM Secretariat also has the authority to establish project or programme accounts outside the Funds-In-Trust as long as the found are allocated for a specific activity (special studies, projects and/or programmes).

The Centre International des Hautes Etudes Agronomique pour la Mediterranee (CIHEAM)

The centre was established by the OECD and the Council of Europe on the request of the General Directors of Agriculture of Southern Europe, and has been in operation since 1962. Its membership has expanded with time and now included Spain,

France, Greece, Italy, Portugal, Turkey, Yugoslavia, Albania, Egypt, Lebanon, Algeria, Tunisia, and Morocco. Of the MEDRAP II countries, Syria, Libya, Bulgaria and Cyprus are not members, though Syria is expected to join shortly.

The organizational structure consists of the Board of Directors, the Scientific Advisory Committee and the four Regional Institutes. The Board of Directors is the governing body; its constituted by one representative from each of the member countries, representatives of the Secretary General of the OECD and the Council of Europe, which also have advisory status. The Scientific Advisory Committee is composed of a variable number of persons appointed by the Board. Members are selected mainly from agricultural research institutions in the member countries, from country representatives and other institutions that contribute to the center.

The committee convenes on the request of the Board to discuss and provide opinions on matters referred to it by the latter. *Ad Hoc Groups* composed of specialists assist the committee in its tasks. The General Secretariat is composed of the Secretary General (appointed by the Board), the Directors of the four Institutes and support personnel. It carries out the activities approved by the Board, prepares the plan of work and budget and plans the meetings of the Board, its Advisory Committee and the latter's *Ad Hoc* groups. The Institutes (one in each of Spain, France, Italy and Greece) carry out programme of work through networking. Their directors are appointed by the Board.

All members pay an annual fee in support of the General Secretariat; in addition, countries which host the Institutes provide all financial support for their respective institute.

The Center provides post-graduate training in agricultural research for higher level staff and conducts research through networks managed by its four regional centers. Programmes are focused on (a) rural development and economics (France), (b) irrigation and virology (Italy), (c) forestry, sub-tropical green house practices (Greece) and (d) plant genetic improvement and animal production(Spain). The Center currently manages 20 research networks. It has carried out short training courses in aquaculture through its Institute in Zaragoza, Spain, and is in the process of expanding this activity. It has not carried out any research on aquaculture topics and its infrastructure does not at present include specialised institutes for this purpose.

The Center has cooperative agreements with the FAO, the CEC (Commission of European Communities) and the AOAD (Arab Organization for Agricultural Development). Observers from these organisations participate in the meetings of the Board. There are also strong linkages with donors, especially in Europe, and many activities have been supported with external funds.

The Mediterranean Action Plan (MAP)

The MAP was established in 1976 by the Barcelona Convention for the Protection of the Mediterranean Sea Against Pollution and became operational in 1978. It has 18 members, including all countries of the Mediterranean rim and the EEC. Of the MEDRAP II countries, only Bulgaria is not a member.

The organizational structure is composed of the following units: (a) the Ordinary Meeting of the Contracting Parties which is the governing body. It is constituted by one representative from each of the member countries and meets biennially, (b) the Bureau which is the equivelant of an executive committe (4 members) which meets in between the meetings of the Contracting Parties to deal with urgent matters; (c) the Scientific and Technical Committee and the Socio-Economic Committee which meet annually to

consider technical matters and draft recommendations to the member countries, for approval by the Contracting Parties, and to review the programme of work and budget (biennially); (d) the Coordination Unit (MEDU, Athens), charge of implementation and coordination of the work programme approved by the Contracting Parties; (e) the Regional Activity Centers (RAC) -- four; one in each of France, Croatia, Malta and Tunisia, which coordinate activities in their respective fields and (f) the National Focal Points constituted by individuals nominated by member countries to coordinate activities with the Centres.

The Action Plan has four components:

(a) Socio-Economic: implemented by BP/RAC, France and PAP/RAC, Croatia.

(b) Scientific & Techical: MEDPOL, implemented by MEDU, Greece.

(c) Legal: implemented by REMPEC, Malta and SPA/RAC, Tunisia.

(d) Institutional: which consists of MAP's institutional arrangements.

The MAP has a substantial action programme in aquaculture which includes all the priority interests of MEDRAP II. (In fact, cooperation with MAP/PAP-RAC environmental matters of mutual concern was initiated during phase I of the MEDRAP Project). The aquaculture element of MAP is the responsibility of the PAP/RAC in Split, Croatia, although MEDPOL, in Athens (MEDU) also deals with technical aspects related to the impact of aquaculture on the environment.

ANNEX 2
OBJECTIVES AND ACTIVITIES

TECHNOLOGY OF AQUACULTURE IN THE MEDITERRANEAN (TECAM)

***OBJECTIVE 1*:**

Increase of production by means of biological and technical diversification.

The activities held in the framework of MEDRAP Project have led to identify two main priorities: the first on diversification of cultured species, the second one on diversification of culture systems.

***OUTPUT 1.1*: Culture of species with high production yield.**

Activity 1.1.1: Development of joint research programme on specific topics directed towards biological diversification, with priority on:

- Fish : *Puntazzo puntazzo, Dentex dentex, Pagrus pagrus, Solea sp., Coryphaena sp.*
- Crustacea : *Penaeus sp.*
- Molluscs : *Mytilus edulis*

Activity 1.1.2: Development of research towards strains and hybrids of species with favourable culture characteristics.

***OUTPUT 1.2*: Extension of existing culture systems and development of new appropriate systems.**

Activity 1.2.1: Seminar and study tour on fish cage culture and long-line for shellfish culture offshore: site conditions, architecture of structures, legal aspects.

Activity 1.2.2: Identification of suitable site for offshore culture and farm design.

Activity 1.2.3: Set-up of global information related to offshore technologies, with special emphasis to equipment.

Activity 1.2.4: Development of extensive culture systems.

***OBJECTIVE 2*:**

Hatchery management.

***OUTPUT 2.1*: Guidelines for broodstock management.**

Activity 2.1.1: Broodstock conditions: feeding, hygiene conditions, handling,…

Activity 2.1.2: Genetic broodstock improvement

Activity 2.1.3: Spawning control.

***OUTPUT 2.2*: Guidelines for larvae and fingerlings production.**

Activity 2.2.1: Optimization of the procedures and protocoles for cysts desinfection and hatching.

Activity 2.2.2: Development of diagnosis and prophylaxy in larval stages.

Activity 2.2.3: Set-up of criteria for selection of fingerlings.

Activity 2.2.4: Training in advanced techniques in marine hatcheries.

OUTPUT 2.3: Live food production

Activity 2.3.1: Bank of species to be used as live food

Activity 2.3.2: Chemostat for live food production

Activity 2.3.3: Enrichment technics for larvae: improvement of nutritional value by pre-feeding with rich diet.

OBJECTIVE 3

Nutrition requirements and feed production.

***OUTPUT 3.1*: Manufacturing and utilization of appropriate feed.**

Activity 3.1.1: Meetings and workshops. A first meeting on food production and feeding technics will include the constitution of a workgroup on the subject.

Activity 3.1.2: Identification and analysis of localy suitable available feed ingredients:

- chemical analysis: the analysis has to be as complete as possible (including toxic and antinutritional factors) and has to be performed, possibly in different countries, with the same intercalibrated methods.
- In a second step chemical analysis should be followed by in vivo measurements such as digestibility. These again need standardisation of methods and the work shared among countries.

***OUTPUT 3.2*: Qualitative and quantitative feeding requirements**

Activity 3.2.1: compilation of existing data on different species, including the ones considered in the diversification objective. (Objective 1).

Activity 3.2.2: completion of scientific data on requirements on main nutrients (energy, proteins, main amino acids, lipids essential fatty acids) on one fish (Sparus aurata).

Activity 3.2.3: Formulation, preparation and experimenting of feeds.

Activity 3.2.4: Training of technicians and scientists.

***OUTPUT 3.3*: Establishment of a data base on nutritional aspects.**

Activity 3.3.1: Inventory of: aquafeed manufacturers existing at regional level, institutions involved in aquafeed research and development, feed equipment manufacturers.

Activity 3.3.2: Integration of information resulting from the activities of the previous outputs.

OBJECTIVE 4

Reduction of pathological hazards.

The main problem in this area experienced by most member countries have been identified as follows:

- The relatively minor production level of aquaculture till now has resulted in low incentive to invest in back-up pathology R & D work at the national level. Therefore, the information available at present is fragmentary and the prospect of cooperation such as networking is well adapted for improving this situation.

- A deficiency in the number of fish veterinarians and pathologists in the region.
- A lack of data collection, documentation and dissemination facilities.

***OUTPUT 4.1*: Establishment of a data base on Mediterranean Fish and Shellfish Disease.**

Activity 4.1.1: Collecting and updating the information on fish and shellfish diseases: listing of institutions involved in research and control in fish pathology, facilities and equipments, projects and research programmes, country desease status, control measures, drug and chemical use in aquaculture, legal aspects, etc.

Activity 4.1.2: Dissemination of information with the scope to create a permanent forum of rapid exchange of ideas and developments throughout the region by means of all available support including SIPAM Newsletter.

***OUTPUT 4.2*: Standardisation and uniformity in pathological methodologies: diagnostic technics and desease control.**

Activity 4.2.1: Initiation of common operations with existing institutions with interests that are applicable to the Mediterranean region.

Activity 4.2.2: Workshop and meetings on intercalibration of methodologies and exchange of information (prophylaxis, diagnosis, treatments, etc…).

Activity 4.2.3: Publication on Mediterranean fish deseases: compreensive review of the state of knowledge on marine fish pathology emphasizing current diagnostic methodology and its application to the Mediterranean region.

Activity 4.2.4: Monitoring in order to prevent deseases appearance and spreading.

Activity 4.2.5: Training on specialized diagnostic methodology.

***OUTPUT 4.3*: Establishment of a regional reference collection of aquatic animal pathogens, reference antisera, etc.**

Activity 4.3.1: Identification, collection and classification of material.

OBJECTIVE 5

Culture of living resources in inland waters.

Freshwater aquaculture is playing an important role in the aquaculture of several Mediterranean countries and has been considered as an integral part of the programme to be enhanced at regional scale. Five major areas have been identified that cover the interest of most of the countries:

- Ecological studies on freshwater areas in order to introduce or develop fish culture in natural waters,
- Technology in pond fish farming with special regards to tilapia and carp production,
- Development on the production technology of high value freshwater species,
- Engineering and design of integrated systems,
- Processing and marketing of freshwater fish species.

Therefore, the following programmes are proposed as start-up activities :

***OUTPUT 5.1*: Restocking programmes for the establishment of permanent stocks capable of sustaining fishery activities.**

Activity 5.1.1: Review of inland waters suitable for restocking and collection of data on their physical and biological charateristics.

Activity 5.1.2: Introduction in lakes and reservoirs of species appropriate to their environment conditions.

Activity 5.1.3: Extension and training of local fisherman on fishery technics.

Activity 5.1.4: Follow-up of fishery yield and stock management.

***OUTPUT 5.2*: Development and extension of technology in pond fish farming particularly for tilapia and carp production.**

Activity 5.2.1: Establishment of seed production systems: broodstock management, propagation, larvae rearing and nursing.

Activity 5.2.2: Integrated small scale aquaculture in rural communities in view to achieve food security and increase the availability of low cost aquaculture products.

Activity 5.2.3: Development of research towards strains and hybrids with favourable culture characteristics.

***OUTPUT 5.3*: New culture systems**.

Activity 5.3.1: Development of joint research programme on the valorization of used waters by aquaculture.

Activity 5.3.2: Development of polyculture production systems.

Activity 5.3.3: Development of research towards strains and hybrids of species with favourable culture characteristics.

***OUTPUT 5.4*: Value-added products resulting from the processing of freshwater production.**

Activity 5.4.1: Review of previous works on the subject (carp, tilapia, etc.),

Activity 5.4.2: Assesment of the market for new products.

Activity 5.4.3: Pilot unit for product development and market testing.

***OUTPUT 5.5*: Data base on Mediterranean freshwater culture.**

Activity 5.5.1: Collecting and updating the information on freshwater species, listing of institutions involved in research and development, projects and research programmes, country production status, etc.

ANNEX 3
OBJECTIVES AND ACTIVITIES

SOCIAL, ECONOMIC AND LEGAL ASPECTS OF AQUACULTURE (SELAM)

OBJECTIVE 1

Economic framework for management and marketing in aquaculture

***OUTPUT 1.1*: Economic viability of farming systems.**

Activity 1.1.1: Selection of farming systems for pilot operations permitting to study and to determine the technical and the economic viability.

Activity 1.1.2: Standard investment criteria.

Activity 1.1.3: Code of conduct for the management of aquaculture facilities.

***OUTPUT 1.2*: Product specifications and new products development.**

Activity 1.2.1: Compemdium of regional and international product specifications.

Activity 1.2.2: Updating of norms and practices for names, quality, freshness, packing, labelling, etc…

Activity 1.2.3: Identification and development of new products according to targeted markets.

***OUTPUT 1.3*: Marketing information systems**

Activity 1.3.1: collection and dissemination of information on markets prices.

Activity 1.3.2: Identification of market forces and characteristics.

Activity 1.3.3: Identification of economic advantages of aquaculture practices: programming the productions in order to be adapted to local and foreign market conditions.

OBJECTIVE 2

Strategy for integrated aquaculture

***OUTPUT 2.1*: Integration of aquaculture in national development plans.**

Activity 2.1.1: Elaboration of guidelines for planners and managers for project formulation and implementation.

Activity 2.1.2: Evaluation of training programme needs.

***OUTPUT 2.2*: Socio-economic aspect of integrated aquaculture.**

Activity 2.2.1: Integration of aquaculture in the activities of existing fishermen communities as a positive factor on employment.

Activity 2.2.2: Food supply and increase of income in rural communities.

***OUTPUT 2.3*: Integration of aquaculture in the environment.**

The concept should involve the durable utilization of resources in harmony with the environment and by using aquaculture technologies which should not endanger the qualities of the ecosystem and its resources. This activity is covered by the EAM network.

OBJECTIVE 3

Legal framework and regulation of aquaculture.

Legislation constitutes one of the needs for national management of aquaculture. Action is required at inter-regional level to identify and classify any legislation or regulation aspect related to aquaculture activities.

***OUTPUT 3.1*: Legal requirements for the establishment of an aquaculture enterprise**

Activity 3.1.1: Collection and comparative assessment of legal frameworks concerning aquaculture development in Member Countries: access to and use of land and waters, rules concerning the used water quality, etc…

Activity 3.1.2: Organisation of meeting on legal aspects and discussion on issues of common interest to be considered as basic reference at national level.

***OUTPUT 3.2*: Compendium of directories of regional and international normes related to aquaculture development.**

Activity 3.2.1: Normes for the quality control of end products.

Activity 3.2.2: Normes for environmental safeguards in relation with aquaculture development: water quality policies and hygiene criteria.

Activity 3.2.3: Normes on trade of aquaculture products related to the regulations on fish desease and food inspection systems.

Annex 1
Steering Committee Report
(Tirana, December 1992)

MEDRAP II THIRD STEERING COMMITTEE MEETING CONGRESS PALACE - TIRANA, ALBANIA
10–11 DECEMBER 1992

THURSDAY 10.12.92

OPENING SESSION

AGENDA ITEM 1

(1) The 3rd Steering Committee Meeting of MEDRAP II was held from 10–11 December 1992 in the Palace of Congress in Tirana, Albania.

(2) The Meeting was attended by the National and Sub-Regional Coordinators of Albania, Algeria, Croatia, Cyprus, Egypt, France, Lebanon, Malta, Morocco, Portugal, Tunisia, Syria and Turkey. Also present were Representatives of UNDP, FAO, IFREMER, CIHEAM and the Coordinator of MEDRAP II.

(3) The meeting was opened by the President of the previous cycle, Mr. A. Shinawy who welcomed all present and passed the floor as has become customery, to Mr. A. Flloko, the National Coordinator of Albania.

(4) Mr. A Flloko on behalf of the Ministry of Agriculture and Food and the Directorate General of Fisheries welcomed all participants wishing them a memorable stay.

(5) Mr. H. Akrout, the MEDRAP II Project Coordinator, thanked all the countries present, and our host in the person of Mr. L. Korra, Vice-Minister of the Ministry of Agriculture and Food. He asked the UNDP and FAO Representatives present to convey to their respective organisations our thanks for their continual support. He stressed the importance of UNDP contribution to RER budget.

(6) Mr. R. Ziesler, Representing FAO, thanked the hosts and expressed FAO appreciation and gratitude to the organisers. He wished the meeting success highlighting the fact that sustainability will ultimately rest on the countries of the region.

(7) Mr. Y. Ibrahim, representing UNDP highlighted the importance of MEDRAP II to the region particularly in relation to food production. He said further development is considered important by UNDP and that UNDP will continue to support financially this activity, and will assist governments in this important area.

(8) Mr. L. Korra, Vice-Minister of the Ministry of Agriculture and Food, thanked all present in the name of his Minister. He highlighted the importance of environmental considerations in relation to sound and sustainable development. He wished all a fruitful and constructive meeting.

(9) The officials of the meeting were unanimously designated as follows:

President	:	Mr. A. Flloko (Albania)
Vice-Presidents	:	Mr. G. Kadari (Algeria)
		Mr. C. Agius (Malta)
Rapporteur	:	Mr. H. Kouyoumjian (Lebanon)
Vice-Rapporteurs	:	Mr. A. Berraho (Morocco)
		Mr. J. Menezes (Portugal)

(10) Agenda was adopted as presented.

AGENDA ITEM 2 MEDRAP II ACTIVITIES REPORT

(1) The Coordinator, Mr. H. Akrout introduced document 1, describing briefly major activities. Action has followed recommendations of the previous Steering Committee Meeting except for 3 activities that were postponed upon the request of the host countries where these activities would have been held. He also referred to the recent supportive letter received from the EC Directorate General of Fisheries. Additional information on accomplished activities were Provided by Ph. Ferlin. B. Tritar, D. Stephanou, G. Kadari, C. Agius, and A. Berraho in their respective capacities of Coordinators of these activities, or representing the host countries where these activities were held.

AGENDA ITEM 3 NATIONAL, SUB-REGIONAL AND NETWORK REPORTS 1992

1) The following sub-regional coordinators presented concise reports about their respective regions.

Mrs. D. Stephanou	(Cyprus, Lebanon. Syria)
Mr. Z. Farsi	(Morocco, Algeria, Tunisia and Portugal)
Mr. A. Benovic	(Croatia, Albania, Turkey and Bulgaria)
Mr. C. Agius	(Malta, Egypt, Libya)

on behalf of the Sub-Regional Coordinator.

All speakers stressed the importance of adhering to past recommendations, and in planning for the future, taking into consideration these reports.

2) Other speakers from Tunisia, Croatia, Syria and Albania gave additional information about their respective countries particularly in relation to environmental and market considerations.

3) Individual reports on the status of MEDRAP II prepared by each National Coordinator were distributed and annexed (Annexe 1).

4) Several recommendations were made. These are included at the end of the report of the meeting.

AGENDA ITEM 4 MEDRAP II BUDGET SITUATION 1992

1) Mr. R. Ziesler (FAO/FIDO) introduced Document 2, and mentioned the discrepancies between the RER and RAB allocations. He mentioned that the RER/B7/009 budget Revision “i” awaits UNDP approval, and that the contribution from the French Trust Fund might balance the deficits.

2) It was also suggested to consider the presence of EC Country Representatives in discussions and negotiations with the EC.

SESSION 2

AGENDA ITEM 5 BRIEFING ON THE AD HOC COMMITTEE ON MEDRAP III

1) Mr. G. Kadari introduced Document 4 in his capacity as Chairman if the Ad Hoc Committee Meeting, and briefly presented the main recommendations of the said meeting.

AGENDA ITEM 6 MEDRAP III PROPOSED FUTURE ACTION

1) Mr. H. Akrout introduced Document 5, 6 and 7. He mentioned in particular the contacts with CIHEAM in this respect. He presented a tentative proposal on the

implementation of a MEDRAP III structure, given in the informative document circulated during the meeting and referred to as Annexe 1 to Document 6.

2) This was followed by a discussion session and the recommendations are given at the end of the report.

AGENDA ITEM 7 INVOLVEMENT OF THE CONCERNED PARTIES

1) The main contents of Document 7 were again mentioned by the MEDRAP Coordinator, who then invited the concerned parties or organisations for their comments.

2) Unfortunately no representative of GFCM was present for discussion and comments.

3) Mr. M. Valls reaffirmed CIHEAM interest in MEDRAP and their willingness to cooperate and contribute. However, he made the following conditional remarks:

- All agreements are subject to approval by CIHEAM Board of Directors.
- Possibility of participation of CIHEAM member countries to future MEDRAP activities.
- CIHEAM can not assume at this stage any budgetary allocations to future MEDRAP activities.

4) On behalf of the Director of PAP/RAC, Mr. A. Benovic (Croatia), highlighted the important aspects of Document 7, Annexe 1. He asked the Project Coordinator to clarify officially the interrelation of PAP/RAC and the Tunis Environment Network Centre.

5) Mr. B. Tritar (Tunisia) expanded on SIPAM projected activities and welcomed collaboration with all concerned. He reaffirmed the commitment of the Tunisian Government to host the SIPAM Project and to ensure its local operating costs.

6) Following these presentations, Mr. Ph. Ferlin (France) invited all to be practical. He said that all concerned parties including GFCM, CIHEAM, SIPAM, etc. must initiate quick action for a definitive resolution of their commitments to MEDRAP III, by April 1993.

The Network Steering Committee was informed about the measures taken for the implementation of SIPAM which will become operational on April 1st, 1993 in Tunisia. The NSC approves the proposed Project and the budget including the Funds from the general MEDRAP budget. The budget includes the contribution from the French Trust Fund and from Tunisian Authorities.

7) Mrs. D. Stephanou (Cyprus) said that she accepts in principle the proposed structure as having potentials of being successful, however, this could not be binding at this stage as she considers certain important elements are missing.

8) Mr. Menezes (Portugal) mentioned the accomplishments of MEDRAP II. He mentioned, however, that there were still unresolved problems like marketing that needed attention.

9) Mr. H. Kouyoumjian (Lebanon) mentioned the sad reality that a group of countries are still today where they were at the beginning of MEDRAP. Of course, this is mainly due to the absence of major aquaculture related activities in these countries. However, in the case of Lebanon the promises of various representatives, particularly those of UNDP representative have never been

materialised even though Lebanon did follow the suggestions made by UNDP respresentatives assisting Steering Committee Meetings. In this respect, Lebanon has requested a small assistance in acquisition of communication equipment.

10) Mr. C. Agius (Malta) said the presence of UNDP at such a critical turing point is important. Various aspects of the budget could be unacceptable to governments. The way forward is to complete the various sub-networks that will make concrete proposals which then need to be prioritised by the Steering Committee before a final proposal is put forward.

11) Mr. H. Akrout responded to the points raised by saying that he is fully sympathetic to these problems, and that no major commitments from governments are requested at this stage. He said that the search for financial sources are of paramount importance.

As regards countries that are not CIHEAM members, Mr. Akrout said ways and means of collaboration must be looked into eventually.

12) Mr. J. Menezes (Portugal) raised several questions about the proposed structures and expressed his reserve. He is willing to propose alternative structures.

3RD SESSION

AGENDA ITEM 8 GLOBAL ACTIVITY PROGRAMME 1993

1) Mr. H. Akrout introduced Document 8, and gave additional information on most activities. The following remarks were made:

a) Mr. Shinawy (Egypt) asked to postpone the Workshop on Fresh Water Aquaculture to May.

b) Mr. Katavic (Croatia) concerning the Network Seminar on Aquaculture and Environment, said in principle he accepts the proposition provided the participation of Croatia to MEDRAP is legalised. He also said that the fresh water culture workshop could be held in Hungary in May.

c) Mrs. Stephanou (Cyprus) supports the idea of holding activities in non MEDRAP countries. Timing of such activities is very important.

d) Mr. Menezes (Portugal) said courses and seminars are two different things. You can hold a course only in countries where there is local expertise. In this respect, he supports the suggestion of Croatia. He said it is better to hold the training course on diagnosis in winter because of accomodation problems.

e) Mr. Agius (Malta) said it will be appropriate to consult Network Coordinators before final decisions are made. He asked the Coordinator to give some information on the seminar on constitution of aquaculture and environment network. He suggested Spain could be an alternative venue for the training course on Bact. diagnosis.

f) Mr. Akrout said there are always budget restrictions, and that MEDRAP can be more effective in developping aquaculture in Member Countries when manifestations are held in Member Countries. There can be no question of spending money on non-Member Countries.

g) Mr. Flloko (Albania) supports the suggestion that courses should be held in advanced countries within the MEDRAP region.

h) After further debate on the matter when representatives of Algeria, Malta, Portugal and Croatia took the floor, Mr. Akrout gave additional information and prioritised the activities. Finally the compromise suggestion of Lebanon to ensure an effective participation of the Szarvas Institute in technical aspects of the workshop was accepted.

i) Mr. Ferlin (France) referred to their contribution to SIPAM and said in principle he has on objection to hold the workshop on engineering in another venue, which they can then support to a certain degree.

j) Finally, Document 8 was reviewed and revised. MEDRAP II Coordination Centre will revise the document including prioritisation, and send it to National Coordinators. At this stage, unfortunately, the venue of several activities could not be finalised. The Project Coordinator was authorised to negotiate and finalise.

As regards the workshop on Artemia, the Project Coordinator is asked to discuss with Algeria and Libya 2 Sub-regions the possibility of organising a specialised meeting.

AGENDA ITEM 9 PREVISIONAL BUDGET 1993

1) Mr. Akrout introduced Document 9 and explained the various headings. Minor modifications were introduced by the participants. The budget will be reviewed together with Mr. Ziesler and all modifications reflected in the new version.

AGENDA ITEM 10 RECOMMENDATIONS

The following recommendations were made:

1) The decision taken in Cairo meetings as regards countries not advanced in aquaculture: Lebanon, Syria, Albania and Bulgaria, is reaffirmed. These countries are targetted for special attention and the Project Coordinator was invited to seek means and methods of special assistance particularly whenever some action toward aquaculture development is initiated.

2) The Project Coordinator was asked to follow up the question of the legal membership of Croatia to MEDRAP. The National Coordinator of Croatia was asked to follow up the matter also with his authorities.

3) There can be no question of introducing new administrative set-ups for the future development of MEDRAP. Existing infrastructures such as GFCM, CIHEAM and PAP/RAC should be considered while setting up perennial structures in this context.

4) In the discussions and negotiations as regards activities the relevant Network Coordinators must be consulted a priori. Priority should be give to organising all activities in MEDRAP countries where relevant expertise and facilities exist.

5) As regards future MEDRAP structures, the following recommendations were adopted:

(a) The GFCM will ensure the General Coordination of the future activities and will have to establish a Committee on Aquaculture for the purpose.

(b) The PAP/RAC should carry out the Aquaculture and Environment Network activities, the CIHEAM to be in charge of the Research and Training Network, and the Tunisian Government to host the SIPAM Project.

(c) For each project, a draft proposal have to be elaborated, by MEDRAP, beginning of 1993, in collaboration with the concerned institutions, and if necessary, with a consultant's assistance.

(d) A seminar should be organised to review and adopt the draft proposal early in 1993. All interested countries and other parties concerned will attend.

(e) MEDRAP will be responsible for the elaboration of the final version of each Project Document, and the identification of funding sources, in collaboration with the concerned institutions.

(f) The adoption of the Project by the respective councils of the concerned institutions should be made by mid-93.

(g) By the end of 1993 the Project will be submitted to the Committee on Aquaculture for advice then to GFCM for adoption.

6) Concerning 1993 activities a number of changes and revisions were introduced before adoption. The Project Coordinator will introduce the changes and send a new version to the National Coordinators by the end of January 1993.

7) The budget was adopted with minor changes that reflect the changes in the Activities Programme, and the availability of funds. The Project Coordinator is invited to look for additional sources of finance.

AGENDA ITEM 11 MISCELLANEOUS

No items were discussed.

SESSION 4 REPORT AND RECOMMENDATIONS

The draft report was read and approved after the introduced modifications.

AGENDA ITEM 12 ADJOURNEMENT OF THE MEETING

At the end of the meeting all the Steering Committee Members reaffirmed their commitment to MEDRAP and their full support to the Project Coordinator. MEDRAP, not only supports aquaculture development in the region but also contributes to the elaboration of a network of human resources.

All the National and Sub-Regional Coordinators and the Project Coordinator take this opportunity to convey their special thanks to the Albanian Authorities and the National Coordinator Mr. A. Flloko who spared no efforts in making this meeting a fruitful and a memorable one.

NEXT STEERING COMMITTEE MEETING IN BEIRUT, LEBANON EARLY NOVEMBER 1993.

Meeting adjourned 14.30, December 11th, 1992.

Development of Technological Capacity through Networking in Agriculture in the Mediterranean Region. The CIHEAM Network

By Mr. Miguel Valls

DEVELOPMENT OF TECHNOLOGICAL CAPACITY THROUGH NETWORKING IN AGRICULTURE IN THE MEDITERRANEAN REGION. THE CIHEAM NETWORK

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INTRODUCTION

The Mediterranean region, -18 countries, 450M inhabitants,-does indeed present a considerable diversity between North, South, East and West, not only due to physical environmental factors but also to the different degree of development of the countries in the region and the importance of the great cultures there in. Not with standing this diversity, the geography, the long history shared and the political conviction that is needed to ensure stability make this region an increasingly more important entity.

The common bonds are complemented by the existence of similar problems related to the preservation of natural resources and agricultural production, the most outstanding being;

- The fragility of resources; soil (erosion, desertification) **water** (scarcity, salinization) and **the sea** (pollution, biological equilibrium).
- The relative importance of agriculture and the necessity of increasing production in order to meet the needs of a soaring demographic growth.
- The need to develop an adequate technology for Mediterranean conditions since very often the techniques and material produced by more developed countries are not applicable to less favourable ecological conditions.

The aforementioned has strengthened desirability to create cooperation links between countries which can contribute to the development of the region and consequently to its stability. This general objective is transformed into instrumental objectives promoting technological development through high level training and research, and creating links between institutions and experts in the Mediterranean countries. Those are the aims for the International **Centre for Advanced Mediterranean Agronomic Studies (CIHEAM).**

The Centre was created in 1962, under the auspices of the OCDE and the European Council by seven countries - France, Greece, Italy, Portugal, Spain, Turkey and Yugoslavia - in order to provide for complementary teaching, both economic and technical, and to develop the spirit of international cooperation among agriculture executive from Mediterranean Countries. From 1983, a progressive incorporation of other countries in the area has taken place leading to the current membership of 14 countries: **Albania, Algeria, Egypt, France, Greece, Italy, Lebanon, Malta, Morocco, Portugal, Spain, Tunisia, Turkey and Yugoslavia.**

This expansion of the Centre towards the southern Mediterranean area runs parallel to the implementation of a broader cooperation with other international organizations. Following Agreements of Cooperation signed by the Centre with the F.A.O. (Food and Agriculture Organization) (1976), the C.E.C. (Commission of the European Communities) (1983), the A.O.A.D. (Arab Organization for Agricultural Development) (1986). Observers from these organizations participate in the meeting of the board.

We summarize, as follows the main characteristics of the structure and activities of the Centre.

The CIHEAM is directed by governors' board, which includes a representative of each member country and has : 1) a scientiic adisory committee 2) a general secretary who coordinates the activity of the Centre and 3) four Mediterranean Agronomic Agronomic Institutes which develop the activities of the Centre. The General Secretariat is based in Paris and the four institutes are situated in Chania (Greece), Bari (Italy), Montpellier (France) and Zaragoza (Spain) (Tables 1,2).

The annual budget of the Organization is approximately 10M ECUS and counts on 130 persons distributed throughout the Centre of whom 50% are Scientific Administrators.

The activities of the Centre fall under the headings of the Production (Plant production, animal production, agricultural techniques) **Economies and Agricultural Development and Environmental and Resource Management**.

The small size of the Centre, its international character and acquired organization experience endow the CIHEAM with a great flexibility to adapt, both in the choice of activities and the form of organization, and with capacity for prompt action, conditions which are most advantageous for the functioning of a cooperation network.

CIHEAM NETWORK ACTIVITY

The actions developed by the CIHEAM are of four types;

- Training
- Research
- Seminars
- Services

The principal aspects of the organization and functioning of each, will be dealt with at a later stage.

Previously, it is important to underline some general principles which can be considered as the bases for action:

1. **Avoid duplication** Not to organize or promote activities when they are already organized by national or international institutions in the area.

2. **Seek complementarity** Become aware of and try to valorize the efforts initiated by otherscomplementing them either by topics, organizationally or financially. This is an essential aspect to be3 achieved rather than seeking exclusive protagonism.

3. **Strive for excellence** Both in human resources (experts and participants) and in programmes. The activities organized with an international character can not be dealt with on a large scale and therefore it is of utmost importance to attract the best.

4. **Build up a network** of collaboration between national institutions beyond the activity of the Centre.

The means available to accomplish the activities of the Centre comply with these bases of action. Thus the CIHEAM Institutes have not been conceived as large research centres with their own objectives, but as dynamic elements in the promotion of contacts. Until recently, all the training activities and many related to research and its networks, were carried out in the Institutes themselves. However nowadays a growing number of

these activities are carried out in the specialized national institutions of the nember countries which are increasingly open to collaborations with other partners.

This policy permits a greater offer from the Centre and a valorization of the national institutions whose evolution makes up the firmest foundation for a stable technological improvement.

Training activities

The activity of the Centre has mainly focused on the organization of postgraduate courses. More than 4000 students of the CIHEAM hold posts in their respective countries, in Economy, Administration , Training and Research and in Government. Together with the evolution of national systems of further training in the member countries, this action has adapted and is now complemented by the organization of short duration courses on specialized topics catering for high level professionals (Table 3). The Centre currently offers both types of training.

a) Programme of postgraduate specialization. This consists of one academic year leading to the diploma of postgraduate specialization. According to the academic results of this first year, students may opt for a second year in which they will carry out a personal research study working towards the thesis of a Master of Science degree. This programme caters fundamentally for young graduates who wish to complete their specialized training.

b) Specialized courses. These courses are aimed towards professionals with very precise programmes lasting from two to four weeks. The objective of these courses, apart from their actual content, is to provide a positive interaction between participants and guest lecturers leading to expectations for a future collaboration.

In the organization of our training activities four criteria we considered to be of great importance. They permit a differentiation between these courses and other existing ones. These aspects are related to what have denominated above bases for action and they refer to:

1. Choice of topics and preparation of the programme. The choice of topics is made by the internal organs of the Centre based on proposals originating from the permanent and active consultations made with experts, responsible officials of institutions and firms related to the Institutes. The programmes are prepared by ad hoc groups of 5 or 6 experts from different countries who are invited to form such groups on the basis of their personal capacity.

2. Collaborations. The organization of activities in collaboration with institutions or organisms relevant to the topic dealt with, is for us an objective in itself. This collaboration allows us to improve the offer, ensuring diffusion, increasing the level of the candidates and creating cooperational links. Furthermore, as previously mentioned, an increasing number of activities can now be organized outside the Institutes.

The situation of institutes of the CIHEAM on or near a National Campus of Research Centres also facilitates a constant collaboration for the purposes of practical work or other studies on site.

3. Lecturers. The majority of lecturers participating in the courses (all in the case of the IAMZ) are guest lecturers. The groups of experts preparing the programme must propose the lecturers according to their personal competence. This is the main argument of interest in our courses and an aspect which ensures their success. In our

experience, the staidness of our programmes, the possibilities of interaction with other colleagues and the contribution to the cooperation in a developing area of the word, are strong incentives which favour the presence of relevant specialists.

4. Participants. It is essential to promote the participation of persons with a high level of training and an activity or responsibility within their organizations of origin allowing a valorization of their presence and a continuity of contacts. The opportunity and quality of the programme are the principal motivations but even so, the institutional relationships and the involvement of the national organizations are the best guarantee for a good selection. This is why their participation in the selection process is desirable.

Research Activities

The Centre, apart from occasional projects, does not carry research activities independently. Its function, in this sense, is **to promote agricultural research** in the Mediterranean area with two objectives; 1) To encourage the cooperative activity of national structures in networks of cooperative research and 2) increase the available knowledge and technology for Mediterranean production systems and products which do not receive attention outside this area.

At the moment the Centre supports the functioning of approximately twenty research networks, each of which is made up of a group of researchers, (normally between four and fifteen) belonging to teams of different countries, brought together by a common objective (Table 4). The scientific objectives, the structure and degree of activity of the research networks are most variable and therefore flexibility must be respected in order to ensure their smooth-running.

From our experience, the main aspects related to the organization and functioning of research networks can be summarized as follows:

1. Origin and implementation. The origin of the networks is at times a decision which is taken as a result of a lack of scientific information and in many other cases a consequence of activities such as courses and seminars where participants have demonstrated a will to continue a task jointly undertaken. In order to set up a network, it is necessary to establish an objective and ensure the willingness of a number of individual researchers to participate. This could be achieved in several ways such as a survey of priorities, a preparatory meeting of the group initially interested, or organizing a larger seminar on a topic with the idea of continuity.

2. Objectives. First of all, the topic must be relevant and secondly, the objectives must be clearly defined and realistic irrespective of the scale of ambition. The extent of the objective, which may be a progressive one, defines the modality of the network. The activity of the networks normally begins with the purpose of exchanging information or material. They develop by means of complementary studies between teams and are consolidated with the accomplishment of common projects.

3. Structure and functioning. The participation in networks is based on a willingness which is almost always individual at the beginning. Therefore it should have a flexible and open structure in which the number of participants will depend on the degree of exigence of the objectives. It is absolutely necessary for one of the participants to be willing to ensure an active coordination. The periodical meetings must reach conclusions and the common activity should produce results. Without any visible result it is impossible to maintain the interest of the participants for whom the common activity is, as a rule, no more than a complement of their own professional interest.

4. **Means**. A structure of material support to the coordination, provided by the Institutes in the case of the CIHEAM, is the only specific requirement of the networks. The research activity is based, in general, on the actual resources of the national institutions. The networks are very often in fact the combination of individual projects. The activity of the networks encourages the preparation of joint projects stemming from the network that can be proposed to different external sources of financing. This is the case of approximately hiteen projects financed by the European Commission set up by the CIHEAM networks.

With regard to **Research**, the action of the Centre's networks is complemented 1) an Exchange Programme of researchers which permits short stays to perfect techniques 2) realization of a M Sc thesis tutored by researchers participating in the networks and 3) the organization of several scientific meetings and workshops every year.

Seminars

Apart from the seminars of a scientific nature which are programmed in connection with the research networks, the CIHEAM organizes, both independently and in collaboration with other Institutions, seminars on topics of general interest which aim to discuss the state of the are eventually contribute to the formation of a policy. During this year seminars were organized on issues such as; “Vulgarization in Maghreb countries” “Soils in the Mediterranean region” “Water economy” “Agricultural policies in Mediterranean countries”.

Representatives of National Administrations are invited to attend these seminars and the conclusions are transmitted to the governments through the members of the Governors Board. These seminars are the origin, at times, of the organization of courses or research networks as perviously mentioned.

Services

Provision of particular services which are either non-existent or incomplete in national organization, could be a strong enough reason in itself to motivate a network, In the case of the CIHEAM, due to the existing infrastructure and parallel to other programmes, opportunities have arisen to provide services linked to specific agreements (the Institute of Bari provides healthy plant material for regional growers; the Institute of Montpellier has a French language centre used by many organizations). However, there are two more general types of service which our Centre is developing;

1. **Data banks**, As a complementary activity to the networks, data banks with information concerning the Mediterranean are implemented. Three most significant examples are 1) basic information on the agro-food industries operating in the region 2) information on all large scale irrigation projects 3) Information on characteristics and evolution of forest fires controlled in the region. These date banks permit the analysis in greater depth of the factors of variation and thus contribute elements for decision taking in the future.

The creation of bibliographical data banks has been considered on certain issues, in particular regarding publications of limited diffusion. Nevertheless, the progress in this field advances at a slower pace.

2. The production of pedagogical resources for training to be used outside the environments of the establishments of the Centre, including audio-visual projects and books written by lectures in our courses and co-edited with international publishers.

During this year a programme of agricultural broad casting had been created for radio destined to French speaking countries in the area which besides international diffusion could be made available to local radio stations.

GENERAL TRENDS OF THE CIHEAM NETWORK OPERATION

1. Following the explanation regarding our activities, we hope it is clear that the establishment of links between people and organizations that underlies our activities, is in our opinion, the surest way to improve the technological capacity of national institutions of the member countries.

2. This aim cannot be achieved immediately even if great economic means were available to give incentive to this process. On the contrary, the process is always a progressive one in which first contacts are followed by mutual interest and consolidated by collaboration, availability and permanent communication.

3. The consolidation of a cooperation networks is, on the other hand, an informal process since this is based on the individual will to collaborate, motivated by different scientific, personal or even moral interests; Only the response to these interests can ensure the stability of the network and pass on to the collaboration between institutions.

4. Within the present structure of the CIHEAM we can identify different states according to which issues are dealt with. In some cases we find ourselves at the very initial stage of promoting a network and the contacts are established based on personal collaboration of an individual nature. Nevertheless, within the field of specialized training, we are in the phase of consolidating a more institutional collaboration with several organisms and universities which make up, together with the institutes of the CIHEAM, a true network, in all the member countries.

5. The relationship between the members of our network for the joint undertaking of activities in precise topics is formalized by specific agreements. The degree of institutional commitment varies according to the topics and whilst with some institutions agreement is made only to organize a short duration course, with others we are now offering joint Master of Science programmes.

6. The Institutes of the Centre constitute an important dynamic element in this process since they give the necessary impulse and **structure** and provide the additional resources. Their role is an essential one whose relevance continue in the future.

7. As a result of the existence of the collaboration network, the **capacity** of the Organization **widens**. As an example an agreement with the E.E.C. allows us to finance an increase of almost 20% of our offer of training in institutions of Southern Eastern Mediterranean countries.

NETWORKING CONTRIBUTION TO TECHNOLOGICAL CAPACITY

Improvement of technological capacity is a complex process based on the availability of trained personnel, the existence of infrastructures enabling this personnel to realize projects and the organization of a system of technology transfer including the training of personnel on an operational level.

The three stages of the process are necessary. Nevertheless the form of ogranization of the whole system can differ. Over the years, the building of large centres disconnected from the already existing infrastructures, which were very often precarious, has been a common practice. Nowadays, the improvement and promotion of these

training and research or experimentation infrastructures, existing in almost all regions, connecting them with a cooperation network is a more interesting approximation.

The main contribution of networking to improve technological capacity is to allow isolated centres or low capacity centres to enter promptly into a technologically advanced system offering them great opportunities of training and cooperative work without leaving their habitual environment.

The advantages of networking for this purpose are:

1. This system is the quickest and most economical since existing structure are encouraged without creating new facilities. Even when this is necessary the planning allows for the participation of the existing structures.

2. To avoid localism and isolation, both of which are frequent, although scientists keep in direct contact with local problems as a source of their scientific activity. Therefore, the risk of brain draining also decreases.

3. The networking based on an international collaboration, as in the case of the CIHEAM, has the advantage of providing a framework in which the relationship between teams is a on a more equal basis, unlike the dominance which is often found in programmes of technical assistance or of bilateral cooperation. This helps to avoid risk of rejection based on nationalistic grounds.

4. The structure of coordination can be very small or the task may even be entrusted to one of the institutions involved.

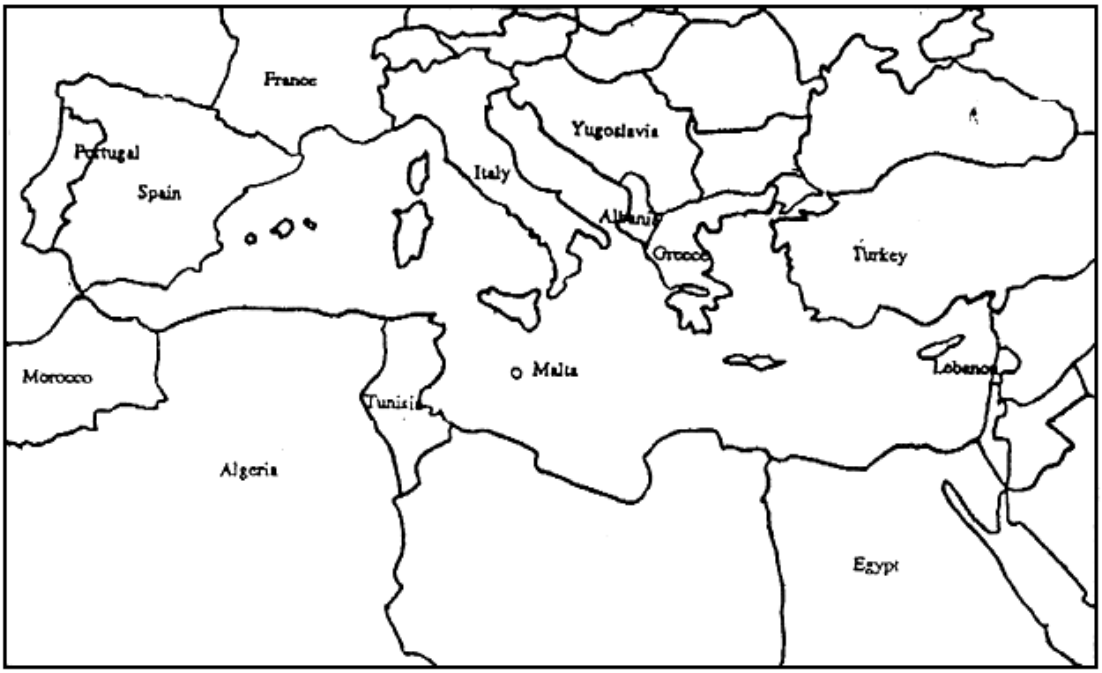
In spite of these advantage, a certain risk of failure is always present stemming from loss of interest of the participants due to a lack of well defined objectives and lack of action taken. These shortcomings are replaced by bureaucratic activism and coordination meetings which neither hold technical content nor reach final agreements.

With regard to actions to be taken, the first step is, in our opinion, that of training through short duration specialized courses. After this first contact, the opportunity for thematic research networks may arise, besides support through services and infrastructures. This progressive construction of the network facilities stability and consequently credibility in order to mobilize resources of possible donors.

C.I.H.E.A.M.

INTERNATIONAL CENTRE FOR ADVANCED MEDITERRANEAN AGRONOMIC STUDIES

MEMBER COUNTRIES



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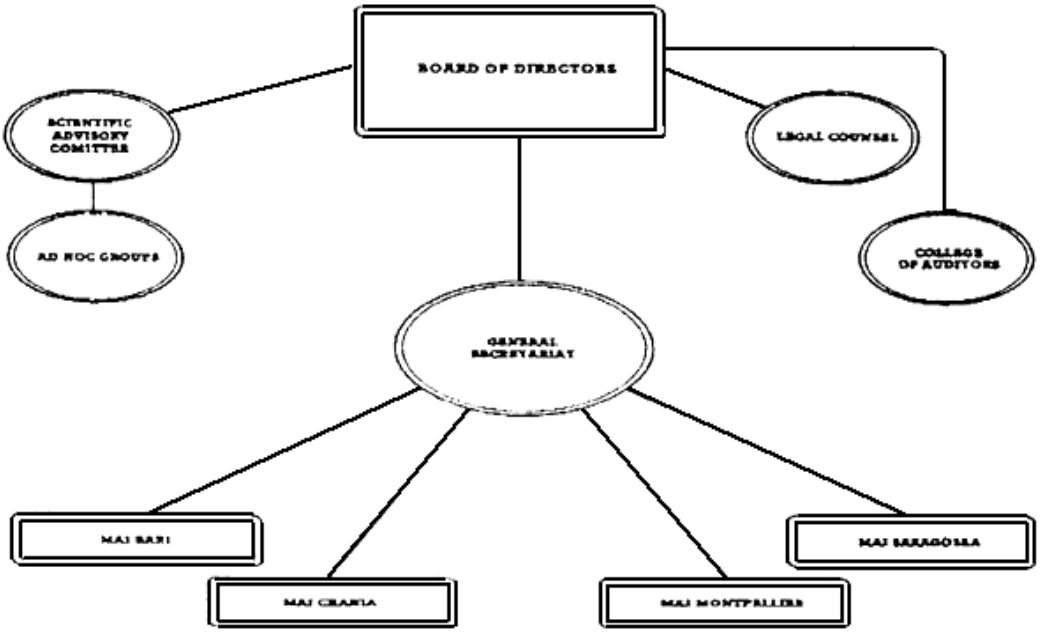


C.I.H.E.A.M.

POST-GRADUATE PROGRAM ACADEMIC YEAR 1992–1993

SPECIALIZED POST-GRADUATE
STUDIES DIPLOMA (ONE YEAR)
MASTER OF SCIENCE DEGREE
(TWO YEARS)
SEPTEMBER 1992–JUNE 1993

AGRICULTURAL TECHNIQUES

- IRRIGATION (M.A.I.B.)
- HORTICULTURAL SCIENCES AND TECHNOLOGY (M.A.I.C)
- Subliepical crops
- Crops under protection

ENVIRONMENT RESOURCE MANAGEMENT

RENEWABLE NATURAL RESOURCES (M.A.I.C.)

- Environmental ecology
- Management of forest resources
- RURAL PLANING IN RELATION TO THE ENVIRONMENT (M.A.I.Z.)

ECONOMICS - DEVELOPMENT

- AGRICULTURAL RESOURCE ECONOMICS (M.A.I.C.)
- Trade and developmental policy
- Business management
- AGRICULTURAL AND RURAL DEVELOPMENT (M.A.I.M.)
- AGRICULTURAL AND FOOD POLICIES (M.A.I.M.)

PLANT PRODUCTION

- PROTECTION AND SANITATION OF MEDITERRANEAN FRUIT GROPS (M.A.I.B.)
- PLANT BREEDING (M.A.I.Z.)
- CITRICULTURE (M.A.I.Z;/UP.V;/I.V.I.A./I.N.I.A.)

These courses are made up of a variable number of
modules that can be taken separately.
each one leading to the delivery of a certificate.

SPECIALIZED INTENSIVE SHORT COURSES
(TWO TO FOUR WEEKS)

ANIMAL PRODUCTION

- RABBIT MEAT PRODUCTION (M.A.I.Z./ U.P.V. september 1992
- CARCASS AND MEAT QUALITY (M.A.I.Z./ September 1992)
- FEEDING VALUE OF MEDITERRANEAN FORAGES AND BY-PRODUCTS (M.A.I.Z., November 1992)

- GOAT PRODUCTION (M.A.I.Z., February 1993
- ANIMAL PRODUCTION AND ENVIRONMENT MANAGEMENT (M.A.I.Z., April 1993)
- RANGE MANAGEMENT AND DEVELOPMENT (M.A.I.Z. / M.A.I.M. / I.N.A.V. Hassan II. May 1993)
- AQUACULTURE (M.A.I.Z. / Tunisia, 1993)

PLANT PRODUCTION

- SEED PRODUCTION (M.A.I.Z. / Algeria, 1992)

AGRICULTURAL TECHNIQUES

- SEWAGE TREATMENTS-PRACTICES-MANAGEMENT FOR AGRICULTURE USE (M.A.I.B. / Egypt. November 1992
- PROTECTED FLORICULTURE (M.A.I.C., March 1993)
- POST-HARVEST PHYSIOLOGY AND TECHNOLOGY OF HORTICULTURAL CROPS (M.A.I.C. May 1993)

ENVIRONMENT RESOURCE MANAGEMENT

- DRY AREAS AGRICULTURAL DEVELOPMENT (M.A.I.C./Cyprus, 1992)
- PREVENTION OF FOREST FIRES (M.A.I.C. October 1992)
- MEDITERRANEAN LANDSCAPE ECOLOGY (M.A.I.C., November 1992)
- HALOPHYTE UTILIZATION IN AGRICULTURE (M.A.I.B/Morocco june 1992)
- SOIL AND WATER CONSERVATION (M.A.I.C/Syria, 1993)
- ARID ZONES MANAGEMENT (M.A.I.M./Tunisia, 1993)
- CULTIVATION, CHEMISTRY AND PROCESSING OF AROMATIC AND MEDICINAL PLANTS (M.A.I.C., May 1993)

ECONOMICS - DEVELOPMENT

- AGRICULTURAL POLICIES CHANGES IN THE WORLD (M.A.I.M./Morocco, 1992)
- ECONOMETRIC MODELS OF THE AGRO-FOOD MARKET (M.A.I.Z., October 1992
- INTERNATIONAL MARKETING OF MEDITERRANEAN AGRICULTURAL PRODUCT (M.A.I.Z., January 1993)
- QUALITY IN THE MARKETING OF AGRO-FOOD PRODUCTS (M.A.I.Z., March 1993)
- AGRO-FOOD DISTRIBUTION (M.A.I.Z., May 1993)
- BUSINESS MANAGEMENT (M.A.I.C., May, 1993)
- TRADE POLICY AND DEVELOPMENT (M.A.I.C. May 1993)

APPLICATIONS

Selection will be based on academic record
The number of participants
Will be limited to twenty-five per course

A certain number of scholarships are awardarded each year.
With priority given to nationals from C.I.H.E.A.M. member countries
(Albania, Algeria, Egypt, France, Grece, Italy, Lebanon, Malta, Morocco, Portugal, Spain, Tunisia Türkye, Yugoslavia).
For further information, Please contact the institutes.

CIHEAM RESEARCH NETWORKS BY AREAS OF ACTIVITIES

ACTIVITIES	PARTICIPANTS		INSTITUTIONAL COLLABORATIONS
	Number	Countries	
PLANT PRODUCTION			
GREMPA	8	AL,F,GR,I,S,TU,TK,Y	EEC
LEGUMES AND CEREALS	9	AL,F,GR,L,MO,S,TU,TK,Y	EEC,ICARDA
ANIMAL PRODUCTION			
TABLES OF NUTRITIVE VALUE MED.FORAGES	10	AL,CY,F,GR,I,MO,P,S,TU,TK	EEC,FAO,FEZ
SHEEP AND GOAT PRODUCTION	12	AL,EG,F,GR,LIS,MO,P,S,TU,TKY	EEC,FAO,FEZ,ILCA
RABBIT PRODUCTION	8	AL,EG,F,I,MO,P,TU,TK	WRA
AGRICULTURAL TECHNIQUES			
BRACKISH WATERS	7	EG,F,I,NL,MO,TU,Y	FAO
COMPLEMENTARY IRRIGATION	4	AL,EG,I,MO	FAO
DATA BANKS ON IRRIGATION PROJECTS	4	AL,EG,I,MO	FAO,WB
NON-SOIL CULTURES	8	EG,F,GB,GR,I,MO,TU,Y	ISHS
POST-HARVEST LOSSES	3	GR,I,S	ISHS
ENVIRONMENT - RESOURCE MANAGEMENT			
PREVENTION OF FOREST FIRES	9	CY,F,GR,J,P,S,TU,TK,Y	FAO,EEC
FORAGE PRODUCTION IN ARID ZONES	9	AL,F,GR,J,MO,P,TU,TK,Y	FAO
AROMATIC AND MEDICINAL PLANTS	11	AL,F,GR,I,IS,MO,NL,S,TU,TK,Y	
ECOSYSTEMS	5	F,I,S,TU,TK	INTECOL
ECONOMICS - DEVELOPMENT			
CEREAL INTENSIFICATION	5	AL,F,LMO,P,	
SMALL SCALE AGRICULTURE RAFAC	7	AL,F,MO,P,TU,TK,Y	
EGECOM/CEREAL POLICY	4	AL,F,MO,TU	
IRRIGATION IN THE MAGHREB	5	AL,F,LMO,TU	
DEVELOPMENT OF LESS FAVOURED AREAS	5	F,GR,I,S,P	
IAA AGRO-FOOD INDUSTRIES		AL,EG,F,GR,I,MO,S,TK,	
AGRO-FOOD PROSPECTIVES	4	AL,F,MO,TU	FAO,WB
INTERNATIONAL COMPARISONS OF EFFICACY	6	F,I,S,TR,USA,Y	

Aquaculture Technology Development in France

By Mr. Arnaud Muller-Feuga

Aquaculture technology development in France

Arnaud Muller-Feuga
MEDRAP II, Tunis, the 18th of may, 1993

Summary:

The development of new tools for aquaculture is examined with special reference to french experience during the last decade. The successive states from identification of needs to commercial promotion of technological products is detailed.

It is emphasized that both research activity and industrial partners are required, the first for seeking of innovation technical solutions, the later as guarantee of existing market and for commercial development. Illustrations of works are presented, especially for open sea equipments for both fish and shellfish farming: it becomes a growing concern for increasing space resources as well as for escaping coastal environment degradation.

The pre-commercial pamphlets of different products are presented.

THE MAIN STEPS

1: Identify and classify the needs

For each particular need:

2) Evaluate technical and economical feasability

3) Choose industrial partner

4) Look for financing sources

5) Develop the commercial products

6) Contribute to promotion

SYNTHESE DES BESOINS EN MATIERE DE TECHNOLOGIE AQUACOLE Classés par ordre de priorités. Extrait des conclusions du groupe de travail animé par le Secrétariat d'Etat chargé de la Mer en 1984.

SECTEUR D'ACTIVITE	DOMAINE D'APPLICATION	FONCTION OUTIL PROCEDE
	Priorité 1	
Information	Tous secteurs	- Annuaire professionnel - Lettre d'information
Ostréiculture	Obtention de juvéniles	- Captage - Pregrossissement
	Tri - conditionnement	- Alimentation calibreuses huîres
	Consommation	- Ouverture des huîtres
	Gestion	- Aide au pilotage des élevages - Surveillance, sûreté des élevages
	Affinage, verdissement	- Curage des claires - Limitation de l'envasement - Contrôle des métaphyte
	Contrôle qualité	- Purification bactérienne
	Elevage en eau profonde	- Récolte
Mytiliculture	Conquête nouveaux sites d'élebvage	- Extension infralittorale bouchots Extension en mer ouverte
	Priorité 2	
Information	Grand public, tous secteurs	- Plaquette générale
Ostréiculture	Grossissement	- mécanisation fixation huîtres sur support
	Exploitation parcs découvrants	- Préparation et entretien - Récolte - Transports sur estran
	Exploitation eau profonde et lagune	- récolte et transport - Protection prédateurs, pollution - Aménager circulation lagunes de Méditerranée
Mytiliculture	Elevage sur bouchots	- Rationalisation de l'exploitation
	Conditionnement	- Décapage épibiontes durs
Autres bivalves (palourde)	Estran ou bassins découvrant	- Récolte des mollusques enfouis - Ensemencement mollusques enfouis
Elevages intensifs (crevettes,	Production de juvéniles	- Prise et rejet d'eau - Obtention de nourriture larvaire

poissons, etc…)	Prégrossissement et grossissement	- Dénombrement des larves - Distribution d'aliment - Confinement en élevage - Dénombrement - Aide au pilotage de l'exploitation - Tri - Calibrage - Prophylaxie - Récolte / recapture
	Installations annexes	- Stockage et transport d'aliment
Elevages extensifs et valorisation du littoral	Grossissement crevettes pénéides	- Confinement par enclos
	Aménagement pêche en milieu ouvert	- Accroissement biomasse exploitable par récifs artificiels - Protection contre chalutage
	Aménagement marais Atlantique	- Assurer la survie, voire la croissance hivernales

Priorité 3

Elevages intensifs (crevettes, poissons, etc…)	Production de juvéniles	- Traitement de l'eau en vue de son recyclage - Confinement en élevage
	Bâtiment d'écloserie	- Transport et distribution d'eau - hermorégulation - Entretien at nettoyage (bàssins, canalisations, cages)

Priorité 4

Elevages intensifs (crevettes, poissons, etc…)	Elevage intensif en mer ouverte	- Elimination des biossalissures - Serrage des animaux, recapture
	Préparation	- Abattage
Elevages extensifs	Gestion rationnelle des ressources	- Récolte de juvéniles

ETAT D'AVANCEMENT DES TRAVAUX DEBUT 1990

Developpements	Faisabilite	Realisation	Industrial	Commer.
Cage d'élevage piscicole sans cadre				
Concept PRINCIPIA de pisciculture en mer ouverte				
Cage d'élevage piscicole HEXAGONE				
Programme RESSAC d'essais de matériels				
Comptage des larves				
Tri qualitatif des huîtres			abandon	
Véhicule chenillé d'estran			abandon	
Coupeur d'algues			abandon	
Systèmes mytilicoles des Frères COMMUNAL				
Tensiomètres sous-marins				
Système d'enceinte gonflable aquacole (SEGA)				
Calibrage au volume des huîtres				
Système de distribution d'aliment pour crevettes				
Machine de pêche des huˆtres				abandon
Projection aliment longue portée				abandon
Collecteurs à huîtres électrosolubles				abandon
Outil d'ouverture des huîtres				abandon
Auto-nourrisseur à la demande (capteur piézo)				
Comptage alevins AQUAVISION 2				
Distributeur d'aliment tous temps				
Cage d'élevage piscicole SEA				
Comptage poissons AQUAVISION 1				
Logiciel d'aide à la gestion en élevage intensif AQUASTOCK				

Système de cages immergeables AQUAVAR				
système de cages en bois JAMES				
Distribution d'aliment SAGAIE				
Conteneurs bivalves Ml 120 des ATELIERS MICHEL FRERES				
Récolteuse palourdes automotrice OCTRA				
Récolteuse palourdes automotrice SMGR				
Logical de dimensionnement des ouvrages d'eau BASMAR				
Alimentation calibreuses à huîtres LA TOURANGELLE				
Essais de matériels	Proposé	En cours	Terminé	Suites
Transbordement d'aliment en vrac				
Compteur à alevins AQUAVISION				
Filière SF, Roscanvel				
Filière SF, Pertuis Breton				
Filière SF, Sète				
Filière SF, Corsen				
Elevages SEGA, Ste Anne du Portzic				
Projection d'aliment longue portée, Guipavas				
Collecteurs solubles				
Oxygénation-brassage par hydro-éjecteur diphasique, Palavas				
Nourrisseur central SAGAIE en pisciculture, Braspart				
Cage SEA, Ste Anne du Portzic				
Remorquage SEGA de transport, Goulet de Brest				
Filières sub-surface, Gruissan				
Rétention de berges par palplanches, Salses				
Etudes de portee generale	**PROPOSE**	**EN COURS**	**TERMINE**	**SUITES**
Comportement hydrodynamique filets				

Measure biomasse par acoustique				
Mesure O par RMN				
Traitement de l'eau de mer (groupe de travail)				
Droit de la et aquaculture				
Bac aplexique				
Prévention des malaïgues				
Bateau conchylicole de service				
Pisciculture en mer ouverte (groupe de travail)				
Modélisation de la croissance en élevage				
Comportement hydrodynamique filières				
Annuaire de l'aquaculture				
PRESTATIONS	**PROPOSE**	**EN COURS**	**TERMINE**	**SUITES**
Véhicule d'estran (assistance)				
AQUAMER (essai)				
DUNLOP/SCOFLEX (essai)				
France-Turbot (conception/essai)				
ALSTHOM (essai)				
Bacs “BERGOT” (conception/essai)				
SALMOR (conception/essai)				

Produits ayant fait objet de fiches de présentation pré-commerciale.

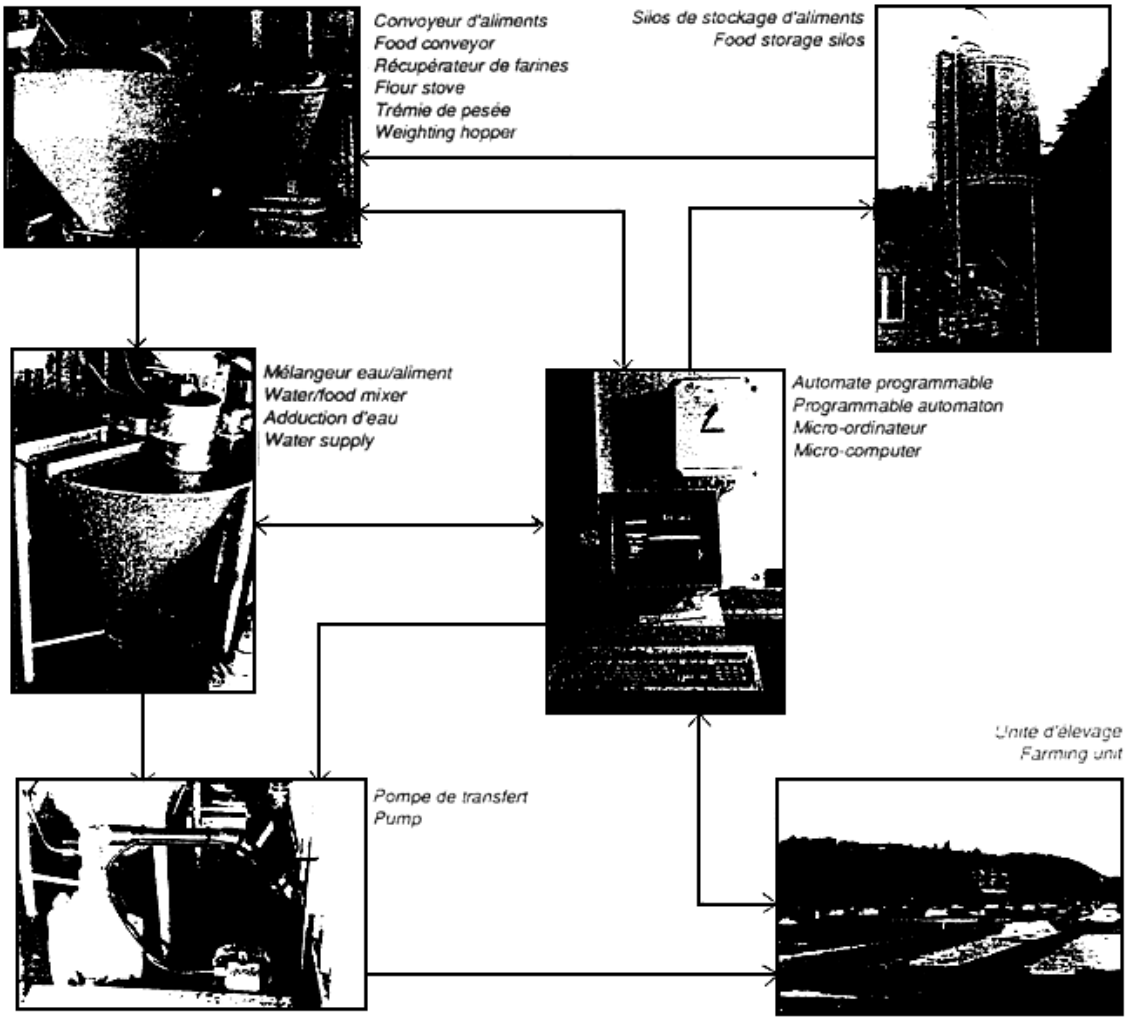
NOM COMMERCIAL	FABRIQUANT	NATURE DU PRODUIT
SAGAIE	SEDIA	Distributeur central d'aliment programmacle
AQUASTOCK	CREO	Logiciel d;aide àla gestion en pisciculture intensive
Conteneur MI 120	Ateliers Michel Frères	Structure gravitaire de grossissement de coquillages
Cage	AQUAVAR	Cage immergeable pour loud et dorade
Cage	SEA	Cage aluminium pour sites exposées avec nourrisseur
Cage	JAMES	Cage en bois pour zones abritées
AQUAVISION 1	Keroman-Pesage	Compteur à poissons d'élevage
Filière SF	multiple	Filière sub-flottante d'élevage mytilicole

S.A.G.A.I.E.

SYSTEME **A**UTOMATIQUE DE **G**ESTION DE L' **A**QUACULTURE **I**NTENSIVE ET DE SON **E**NVIRONNEMENT **A**UTOMATED **S**YSTEM OF **I**NTENSIVE **A**QUACULTURE AND **E**NVIRONMENT **M**ANAGEMENT

L'IFREMER et la Société SEDIA ont développé et mis au point un dispositif performant de distribution automatique et de suivi d'alimentation pour piscicultures. Ce système est fabriqué et commercialisé par la Société SEDIA, sous le nom de SAGAIE.

IFREMER and SEDIA designed and developed an efficient, easy-to-operate system of automated supply and feeding control for fish farming. The SAGAIE system is manufactured and commercialized by SEDIA.



AQUASTOCK

Version 3.4

Aquastock est un logiciel d'aide à la gestion des élevages aquacoles marins, distribué sous licence IFREMER.

Aquastock permet un suivi rigoureux de la croissance par modélisation en fonction de l'alimentation pour les espèces tel que le loup, les saumons Coho et Salar, la truite, le turbot …

FONCTIONS

Aquastock permet:

1 - De connaître instantanément l'état de l'exploitation.

2 - De comparer les résultats mesurés à ceux de la modélisation.

3 - De calculer les rations alimentaires permettant une croissance optimale.

4 - De revenir sur les situations antérieures afin de modifier et de perfectionner les techniques d'élevage.

5 - D'envisager les états futures par simulation et de déterminer une stratégie d'élevage.

6 - De calculer automatiquement la composition des commandes d'aliments nécessaires à l'élevage.

7 - De calculer le prix de revient et de décider d'une éventuelle mise en marché.

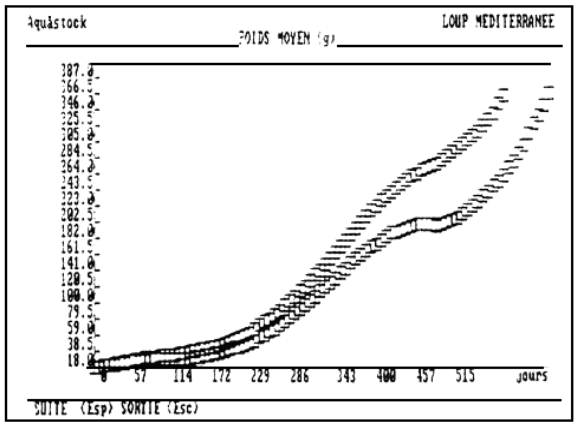
Le logiciel Aquastock est conçu pour simuler la croissance animale à partir des quantités d'aliments distribuées et de la température de l'eau.

Les paramètres du calcul sont ajustés automatiquement en fonction des résultats obtenus, pour prendre en compte l'évolution de la technicité de l'éleveur et des performances des animaux.

MATERIEL

Aquastock fonctionne sur tout micro-ordinateur compatible PC ou AT, utilisable à d'autres usages (secrétariat, comptabilité, …).

Un matériel supportant le graphique permet l'exécution des fonctions graphiques, non indispensables mais particulièrement utiles.

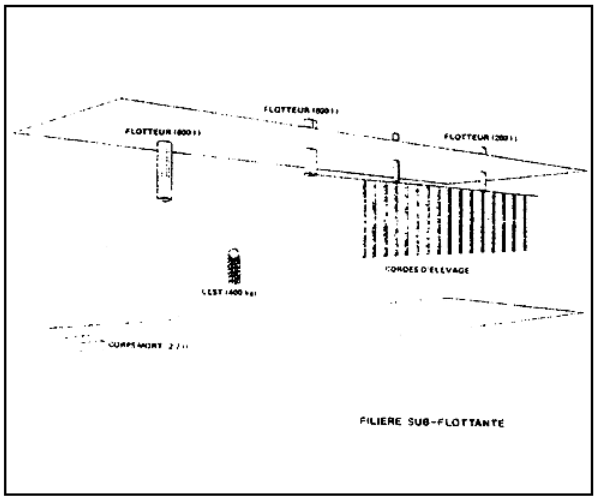


FILIERE
SUB-FLOTTANTE

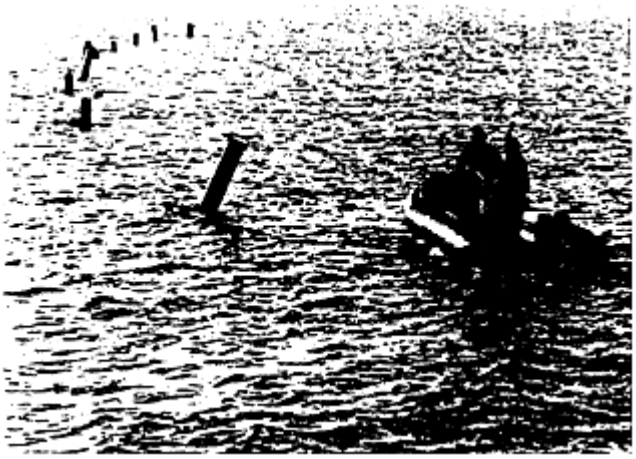
OBJECTIFS:

En liaison avec les professionnels, l'IFREMER conduit le développement de la filière d'élevage de moules sub-flottante (“SF”), spécialement adaptée aux mers à fort marnage.

Dans le but de limiter les effets néfastes de la houle sur l'élevage, les flotteurs sont de forme cylindrique et allongée : les coups de fouet imprimés aux cordes d'élevage par les mouvements de la surface sont ainsi évités.



PRINCIPE D'INSTALLATION



FILIERE SUB-FLOTTANTE EXPERIMENTEE
AU CONQUET (FINISTERE)

CARACTERISTIQUES DE LA FILIERE :

- 4 flotteurs de 600 litres;
- 25 flotteurs de 200 litres (mis en place progressivement);
- 225 suspensions d'élevage (longueur : 6 m, soit 1350 m de support);
- aussière en câble mixte (diamètre : 32 mm longueur : 200 m);
- production : 11 t/an;

CARACTERISTIQUES EXTREMES DES SITES D'ESSAI :

- courant : 2 noeuds;
- houle maxi décennale : 7,50 m;
- profondeur : de 8 à 35 m.

CONTENEUR MI 120
MI120 CONTAINER

Pour capter, pré-grossir et/ou élever vos coquillages en mer ouverte, nous vous proposons le

CONTENEUR MI 120

qui offre :

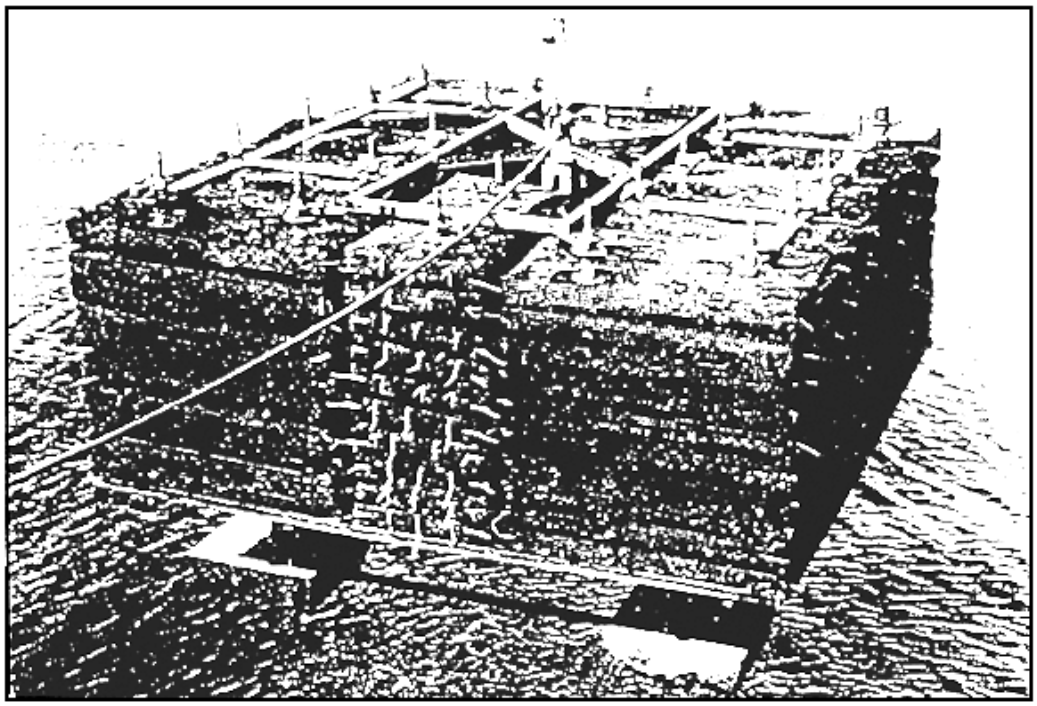
- une capacité de stockage de plusieurs types de paniers selon un agencement rationnel et compact,
- une stabilité au retournement et au glissement qui le rend sûr par tous les temps,

For spats collecting, pre-rearing and on-growing of shellfish in open sea, we propose the

MI 120 CONTAINER

which offers :

- a storage capacity of several types of baskets according to compact and rational arrangement,
- a stability to capsizing and sliding which makes it secure by any weather,



pour :

- le captage des huîtres plates,
- le pré-grossissement des huîtres plates,
- l'élevage expérimental des coquilles Saint-Jacques.

for :

- flat oyster spats collecting,
- flat oysters pre-rearing,
- experimental scallops on-growing.

CAGE D'ELEVAGE PISCICOLE IMMERGEABLE
SUBMERSEABLE FISH-REARING CAGE

Pour protéger votre cheptel en élevage contre ;

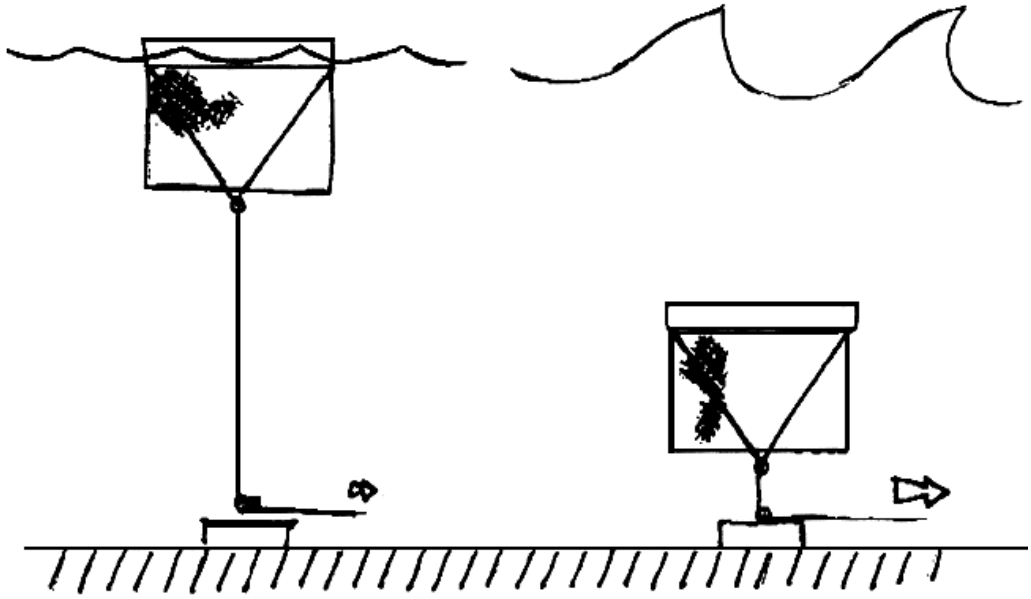
- les conditions de mer sévères plus de 6 m de creux
- le vandalisme
- les pollutions de surface

nous proposons une cage immergeable par càble tendu

In order to protect your livestock against ;

- rough sea more than 6 m waves
- vandalism surface pollution

we propose the tension leg submersible cage



POSITION NORMALE/REGULAR POSITION

POSITION “SURVIE”/“SURVIVAL” POSITION

CONCEPTION (SYSTEME BREVETE)

DESIGN (PATENTED SYSTEM)

Le càble tire la cage vers le bas et fait office d'amarrage, il circule dans des poulles elles même fixées à des corps-morts

The cable pulls the cage towards e bottoms and plays also as mooring

La longueur du càble permet de régler l'immersion de la cage, Elle est déterminée soit par un treuil situé sur la berge, soit localement par un flotteur immergé plus ou moins plein d'air

The cable length, which determines the cage depth, is regulated by a winch operated from the shore or by a locally submerged float, which air volume can be adjusted.

CAGE D'ELEVAGE PISCICOLE POUR SITE EXPOSE
REARING CAGE FOR EXPOSED AREA

Opérationnelle depuis 1987, cette cage performante d'élevage de poissons marins est constituée de quatre casserelles articulées sur un flotteur central qui supporte le distributeur automatique d'aliment.

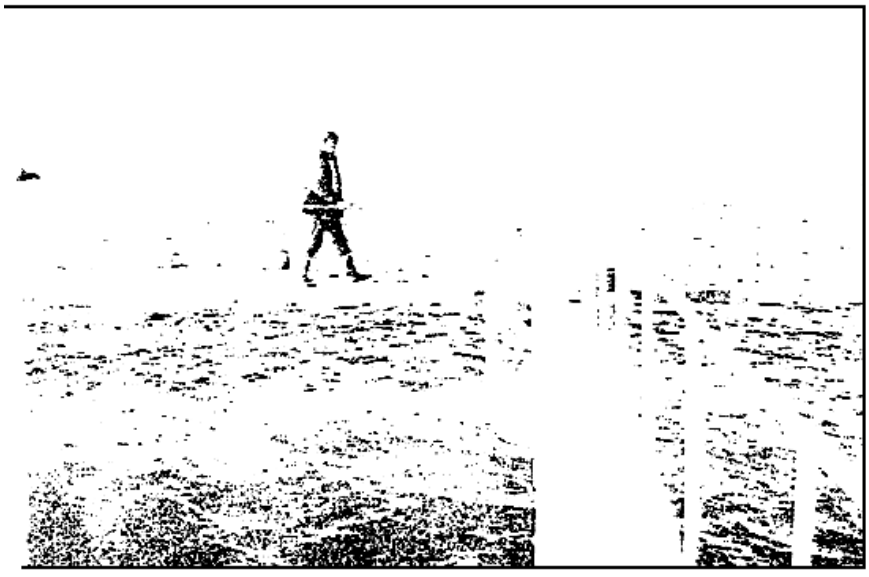
In operation since 1987, this efficient rearing cage for sea fishes is composed of four bridges articulated on a central float which supports the automatic feeding system.

Sa structure en croix, dotée d'articulations souples, permet d'étendre ses possibilités d'implantation à ces zones semi-exposées, offrant ainsi;

Its cruciform structure, equipped with flexible articulations, extends the use possibilities to semi-exposed areas, offering :

- une meilleure qualité de l'eau.
- une grande stabilité thermique d' l'eau
- peu de concurrence avec d'autres activités (pêche, tourisme, etc …) pour l'implantation de la cage.

- a better quality of water
- a great themic stability of water
- few competition with other activities (fishing, tourism, etc…



Le distributeur d'aliment programmable est autonome grâce à une batterie chargée par panneau photovoltaïque. L'aliment est ainsi reparti sur toute la surface de la cage.

The programmable feeding system is autonomous by means of a photovoltaic battery. The food is therefore spread on the whole surface of the cage.

CAGE D'ELEVAGE EN EAUX CALMES
REARING CAGE FOR CALM WATERS

(houle ne dépassant pas 2 creux/swell not over 2 m)

DESCRIPTION TECHNIQUE

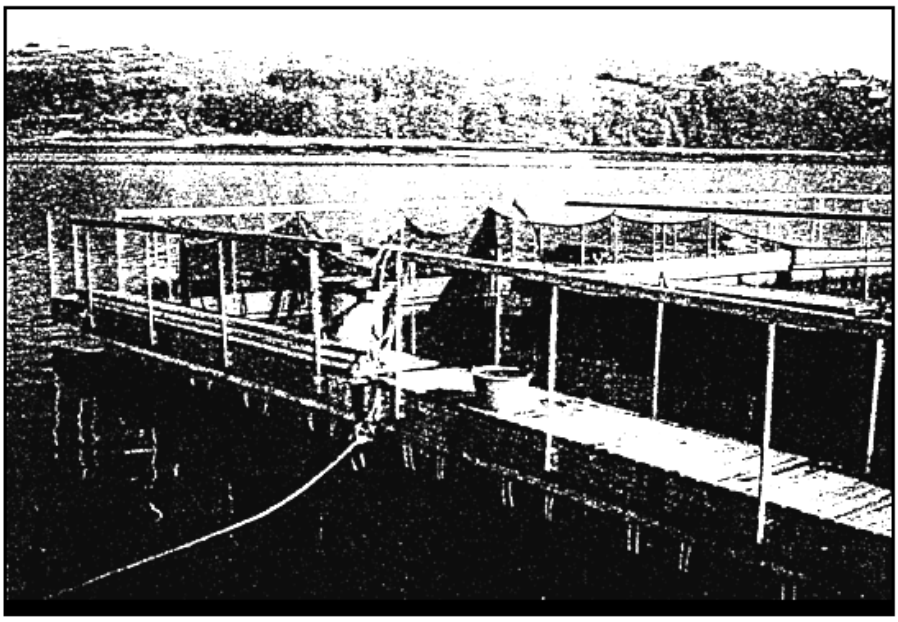
La structure d'élevage, support de l'enceinte en filet, est composée de deux parties :

TECHNICAL CHARACTERISTICS

The rearing structure, support of the net enclosure, is divided in two parts :

Matériaux : Bois, acier, plastique

Materials : wood, steel, plastic



- pontons de 5 m × 0.80 m constitués par deux poutres en lamellé reliées par des ferrures d'extrémité et un platelage en bois pour la circulation

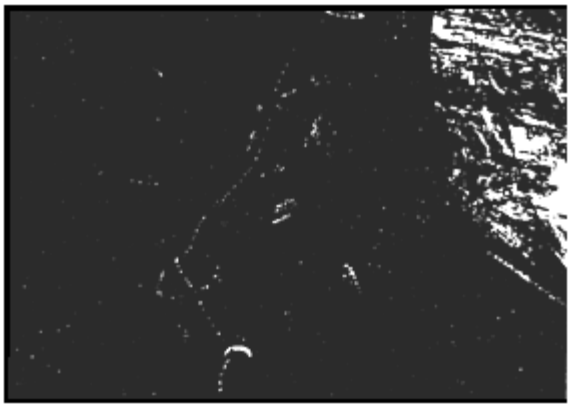
- 5 m × 0.8 m pontoons made of two lamellated gluec beams linked by extremity fittings and a wood plating for easy walk.

Les flotteurs sont des tûts en polyéthylène de 220).

The floats are polyethylene barrels of 220 l,

- éléments de jonction en acier (0,80 m). Les liaisons des différents éléments sont soit rigides (boulonnage), soit par charnières (avec axes). soit par cylindres en caoutchouc précontraints par des chaînes.

- steel junction elements (0.80 m × 0.80 m). The bonds between the different elements are either fixed (bolting), either by hinge-pin, or by rubber cylinder prestressed by chains.



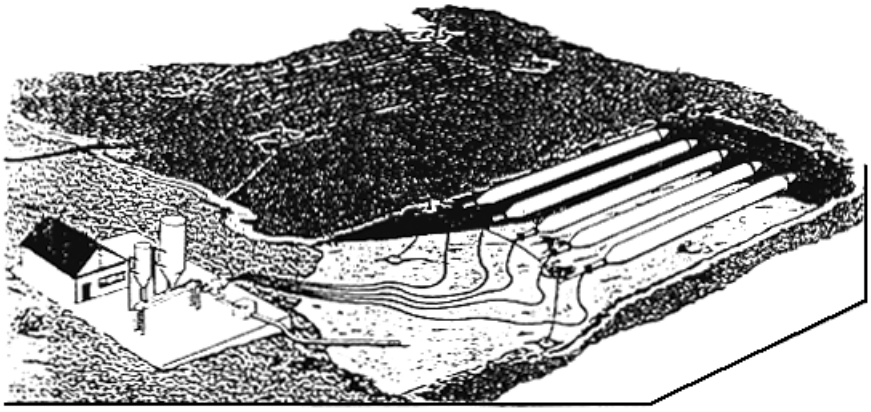
ADVANTAGES

- High production levels per volume unit
- Low investment for facilities
- Lightness and mobility of structures
- Rapidity of implementation according to the sites
- Low energy expense
- Self-cleaning
- Low draught
- Photoperiod control
- Collection of dead animals
- Reduction in feed wastes
- Possibility of distant water supply
- Possibility of livestock treatment through external access
- Feed teledistribution from shore

LIMITS

- No direct perception of livestock
- Difficult catching but sorting out possibility

SYSTEME D'ENCEINTE GONFLABLE AQUACOLE (S.E.G.A.)



A FARM IN ITS ENVIRONMENT

S. E. G. A.

INFLATABLE ENCLOSURE SYSTEM FOR AQUACULTURE

78

AQUAVISION

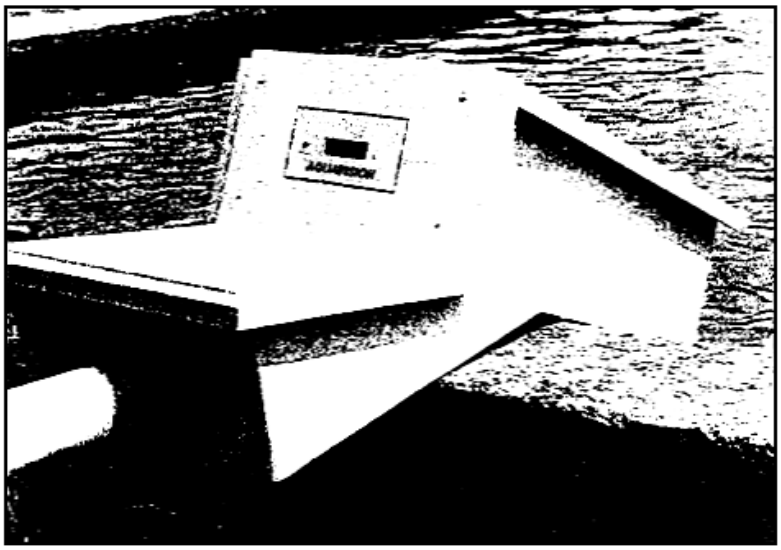
COMPTEUR POISSONS D'ELEVAGE

FISH COUNTER

AQUAVISION a été doté des derniers perfectionnements de la vision industrielle : une caméra voit tous les animaux qui traversent son champ, puis l'image est analysée par un logiciel qui effectue l'identification des individus et le comptage en temps réel.

AQUAVISION takes advantage of the most improvements of industrial vision. A **camera** sees all animals passing through its field. Then, the image is analysed by **a software** which identifies individuals and counts them at run time.

AQUAVISION compte tous les animaux dont le poids est compris entre 20 et 1000 grammes, avec une bonne précision.



AQUAVISION counts all animals weighing beetween 20 and 1000 grammes with high accuracy.

AQUAVISION doit sa précision à une fonction d'auto-apprentissage assurée par le logiciel : la taille moyenne des animaux est recalculée lors des premiers passages après remise à zéro : ce qui permet de **séparer les animaux passant en groupes** et d'éliminer une des principales causes d'erreurs de comptage.

AQUAVISION owes its accuracy to a **self-teaching** function provided by the software : the average size of the animals is re-calculated during first passages after each reset : which allows to **separate grouped animals** with single signature, and to eliminate a major counting error source.

Socio-Economic and Legal Aspects of Aquaculture

By Mr. James Young

MEDRAP II : TECHNOLOGY OF AQUACULTURE (TECAM) AND SOCIAL, ECONOMIC AND LEGAL ASPECTS OF AQUACULTURE (SELAM) SEMINAR

Tunis, 19 – 21 May 1993

"Socio-economic and legal aspects of aquaculture"

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Introduction

Over recent years it has become increasingly accepted that the development of aquaculture might benefit from a wider disciplinary perspective than that traditionally associated with the subject. In particular socio-economic and related issues have been recognised to have received comparatively scant attention in the past. This deficiency is significant not least because of the role of such matters in determining the desirability and viability of aquaculture developments.

There are many dimensions to the socio-economics of aquaculture and within the confines of this paper it is the intention to focus on only a few key issues, and to illustrate useful parallels with the wider fishery sector, and with other areas of development interest. Hopefully these and other issues will arise in the course of subsequent discussion. In addressing this aim the first part of the paper is devoted to the legal aspects of aquaculture.

The Legal Framework for Aquaculture

There being no good reason to re-invent the wheel, the structure adopted in this section owes much to the perspective adopted in the excellent review by Van Houtte (1989). The process of comparing the legal framework of different countries and regions has identified considerable variations.

For enabling and development purposes, legal perspectives on an individual country basis are often require, as have been provided by the FAO Development Law Service since 1989. That apart, a basic tripartite division of countries may be made in respect of the legal framework for aquaculture. Firstly there are countries which have specific aquaculture legislation; secondly those with only some specific legislation and finally, there are those which use enabling legislation. It will be appreciated that considerable variations in the treatment of aquaculture may remain even within each of these categories.

Aquaculture Development: Some Basic Legal Issues

A number of fundamental issues need to be addressed in considering the legal aspects of aquaculture. Not the least concerns the scope of legal instruments in terms of the coverage of each type of aquaculture and the variations, if any, to be applied to different ownership structures. The identity and role of the legal authority is obviously of fundamental concern, and in particular it is necessary to clarify its position within the existing politico-legal hierarchy.

The actual form of the authorisation may also be varied to suit particular needs, conceivably ranging from a license-to-culture particular species through to the awarding of time-period or area rights. Various conditions, determined by local objectives, may also be attached to any authorisation. Information regarding past production, for

example, may be used to establish any notional quota entitlement; a method some parallels in the imposition of resource management in capture fisheries. Entry to the industry may also be restricted on the basis of citizenship or other criteria such as qualifications. Authorisations may also be issued, and be renewable, for varied time periods; a situation which can introduce considerable uncertainty and temper propensity to invest. Superimposed upon these more standard criteria, special conditions may also need to be satisfied as a means of tailoring control to suit localised demands.

Legal Aspects of Land and Water Use

Particular issues tend to arise pertaining to the usage of land and water, though necessarily variations within each category will exist. Land ownership issues commonly revolve around the public or private status of the land. That under public ownership may be regarded as a common property resource to which individuals, as sections within society, may have some entitlement. Transfer of ownership to some private basis may thus result in some incurring a cost as a result of the access foregone. Interesting parallels may be drawn to events within capture fisheries and the classic analysis of the "Tragedy of the Commons".

Conflicts in land use may also result from the co-existence with other land policy measures, often established prior to the introduction of aquaculture. Policies dealing with agricultural development and land reform are commonly the source of dispute. Whilst such conflicts of interest may be inconvenient to the aquaculture sector, it is important to consider the reactions of the public who may be the ultimate market. For example, unfavourable publicity may result if aquaculture is perceived to develop a conservation site, reduce water quality or otherwise degrade the environment.

Both access to and usage of water may present a further source of legal problems due to a number of factors. For example, the legal status of ownership of the water may vary, as will those concerning access and rights to discharge. in some instances water space, formerly unrestricted in access, may become enclosed and preclude other traditional users who will then incur additional costs in finding alternative locations.

Also likely is the emergence of disputes over the introduction of property rights to formerly open access situations. For example in coastal locations an individual given entitlements to particular fish stocks may mean that some, or all, traditional harvesters of the resource may no longer be free to fish. Clearly much will depend upon the specific stipulations of any licence required; indeed the importance attached to any such licence itself will depend upon the standing of aquaculture within the hierarchy of competing resource users.

Restrictions also may apply in respect of discharge treatment and the quality of water passed on to other prospective users. In most situations water will pass through a number of different users, if not contemporaneously, then at subsequent time intervals. Protecting and safeguarding the standards of other users is thus a common prerequisite for equitable water management.

Finally, even this outline consideration of the legal aspects of aquaculture would be quite incomplete without some discussion of the key environmental issues. Interestingly, it may be noted that the attention of the fish farmer to environmental issues is increasingly important not least due to the consumers growing concern with products perceived to be“environmentally friendly” . The aquaculture industry must ensure that it does not fall prey to some of the consumer concerns raised in respect of many intensively-reared

agricultural products. Whilst there is some evidence that this process has already begun, damage hitherto has been comparatively minor.

More traditional legal aspects of environmental matters may also be identified in respect of land use planning, zonation and the control over installation and operation of activities within designated areas. Control may be applied by some combination of the stick and carrot. Finite limits, representing a “tolerable” degradation of the environment, may be established with fiscal incentives, taxes and prohibitions being used to attain stated objectives, Environmental considerations may also encompass the movement of fish and measures to curtail the spread of fish diseases.

Some Conclusions on the legal Aspects of Aquaculture

Aquaculture has evolved under a diversity of legislation, comparatively little of which has been developed specifically to contend with aquaculture in isolation. Most frequently, rules and regulations have been developed and/or extended from the agriculture and fisheries sectors. Despite the apparent similarities of these respective industries, significant differences often exist and may present problems when transferred to aquaculture. Restrictions on species minimum landing size, water movement, ranching and several orders are frequent cases in conflict.

The very diversity of aquaculture legislation which has evolved to some extent also reflects the intrinsic differences which exist between aquaculture situations. Situation-specific legislation is often necessary to ensure the attainment of objectives deemed apposite to the location's needs. Neither is it surprising that aquaculture legislation may conflict with other activities. In many cases aquaculture has been superimposed upon existing systems, often with quite controversial and dynamic interactions.

The above characteristics of aquaculture have also tended to produce over-regulation. The fact that little aquaculture-specific legislation exists tends to encourage an endless sequence of legislative amendments whose contexture becomes evermore complex and inappropriate to the key tasks in hand. Again there is an interesting parrallel with the situation in caprture fisheries here. But whatever the deficiencies, the impression should not be gained that there is some ideal model “aquaculture law” awaiting uplift and implementation. But arguably there is a framework of points which, properly considered, should result in a more apposite legislative outcome than that which exists in many aquaculture developments at present.

Socio-economic Aspects of Aquaculture

In addressing the socio-economic issues, the caveat should be made once more that the constraints within this paper permit only the key matters to be discussed. The fuller significance of the socio-economic aspects of aquaculture has only begun to be recognised comparatively recently. The repercussions of this deficiency have been noted to be significant in some cases and may demand redress (Harrison,1993). Whilst this neglect may be explained by the subject's historical concern with production and related technologies, it remains the case that the success of production processes ultimately will be determined by their integration within the wider local economy and society.

Aquaculture and Fisheries

Much of the literature dealing with the socio-economic aspects of aquaculture has drawn strong parallels between aquaculture and fisheries. The validity of such comparisons however is very much dependent upon the type of aquaculture in question. In many

cases the similarity extends merely to the fact that the end product is fish. For example, with inland aquaculture operations any similarity is often far closer to agriculture rather than aquaculture. This is because inland aquaculture commonly will encompass issues pertaining to land ownership and property rights.

In coastal aquaculture operations, the parallel with fisheries is much closer. Often the activity will be based upon a common property resource, although increasingly one in transition to a system of property rights. Basis industry inputs and outputs, for example labour, products and markets serviced, also tend to be much more similar.

Similarities and differences may also be identified in intensive and extensive operations. Intensive aquaculture is likely to portray rather similar characteristics to the industrial fisheries sector, or that of agribusiness. Extensive operations, on the other hand, are more akin to features found within the artisanal fisheries sector or subsistence agriculture. Whatever the similarities, analysis requires first that some consideration be given to the objectives of the aquaculture activity.

The Objectives of Aquaculture

The objectives established for aquaculture developments naturally will tend to vary between different situations and a wide range of plausible goals may thus be identified. Within this paper only the more common can be mentioned.

Aquaculture is often established with the aim of increasing National Income. Attainment of an increase in National Income however will also bring a range of other considerations; for example the distribution of benefits, compensation for the loss of traditional activities such as fishing or agriculture, or recompense for any degradation of the environment.

Related to the expansion of National wealth, aquaculture is also often established so as to increase export earnings. Concentration on production for the export market may result in a diminution in supply of particular species to the local population who cannot compete with the purchasing power of the export market.

The imbalance of power may be especially significant where availability of low-priced species is reduced. In more extreme circumstances an emphasis on exporting may reduce available protein supplies from the local food chain. Much the situation may also result where higher export earnings potential encourages the transfer of production capacity from low unit value species to those sought by the export market. Such possible outcomes suggest that aquaculture objectives must take into account the wider food policy objectives of the country. In particular it should be concerned as to how the impact of any policy decision will actually transfer down to more vulnerable, and needy, sections of society.

Aquaculture may also be established as a means of generating a number of welfare gains such as income and employment multiplier effects. Often these may occur in a region devoid of many, if any, alternative opportunities. Notwithstanding the potential significance of any such gains it should also be appreciated that usually gains cannot be achieved without some cost being incurred elsewhere and thus may warrant incorporation of some balancing mechanism.

Development of Aquaculture

The development of aquaculture, and its failure in some instances, has been the subject of much concern and many explanations have been forwarded. The role of donor

agencies has figured prominently within the debate. In particular regarding the necessity and desirability of aid to develop and sustain projects.

The introductions, or adoption, of aquaculture within a particular location traditionally has been perceived by economists in terms of entry barriers. Whilst there is increasing debate over the full significance of entry barriers, it is likely that they will exert some influence in most situations. Capital barriers to entry clearly will tend to be more significant in those capital intensive operations where high entry costs may restrict participation. At the extreme capital barriers may preclude local participation and result in wholly exogenous ownership of wealth; a situation with potentially adverse implications for the local economy.

More intensive aquaculture operations will also tend to have higher technical barriers to entry. Whilst it can be expected that diffusion of knowledge will tend to lessen the significance of any barrier over time; in order to maintain a competitive advantage the firm constantly needs to remain innovative. Technical resources thus become a mechanism to maintain market power and failure to own them will result in diminished profitability and then industry exit.

Technical barriers clearly will be linked to the characteristics of the operation too, not least due to the need to maintain R & D programmes and expenditure. For example, product diversification, including production of new species, is an increasingly adopted strategy in order to avoid market saturation. Yet successful adoption of this strategy requires that the firm has the technical ability to invest in a new product sector, and with that the financial resources to fund it. Interestingly this situation has many precedents with pig cycles in agriculture and more generally within capture fisheries.

Human resources also represent a potential constraint on aquaculture development. The adoption of aquaculture may critically depend upon those currently possessed and those which can be acquired within realistic time and financial constraints. Whilst extension programmes and other training courses may provide valuable opportunities, questions must again be raised as to their opportunity cost. In many cases the more appropriate participants may not be able to attend because of their pivotal tole within the organisation. But on the other hand one may question the cost of non-participation.

Sustaining Aquaculture

Having overcome the initial barriers to the development of aquaculture, maintaining activities presents a further set of obstacles which warrant consideration. Clearly each individual success, or failure, will reflect its own particular circumstances, however some general features may be noted.

The existence of scale economies are commonly cited as a major reason for the ability of aquaculture to be sustained. Especially in capital intensive operations, expansion to a critical size is often found to be necessary so that some reduction in unit costs may be generated. In some situations constraints on ownership, due to other reasons, may preclude attainment of the necessary size. The example is often given to Norway, where the size of salmon farms had been limited in law in an attempt to restrict to any tendency towards monopoly control.

However whilst may well be some merit in exercising some control over the concentration of ownership, determination of optimal level is neither easy not static. moreover it is often very difficult, if not impossible, to determine exactly who owns whom. Covert ownership can thus render many restrictions ineffective. Even in those cases where legal ownership linkages may be controlled, larger operations may effect control

over smaller units by practices such as contract growing. Scale economies thus may be attained in a variety of ways and make the task of small operation competing, and so sustaining their presence, all the more difficult.

However the existence of scale economies should not be interpreted such that expansion alone is seen as the sole route to survival. Other support mechanisms can also be implemented to encourage and develop the smaller scale operation. For instance Governmental advisory schemes provide a common mechanism whereby projects may receive a range of resource inputs. Producers may also generate scale economies trough joint and co-operative action. Producer and trade associations may be created so as to expand the collective market power of small unit. For example in the case of Atlantic salmon producers, many are currently in the process of joining a Producers Organisation so that they may control smolt production and thereby ultimately influence the market price for salmon.

In addition, co-operative actions may also be undertaken as improve activities and functions downstream in the marketing chain. Adding value to processing the product may be uneconomic for individual smaller scale operations, but in conjunction with supplies from other producers a viable capacity may be aggregated. This may extend to permit investment in more sophisticated plant and equipment thereby extending the product range and markets serviced. Similarly, co-operation in specialist distribution services may become viable on a joint-action basis.

Sustaining aquaculture development may thus demand that individual operation adopt a more unified perspective on their common needs. In many situations it needs to be recognised that there is much to be gained from joint and/or co-operative action, not least being the ability to compete with those operation which have adopted the more conventional “bigger is better” route. In addition to the foregoing, it should be emphasised that a vital corollary to ensuring that the project is sustained is some consideration of marketing.

Marketing Issues in Sustaining Aquaculture

Traditionally a rather narrow perspective on the function of marketing has tended to be adopted within fisheries and aquaculture. Often marketing has been interpreted as the selling of the finished product. More enlightened perspectives have recognised that marketing is concerned with the addition, communication and delivery of values. But what still tends to be omitted is the fact that the marketing function, as an interactive part of all the other operational systems, will have profound socio-economic implications too.

One of the characteristic features of any marketing environment is that of uncertainty. Irrespective of the quality of marketing resources within the organisation, decisions still need to contended with the exogenous forces at play. Whilst aquaculture to some extent operates in a more controlled environment than capture fisheries, uncertainty remains a significant consideration.

Market Structure

The ability to control marketing actions will also be influenced by the structure of the market. Market structure will help determine the power which an organisation may be able to exert over its competitors. Aquaculture products compete in the wider market for foods, within which there are significant concentrations of market share. Especially in the case of the North European countries, the food market is now dominated by the multiple retail outlet (MRO) or supermarket chains.

Although MROs do create the opportunity to target increasingly large numbers of end consumers, it must also be recognised that they may present a constraint to market penetration. Restrictions may arise since smaller aquaculture operations sometimes are unable to meet volume, quality, delivery and other specifications at the price offered. The imbalance in market power may thus suggest that smaller individual producers might seek other ways to circumvent the downward pressure on price which will face them. Although MROs are currently less dominant in Southern Europe, their importance is growing rapidly.

Marketing Management

Having identified some of the exogenous variables at play, it should also be emphasised that an effective marketing function demands productive management. Ultimately the aquaculture producer is concerned with producing products which convey value to the fish consumer. Exactly what gives value to consumers will change over time, for example as witnessed in the current emphasis upon healthy eating. To ensure ongoing delivery of value thus demands marketing information about the consumer and the target market.

Data collected through the various routes of marketing research should be assimilated so as to ensure the supply of a product delivering values currently sought and identification of new product opportunities. As other organisations within the food market, aquaculture must respond to changing consumer demands. Within these fundamental goals the aquaculture enterprise might also seek to increase the value added. This combination should ensure a greater chance of the operation longevity and with that an ongoing stream of socio-economic benefits to the local economy.

Environmental Considerations

Socio-economic gains also demand that the marketing function is responsive to wider issues of concern to consumers. A good example of this is found within the growing environmental concerns of consumers. Green issues have become of central importance and the potential vulnerability of aquaculture to the “cruel food” lobby should be both recognised and prepared for.

Notwithstanding the private costs and benefits which result from environmental issues, the much larger and wider social costs and benefits clearly must also be recognised. The possible risks of environmental degradation resultant from intensive aquaculture suggest the need to incorporate a more holistic perspective in planning aquaculture operations. There is a need to consider the implications for other users of the resources rather than just the aquaculture producer in isolation. For example, shrimp monoculture in Indonesia's mangroves has generated gains for some but only at considerable cost to other former users.

Conclusions

In the course of this brief overview of some legal and socio-economic aspects of aquaculture a great number of issues have been touched upon. That such a number of different issues is necessarily incorporated within, what constraints demand is, only a brief paper is testament in itself to the interdependence of socio-economic phenomena.

It may be argued that recognition and understanding of the interdependence of the various disciplines and related phenomena in aquaculture remains a goal yet to be fully achieved. Whether through technical and scientific myopia in the past, or a perceived lesser need, aquaculture is coming round to recognise the wider contributions to be

made. This more holistic perspective in encouraging and is warranted, as evidenced by the diversity and importance of socio-economic phenomena discussed.

Acknowledgement

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