

M

E

D

R

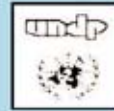
A

P

II



MEDITERRANEAN REGIONAL  
AQUACULTURE PROJECT



7

**SEMINAR ON AQUACULTURE  
RESEARCH  
SUB-NETWORK**

**Nicosia, October 22-25 1991**



**MEDRAP II**  
**RAB/89/005-RER/87/009**

**FIELD DOCUMENT**  
**91/7**

**SEMINAR ON**  
**AQUACULTURE RESEARCH SUB-NETWORK**

**Nicosia, October 22–25 1991**

United  
Nations  
Development  
Programme



Food and  
Agriculture  
Organisation  
of the United  
Nations



**Edited by MEDRAP II Regional Center**  
**Tunis - Tunisia**

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying or otherwise, without the prior permission of the copyright owner. Applications for such permission, with a statement of the purpose and extent of the reproduction, should be addressed to the Director, Publications Division, Food and Agriculture Organisation of the United Nations, Viale delle Terme di Caracalla, 00100 Rome, Italy.

### **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 stage 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 or 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**

In view of the interest for Research in aquaculture, a Seminar on Research Sub-Networking was held in Cyprus on October 22–25 1991, to assess the research capacities and needs of each member country in order to establish a relevant Network.

The National and Sub-Regional reports on the capabilities and needs, and the case studies introduced by specialised regional institutions (CIHEAM, HAKI, UNEP) allowed to express the experience and opportunities that they could provide to favour the implementation of a Network on Research.

On the basis of the presented communications and the collected data from the participants, the following priority topics were selected as sub-networks:

1. Diversification
2. Nutrition
3. Fresh Water Aquaculture
4. Interrelations between Aquaculture and Environment
5. Pathology
6. Lagoon Management

Cyprus, Portugal, Egypt, Tunisia, Malta and Morocco have been mentioned as possible respective coordination centres for these sub-networks.

The participants were divided into groups to deal with the objectives, the identification of priorities for the elaboration of programmes of activities and the possible funding of these sub-networks.

It was proposed that MEDRAP II should consider the possibility of promoting a publication dealing with Aquaculture development in the Mediterranean and particularly on MEDRAP activities.

### **Acknowledgements**

The Editor would like to thank the Cypriot Authorities, namely H.E. the Minister of Agriculture and Natural Resources and the National Coordinator, Mr. Andreas Demetropoulos, for the remarkable help and assistance in the organisation of the meeting.

The Editor would also like to thank the UNDP Representatives, the participants and the invited experts for their positive contribution to the success of the meeting.

### **Note from the reviser**

The revision and publication of this document could only be done a long 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 or files 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.

## Contents

	Page
• <b>Agenda</b>	1
• <b>List of participants</b>	3
• <b>General Introduction</b>	5
1       Opening of the session	5
2       Designation of officials	5
3       Adoption of the Agenda	6
• <b>National reports</b>	6
• <b>Sub-regional reports</b>	6
• <b>Case studies by intentional specialist institutions</b>	6
• <b>Identification of regional priorities</b>	7
• <b>Network report on Fresh Water Aquaculture</b>	9
• <b>Network report on Diversification</b>	13
• <b>Network report on Pathology</b>	16
• <b>Network report on aquaculture and the environment</b>	18
• <b>Network report on Nutrition</b>	22
• <b>Preliminary report on Research Capacity and needs in the Mediterranean countries involved in MEDRAP II</b>	25

## **AGENDA**

- 22/10/91** : **First work session**  
: **RESEARCH CAPACITY AND NEEDS IN THE REGION**
- 9h00 – 10h00 : Opening session.
- 10h00 – 10h30 : Coffee break.
- 10h30 – 17h45 : **Evaluation of research capacity and needs in the member countries.** (see Annex 1).
- 17h45 – 18h30 : **Statement on Research needs presented by Private Sector Representatives:**  
- **(Cyprus)**  
- **Mr. Abouhala, Marost (Morocco)**
- 18h30 – 19h30 : **Global synthesis on the research Capacity of the region (MEDRAP II and Consultant).**
- 23/10/91** : **Second work session**  
**CONSTITUTION OF RESEARCH SUBNETWORK: CASE STUDIES BY INTERNATIONAL RESEARCH INSTITUTES**
- 9h00 – 9h45 : CIHEAM - instituto Agronomico  
: Mediterraneo de **Zaragoza**  
Dr. M. VALLS.
- 9h45 – 10h30 : ISNAR - International Service for National Agriculture Research.  
The Hague, Netherlands.
- 10h30 – 11h00 : Coffe break.
- 11h00 – 11h45 : PAM.  
Dr. G. GABRIELIDES.
- 11h45 – 12h30 : NACA - Network Aquaculture Centers in Asia. Bangkok - Thailand.  
Dr. FOO YAN CHEN.
- 12h30 – 13h00 : General recommendations.
- 13h00 – 15h00 : **Lunch.**  
**Third work session**  
**IDENTIFICATION OF REGIONAL PRIORITIES**
- 15h00 – 16h30 : Definition and choice of priority programme for the constitution of research subnetworks. General discussion on areas of commun interest.
- 16h30 – 17h00 : **Coffee break.**
- 17h00 – 18h00 : Introduction to Groups Works
- 18h20 : Round tables on each selected priority programme (to be supervised and animated by invited experts)  
- Programme contents;  
- Participants;  
- Coordination;



- funding.

**24/10/91** : ***Fourth work session***

**CONSTITUTION OF RESEARCH SUBNETWORKS and  
STRATEGY FOR NETWORK ORGANISATION**

9h00 – 10h30 : Report of discussion for each priority programme by Reporters:

- Programme;
- participants,
- contribution;
- funding.

10h30 – 11h00 : **Coffee break.**

11h00 – 13h00 : Establishment of a global strategy for the constitution of research subnetwork system and mechanisms of the cooperation

- Exchange of information;
- workshop and seminars;
- exchange of staff;
- joint research programme;
- others (to precise).

13h00 – 14h00 : **Lunch.**

14h00 – 18h00 : Visit of aquaculture and research facilities.

**25/10/91** : ***Final work session***

9h00 – 10h30 : Final proposals for MEDRAP research subnetwork organisation.

10h30 – 11h00 : **Coffee break.**

11h00 – 13h00 : Final discussion and approval.

13h00 : Adjournment of the seminar.

## LIST OF PARTICIPANTS

- 1- **Mr. ZOUBIR FARSI**
- 2- **Mr. FATHALLAH ZEMASNI**  
ONDPA - BP 32 BOU ISMAIL TIPAZA – ALGERIA  
Phone 2-468050 - Facs : 2-468051
- 3- **Mr. ABDERRAHMANE EL GAMEL**  
C/O Mr. SHINAWY. Telex : 21360 - EGYPT
- 4- **Mr. JACQUES FUCHS**  
IFREMER - FRANCE.
- 5- **Mr. SALAH FITURI GASHOUT**
- 6- **Mr. ALI MUJAHED**  
Marine Biological Research Centre. Tajoura-LIBYA  
Phone: 690002 - Facs: 41 529- Telex 20523
- 7- **Mr. KOUYOUMJIAN HRATCH**  
Marine Research Centre PO Box: 123 Jounieh – LEBANON  
C/O FAO LEBANON
- 8- **Mr. JAIME MENEZES**  
Instituto Nacional do investigacao das Pescas. LISBOA-PORTUGAL  
Phone: 610814 - Facs: 89 818560
- 9- **Mr. ABDERRAHMANE ABOUHALA**  
MAROST, BP 4 ATALAYOUN. MAROC.  
Phone 6-608754. Facas: 6-606816
- 10- **Mr. LASZLO VARADI**  
HAKI. Fish Culture Research Institute-H 5541 SZARVAS  
PO Box 47. HUNGARY  
Phone: 36-6712311. Facs: 36-6712142. Telex: 83692.
- 11- **Mr. GABRIEL P. GABRIELIDES**  
Mediterranean Action Plan. Leoforos Vassileos Konstantinou. 48/PO  
Box 18019 GR-11610. Athens. GREECE  
Phone: 72-44536. Facs: 72-18246. Telex: 222611 MEDU. GR
- 12- **Mr. MIGVEL VALLS**  
CIHEAM. Instituto Agronomico Mediterraneo de Zaragoza. SPAIN  
Phone: 76-576013. Facs: 76-576377. Telex: 58672 IAMZE
- 13- **Mr. MUEEN ISMAIL**  
General Establishment for Fisheries, Jebelah. SYRIA  
Phone: 21676/21677. Telex: 411025 Fish Syr.
- 14- **Mr. MAMUN NOUAYED**  
Marine Research Centre. PO Box: 123 Jounieh. LEBANON  
C/O FAO LEBANON
- 15- **Mr. ISMAIL BELLAGHA**  
Centre National d'Aquaculture de Monastir, 5000 Monastir. TUNISIA  
Phone: 216-3-62867
- 16- **Mr. JEAN GUILLAUME**

Centre Océanologique de Bretagne. BP 70 Plouzane. FRANCE  
Phone: 98-224040. Facs: 98-224547

**17- Mr. MERCERON**

IFREMER, Centre Océanologique de Bretagne. BP 70, Plouzane.  
FRANCE. Phone: 98224040. Facs: 98224547.

**18- Mr. KURTI SHTJAFEN**

Scientific Research Station of Fishery. Durrës – ALBANIA  
Facs: 355-4226807. Telex: 4206 Minlet AB.

**19- Prof. CARMELO AGIUS**

National Aquaculture Centre. Fort San Lucjan. Marsaxlokk. MALTA  
Phone: 356-342488. Facs: 356-688380.

**20- Mr. ANDREAS DEMETROPOULOS**

**21- Mrs. STEPHANOU DAPHNEE**

**22- Mr. GEORGE GEORGIU**

**23- Mr. GEORGE ANASTASIADES**

Ministry of Agriculture and Natural Resources. 13, Aeoulou Street,  
Nicosia. CYPRUS. Phone: 357-2-303526. Facs: 357-2-365955.  
Telex: 4660 MINAGRI CY

**24- Mrs. SONYA ZLATANOVA**

Fisheries Institute. 3, Industrialana street 8000 Bourgas.  
BULGARIA. Phone: 359-5644892. Facs: 359-56-442132. Telex 83522 BULRIB.

**25- Mr. ABDELLATIF BERRAHO**

Institut Scientifique des Pêches Maritimes. 2, Rue TIZNIT 01  
CASABLANCA. MOROCCO. Phone: 212-2-222090. Facs:  
212-2-266967. Telex: 23823 M.

**26- Dr. ADAM BENOVIC**

Biological Institute. PO Box 39 Dubrovnik, YUGOSLAVIA  
Phone: 38-50-27937. Facs: 38-50-27775.

**27- Mr. IVAN KATAVIC**

Institute for Oceanography and Fisheries. PO Box 500-58000 Split.  
YUGOSLAVIA. Phone: 38-58-46688. Facs: 38-58-46593

**28- Mr. HASSEN AKROUT**

MEDRAP II PROJECT COORDINATOR. C/O Ministère d'Agriculture,  
Commissariat Général à la Pêche, 32, Rue Alain Savary 1002 Tunis.  
TUNISIE. Phone: 216-1-890727. Facs: 216-1-793962. Telex 14994 FAO TN

**29- Mr. MOHIEDDINE BELKHIR**

MEDRAP II Tunis. TUNISIA

**MEDRAP II**  
**REPORT OF THE AQUACULTURE RESEARCH SUB-NETWORKING SEMINAR**  
**NICOSIA 22–25 OCTOBER, 1991**

**CYPRUS.**

In view of the interest for research in aquaculture this seminar was held in order to assess the research capacities and needs of each member Country, with the aim of establishing research networks among them.

The meeting was attended by participants from Morocco, Algeria, Tunisia, Libya, Egypt, Lebanon, Cyprus, Bulgaria, Yugoslavia, Albania, Malta and Portugal.

The session was opened by His Excellency the Minister of Agriculture and Natural Resources of Cyprus Mr. A. Gabrielides who emphasised the importance of research in aquaculture development. The UNDP Resident Representative Mr. Jan Switering also welcomed the meeting. After that MEDRAP II Coordinator Mr. H. Akrouth thanked the organisers and gave a short address stressing the need for continuous, regional and international cooperation especially in the area of aquaculture research.

The meeting elected:

- |                  |                            |          |
|------------------|----------------------------|----------|
| - Chairman:      | Mr. Andreas Demetropoulos, | Cyprus   |
| - Vice-Chairman: | Mr. Abdel Abouhala,        | Morocco  |
| - Reporters:     | Mr. Jaime Menezes          | Portugal |
|                  | Mr. Abdel Rahman ElGamal   | Egypt    |

The proposed agenda was adopted

**NATIONAL REPORTS**

The attending representatives of each Country gave an account of the research capabilities and needs in his/her Country.

**SUB-REGIONAL REPORTS**

Sub-regional Coordinators present at the meeting have summarized the principal results on the survey on aquaculture Capacities and Needs in the sub-region.

Two interventions related to the private sectors showed their experience and needs in marine aquaculture in this sector.

The delegate of Morocco mentioned the importance of the producers cooperation and exchange of their competences and information. He proposed to organize a meeting on production network in Morocco in 1992.

**CASE STUDIES BY INTERNATIONAL RESEARCH INSTITUTES**

1. Dr. Gabriel P. Gabrielides FAO Project Office gave information on "The MED POL Programme of the Mediterranean Action Plan".
2. Dr. M. Valls Instituto Agronomico Mediterraneo spoke about C.I.H.E.A.M. (International Center for Advanced Mediterranean Agronomic Studies):

These communications expressed the experiences and the opportunities which their institutes provide and that are of interest for the establishment of research networks.

**IDENTIFICATION OF REGIONAL PRIORITIES**

On the basis of the discussions and on the data collected, the Participants selected the following priorities to be established as sub-networks.

- 1- Diversification
- 2- Nutrition
- 3- Freshwater Aquaculture
- 4- Interrelations between Aquaculture and the Environment
- 5- Pathology

The topics related to nutrition and the interrelations between aquaculture and the environment were introduced by: Dr. J. Guillaume Director of Research INRA, France and Mr. Merceron IFREMER. Brest, France respectively.

Subsequently participants joined in equivalent Sub-groups in order to reflect about these topics

- I. Sub net work: Pathology
- II. Sub net work: Diversification
- III. Sub net work: Freshwater Aquaculture
- IV. Sub net work: Nutrition
- V. Sub net work: Interrelation between Aquaculture and the Environment.

The participants examined and adopted the working group reports

They are proposing to the NSC the creation of Networks on Diversification of Aquaculture Production, Interrelation Between Environment and Aquaculture, Fresh Water Aquaculture, Pathology and Nutrition. Cyprus, Tunisia, Egypt, Malta and Portugal have been mentioned as possible coordination centres for these Networks respectively. However it has been agreed to proceed to the collection of information, the elaboration of data bases and the organization of meetings of experts in the preparation of the creation of the Networks of Pathology and Nutrition.

The representative of Morocco suggested the possibility of creating a Network on Lagoon Management, and that Morocco could eventually act as the future coordination Center.

Lastly it was proposed that MEDRAP II should consider the possibility of promoting a publication dealing with Aquaculture development in the Mediterranean and particularly on MEDRAP activities.

## NETWORK ON FRESHWATER AQUACULTURE

Freshwater aquaculture has an important role in the aquaculture of the Mediterranean countries. A significant part of the aquaculture production comes from freshwater aquaculture as it has been clearly demonstrated in the preliminary evaluation report prepared by the expert of IFREMER.

The working group (representatives from Algeria, Cyprus, Egypt and Hungary) concluded that freshwater aquaculture should be an integral part of the MEDRAP programs.

### 1. Objectives

Research capacities and research needs have briefly been surveyed and it was found that both capacities and needs are highly diversified. However, five major research areas have been identified that might cover the interest of most of the countries in the Mediterranean region. These are as follows:-

- I. Ecological studies on freshwater areas in order to introduce or develop fish culture in natural waters.
- II. Technology development in pond fish farming with special regards to tilapia and carp production.
- III. Development of the production technology of high value freshwater species;
- IV. Research in aquaculture engineering with special regards to the design and operations of integrated systems (fish-cum-rice production, fish production in effluents from irrigation plants, sewage treatment plants etc.)
- V. Development of processing and marketing of freshwater fish species.

Within these general research areas, specific programs have also been identified according to the following:

- I. Ecological study of selected reservoirs and other water bodies in Algeria, for the exploitation of those waters suitable for fish culture.
- II. The development of mass production of tilapia fry in Egypt.
  - The development of carp breeding technology (broodstock management, propagation, larvae rearing and nursing) in Albania.
- III. Experimental work with sturgeon as a potential new species for the use of available freshwater resources in Cyprus.

### 2. Network

Abbassa Aquaculture Research Institute in Egypt was proposed to be the focal point in the field of the research on freshwater aquaculture.

This **recently** developed institute is definitely the most important research institute in freshwater aquaculture in the region. The institute could work in close collaboration with the Fish Culture Research Institute Szarvas in Hungary that would act as a supporting institution during the implementation of research programs in freshwater aquaculture in the region, providing research consultancies and results of longer term research programs in genetics, nutrition, aquatic ecology, fish pathology and engineering. A competent research institute, station or department from each MEDRAP countries will be member institution of the network. At the level of exchange of informations all institutions

are involved in the cooperation. During the implementation of specific projects, the related institution organize a cooperation within the network.

### 3. Activities.

- Exchange of information;
- Exchange of material and experts
- Workshop and meeting in specific subjects
- Training programs

Exchange of information, organization of workshops and meeting and training programs can be coordinated by Abbassa Institute with the involvement of Szarvas Institute.

Exchange of materials and experts and the elaboration of joint projects could be coordinated directly by the countries concerned.

### 4. Funding

- Contribution from the member Institution (exchange of information, materials, experts)
- MEDRAP II (Workshops and meetings)
- External sources (joint projects, training programs). Recognizing the research capability of the National Aquaculture. Center at Abbassa, Egypt in Freshwater research, member countries proposed Abbassa center to be a Focal institute for Freshwater research. Institute of Szarvas, Hungary expressed the desire to be involved with Abbassa Center in that regard as well as other countries. A preparatory meeting for concerned people from member Countries need to be held next year. Egypt could be the Country of the meeting.

## DIVERSIFICATION NETWORK

### General Comments:

1. The group decided to use the Malta Workshop recommendations as a working basis since this reflects the priorities of the region.
2. The group decided to limit its proposals to a small member in line with the resources available.

### Priorities

1. Diversification of species.

The species of top priority are :

Puntazzo puntazzo

Dentex dentex

**Penaeid** shrimps

since these are of national interest to a number of countries.

Participation: all countries interested in these species.

Type of activity:

Cooperation in research and development through:

- i) exchange of information
- ii) exchange of biological material
- iii) Working group meeting every 18–24 months.

Establishment of data base for these species identified in the Malta workshop as offering long - term potential.

2. Diversification of Technology

There is a very strong feeling that heavy emphasis need be placed on offshore technology since most participating countries see considerable expansion potential in this area.

Type of activity

- i) exchange of information
- ii) formulate a pilot scale project in a Mediterranean country and use the MEDRAP organization to seek financial assistance for it from within or outside the region. The cage manufacturers themselves may be willing to assist. This pilot project will be used to adapt the technology currently employed in Salmonid Culture to culture of Mediterranean species.

### Coordination

The network should be coordinated by a network coordination centre. Within this network focal points/ institutions will be identified for each project. Such an institution should have a track record in research and development in the particular topic.



Cyprus expressed its interest to act as the Coordination Centre of this sub-network.

Funding:

For the exchange of information and organisation of workshops MEDRAP and other agencies could help.

For the pilot offshore farm MEDRAP should prepare the feasibility study and seek to secure funding from within or outside the region.

The following are possible sources of funding: EEC, NORAD, SIDA, private sector.

## NETWORK ON PATHOLOGY

### General

The expansion, and especially the intensification, of aquaculture activities enhance the dangers for fish disease. In some countries the fish losses from pathological reasons are quite high, resulting to high damages. In France 20% of the trout production is lost per year from VHS and in Japan 12% of the yellowtail production is lost per year from bacterial pathogens.

The main pathological problems in the Mediterranean area are due to parasitic infections (protozoan etc.), and bacterial diseases, (vibriosis, pasteurella etc.) Lymphocystis, the only viral disease which appears in certain Mediterranean countries is reported to have no economical impact. Other losses in the MEDRAP II countries are related: a) to the deterioration of the water quality and b) to nutritional reasons. Certain parasitic infections, mainly ectoparasites like Trichodinella, Cryptocaryon irritans, Oodinium ocellatum and some parasitic crustaceans, are becoming very important and must be considered. The use of vaccines against vibriosis can have negative results, if not used rationally. The specific strain must be taken into account, and so vaccines developed in one country cannot necessarily be effective in other countries. Several strains on one species can exist.

### Recommendations of the group meeting

Fish pathology must be faced as a serious problem in all MEDRAP II countries. Research in the field is necessary not only on problems related to potential pathogens, but also on problems related to water quality and nutritional deficiencies.

Cooperation and Coordination is necessary among the MEDRAP II member countries as well as the associate members, to face the problem successfully.

### Cooperation Proposals

1. Collection of information from each country for the formation of a data base in the Mediterranean area in order to have among others a complete list of:
  - a) Pathologists
  - b) Facilities and equipment
  - c) Projects, incidents experienced, etc.
2. Organise regular meetings on pathology and related aspects, to bring together the parties involved and especially the scientists who will take measures for the prophylaxis, who will make the diagnosis, the treatment and so on (exchange of information and experiences).
3. Continue training in pathology at a high level as well as low level (technicians).
4. Malta expressed its interest to act as the Coordinating centre for this network.

## NETWORK ON AQUACULTURE AND THE ENVIRONMENT.

### Introduction

The group considers that most of human activities near the sea shore are more or less pollutant (industry, towns, intensive agriculture, tourism etc.). Among them aquaculture has its place. But, contrarily to other activities aquaculture is so dependant on the water quality even for being possible, that it is more active than others about this problem. Though pollution generated by aquaculture is generally very low compared to other sources, the group considered it prudent for MEDRAP II to deal with it.

### Objectives

The working group considers that the objectives of research concerning the relation between environment and aquaculture are:

- a) to promote aquaculture,
  - in seawater of such quality that farming results are technically successful,
  - in awareness of the its environment in all its components, both natural and socioeconomic;
- b) to enhance the scientific base which is necessary to define national needs concerning the relations between aquaculture activities and environment.

### Recommended topics of research

#### 1. Site Selection

The need was expressed by several countries to make available a method of selecting sites for aquaculture use in the best way possible. The steps involved are:-

- The first step is to collect scientific information about it and to achieve a bibliographic synthesis defining general criteria of selection.
- The second one should be to define a widesspectrum of sites covering Mediterranean Sea. Some types are obvious: lagoon, offshore, onshore, but some others are less easy to be defined.
- Then it should be useful to find out additional specific criteria for each type of site in order to make a more precise tool of selection guidelines.

On the another hand, the means of achieving such selections should be defined: classical parameters study during a long enough time (generally one year cycle), satellite picture, etc.

If possible to reach a method of evaluation of the carrying capacity of sites, and a zoning of the region would be very positive.

#### 2 Environmental Impact of Aquaculture

##### a) Loads **emanating** from farms

The pollution loads from reared fish, both particulate and dissolved, must be known, at least for reasons of comparison with loads from other sources

(industry, tourism, towns), so that Aquaculture projects could be put in the right environment context.

This should be done for at least the three main Mediterranean species: sea-bass, seabream, and mussel. Also, it has to be performed at several conditions of temperature and feeding.

The more simple way to do this seems to be by laboratory studies, or eventually by the use of shore farm facilities if possible, mass balance calculations, etc.

b) Impact of loadings.

Aquaculture impact regarding the ecosystem can be in some cases negative. The continued and uncontrolled loadings can bring significant modifications in the flora and fauna and particularly in the benthic ones. It is important to establish a Comparative Study before and after the implementation of a fish farming. This will be helpful in describing and evaluating the impact of fish farm loading on coastal marine zones (Lagoons, Sandy Coast, Rocky shore, etc.)

The main problem caused by such loading is eutrophication. The monitoring coupled with survey of currents and dispersion should be done before and after farming operations.

The carrying capacity of the medium should be taken into consideration.

Regarding the important relation between aquaculture and the environment it is proposed to establish a networking on that subject.

As MEDPOL is concerned by the impact of Aquaculture activity on the environment and as MEDRAP is interested by the development of these activities on a Regional scale Cooperation between MEDRAP and MEDRAP is needed and strongly recommended.

Furthermore, Tunisia which is dealing with site studies for aquaculture purposes was mentioned as a focal point to lead this Network on Environment and Aquaculture.

## NUTRITION NETWORK

The meeting considered that the Nutrition studies to be carried out should be restricted to actual nutrition i.e. composition and feeding values of ingredients (raw materials) digestive physiology, nutritional requirements (both qualitative and quantitative) of fish, metabolism of nutrients as well as influence of diets on body composition, quality and other characteristics of products obtained. Comparison tests of commercial diets or empirical approaches of formulations or rough tests of overall feeding values are not considered as nutrition.

Because of the gap existing between the lack of knowledge and the potential of research of the different countries members of MEDRAP II the number of topics to be chosen in the future network must be limited.

**As for the** priorities in nutrition research could be evaluated by a small group of 4 scientists in a limited period they are:

The analysis of local feed staff (or raw materials) available in different countries of the Mediterranean. This analysis has to be as complete as possible, it has to be performed with the same standardised intercalibrated method but the different nutrients can be analysed in different countries (for example amino acids in one country, fatty acids in another). The analysis should include toxic and antinutritional factors as well.

In a second step chemical analysis should be followed by in vivo measurements such as digestibility. These again need a careful standardisation of methods and the work shared among countries. This work should contribute to a specific data base.

The second priority is the determination of the nutritional requirements of the Mediterranean species. Due to the lack of complete scientific data for each species submitted for Aquaculture in the Mediterranean countries this programme has to be limited to the nutrients i.e. energy, proteins, the main essential amino acids, lipids, essential fatty acids and one fish has to be chosen for the first step.

The group estimates this species should be the gilthead sea bream (*Sparus aurata*). It is to be noticed that nutrients are complementary for scientific formulation of diets.

As a third priority the group considered the feeding of larval stages with dry foods (micro diets) However due to the numerous difficulties met in this field and to the fact that many laboratories of several countries are already working on this topic the group does not consider this to be of immediate interest.

The group considers that it is very difficult to estimate the actual research potential of each member country.

The group recommends a questionnaire to be sent to every country in order to learn the number of nutritionists, their experience, the laboratory facilities, other experimental facilities which are available as well as the ongoing research in the field of nutrition.

The group did not discuss the priorities of nutrition of fresh water fish.

**RESEARCH CAPACITY AND NEEDS  
IN MEDITERRANEAN COUNTRIES  
INVOLVED IN MEDRAP II**

**PRELIMINARY RESULTS**

**by**

**J. FUCHS**

**IFREMER**

**Department of Living Ressources/Aquaculture Ressources**

## **SUMMARY**

### **I - SITUATION OF AQUACULTURE PRODUCTION IN MEDITERRANEAN COUNTRIES INVOLVED IN MEDRAP II.**

- **TOTAL PRODUCTION**
- **FRESHWATER AND SEAWATER PRODUCTION**
- **MAJOR AREAS OF PRODUCTION**
- **SPECIES OF MAJOR INTEREST**
- **CONCLUSION**

### **II - ANALYSIS OF CAPACITY AND NEEDS OF RESEARCH IN MEDITERRANEAN COUNTRIES INVOLVED IN MEDRAP II.**

- **SYNTHESIS OF ON GOING RESEARCH PROGRAMMES**
- **LIST OF MAJOR PLANNED PROGRAMMES**

### **III - PRELIMINARY LIST OF PRIORITIES OF RESEARCH NETWORKING**

### **IV - EVALUATION OF CAPACITY**

## **I- SITUATION OF AQUACULTURE PRODUCTION IN MEDITERRANEAN COUNTRIES INVOLVED IN MEDRAP II.**

Before presenting the results of the survey on research capacity and needs in each countries, some general figures on aquaculture production in Mediterranean countries are presented thereafter.

Total volum of production both in fresh and seawater (brackish and seawater) is analysed in each country and geographical area (zone I Yugoslavia, zone II Syria, zone III Lybia, zone IV Morocco).

These basic informations on total production in tons will give ideas on relative importance of aquaculture activity in the differents countries.

Data collected from 1987 to 1990 are summarized in table.1 and illustrated by figure 1: total aquaculture production; figure 2: production in sea and brackishwater and figure 3: production in freshwater.

### I. 1 - Total production (table 1):

150 000 tons in 14 countries among with 59% (87 644 T) are freshwater species again 41% (61 478 T) in brackish and seawater.

### I.2 - Major areas of production (table 1):

Classification of production by zone givess:

- 86 637 or 60% in zone III (Lybia)
- 48 131 or 32% in zone I (Yugoslavia)
- 10 8314 or 7% in zone IV (Morocco)
- 1 473 or 1% in zone II (Syria)

### I.3 - Major counties of production (figure 1)

Four most important countries are producing 92% of total aquaculture:

- 1) Egypt : 88 600 or 59%
- 2) Yugoslavia : 27 500 or 18%
- 3) Bulgaria : 12 850 or 9%
- 4) Portugal : 8 448 or 6%



TABLE 1 - MEDRAP II : CAPACITY AND WEEDS IN RESEARCH - AQUACULTURE PRODUCTION

AREA	COUNTRY	SW + BW	FW	TOTAL	Major Species
I	YUGOSLAVIA	2500	25000	27500	oyster, bass, bream, eel, carp, trout
	BULGARIA	850	12000	12850	mussel, mugil, pleuronectes, palaemon
	ALBANIA	3500	625	4125	mussel, carp, trout
	TURKEY	300	3356	3656	crayfish, catfish, carp, trout
	TOTAL	7150	40981	48131	
II	CYPRUS	50	73	123	trout, bass, bream
	LEBANON		100	100	trout
	SYRIA		1300	1300	carp, tilapia, trout
	TOTAL	50	1473	1523	
III	EGYPT	44800	43800	88600	mugil, tilapia, carp,clarius, perch
	LIBYA	2	30	32	bass, bream, shrimps
	MALTA	5		5	tilapia, bass, bream, clams
	TOTAL	44807	43830	88637	
IV	MOROCCO	540		540	oyster, clams, bass, bream, eel, peneide
	ALGERIA	45	379	424	oyster, mussel, carp, mullet
	TUNISIA	1416	3	1419	clams, oyster, mussel, bass, bream, sole, pe
	PORTUGAL	7470	978	8448	oyster, mussel, bass, bream, eel, trout
	TOTAL	9471	1360	10831	
	TOTAL (1+2+3+4)	61478	87644	149122	

FIGURE 1 - TOTAL PRODUCTION OF AQUACULTURE IN MEDRAP COUNTRIES

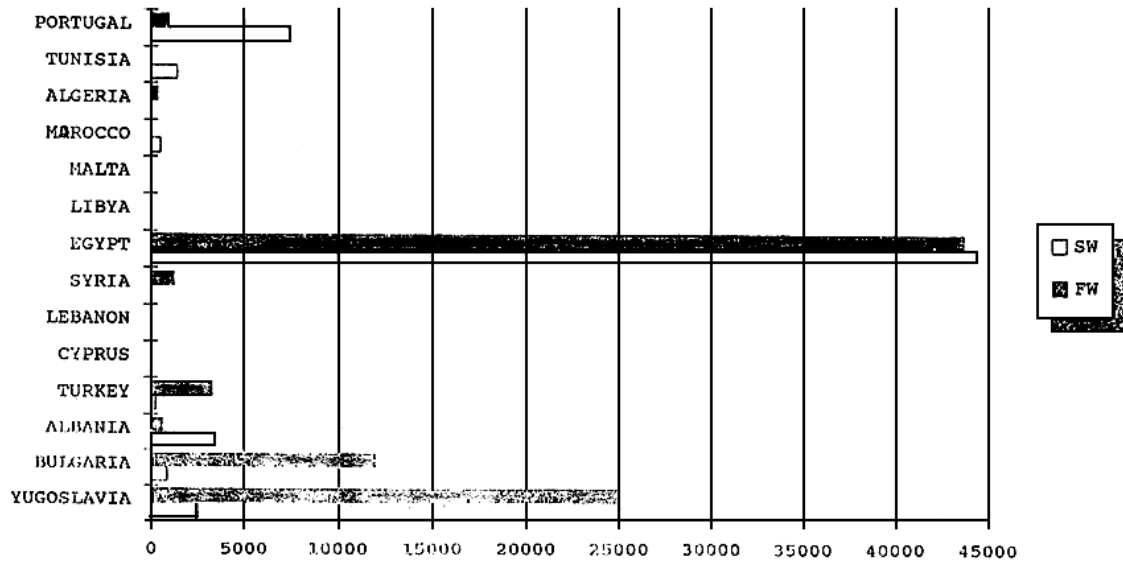


FIGURE 2 - SEA AND BRACKISHWATER AQUACULTURE PRODUCTION IN MEDRAP II COUNTRIES

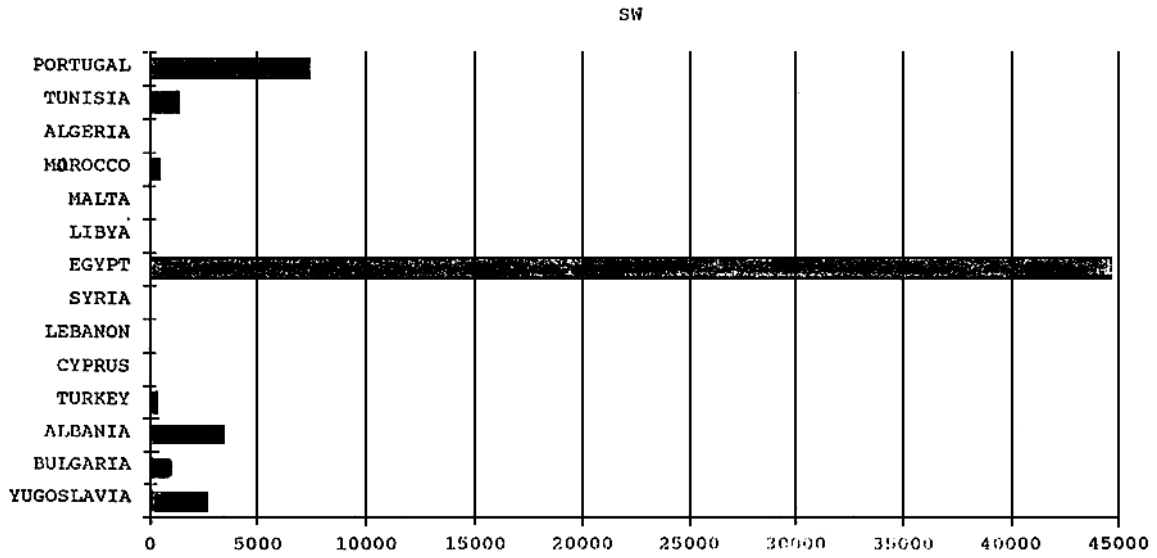


FIGURE 3 - FRESHWATER AQUACULTURE PRODUCTION IN MEDRAP II COUNTRIES

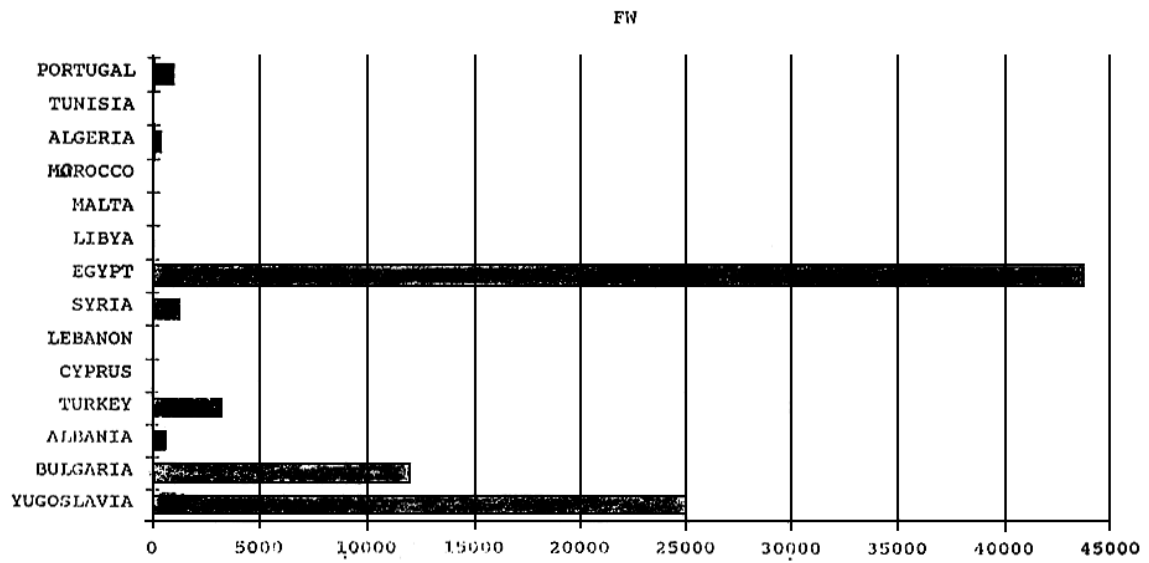


Table 2 - SPECIES OF MAJOR INTEREST FOR AQUACULTURE IN FW AND SW

FW	ZONE I	ZONE II	ZONE II	ZONE IV	TOTAL	SW+BW	ZONE I	ZONE II	ZONE II	ZONE IV	TOTAL
	Y-B-A-T	C-L-S	E-L-M	M-A-T-P			Y-B-A-T	C-L-S	E-L-M	M-A-T-P	
TROUT	3	3		1	7	MUSSEL	2			3	5
CARP	3	1	1	1	6	OYSTER	1			4	5
TILAPIA		1	2		3	CLAMS			1	2	3
EEL	1			2	3						
CLARIA			1		1	SEABASS	1	1	2	3	7
CATFISH	1				1	SEABREAM	1	1	2	3	7
CRAYFISH	1				1	MULLET	1		1	1	3
						FLATFISH	1			1	2
						SHRIMPS			1	1	2

#### I.4 - Detailed production in brakishwater and seawater (figure 2)

Egypt is the major producer with more that 40 000 T/Year (72%), followed by Portugal with 7 470 T (12%), Albania ; 3 500 T (6%) and Yugoslavia : 2 500 T k(4%). Production is inferior to 1 000 T in Bulgaria, Morocco and Tunisia, and very limited in the others 7 countries.

#### I.5 - Detailed production in freshwater (figure 2)

Egypt is also the first producer of freshwater species with 43 800 T (50% of the total). Bulgaria and Yugoslavia also produce a large quantity of freshwater fish with respective 12 000 (14%) and 25 000 T/Year (29%).

Turkey. Albania, Syria and Portugal are producing between 500 to 3 000 T/Year and the others 7 countries around 100 T/year.

#### I.6 - Species of major interest

Table 2 gives an idea of the most important species for aquaculture in brackish, seawater and freshwater, and their repartition in each area.

##### \* *Freshwater species* :

Trouts and carps are the 2 most important species, respectively present in 7 and 6 countries again 3 for tilapia. The distribution in each country is indicated in table 2.

##### \* *Seawater species* :

*Molluscs*: mussels and oysters are mainly grown in zone 1 and 4 and relatively important in Morocco and Tunisia.

FinFish seabass and seabream are reared in 7 countries, mullet in 3 and sole and flotfish in 2 countries.

Penoides shrimps are only reared in Lybia, Tunisia and Marocco.

#### I.7 - Conclusion

- With a total production of 150 000 Tons, the 14th countries involved involved in MEDRAP II represent important important potential for the futur.
- This production in mainly concentrated in 4 countries (Egypt, Yugoslavia Bulgaria and Portugal) with 92% of the total production. Egypt itself produce 60% of aquaculture (30% in freshwater and 30% in seawater).
- Diversity is one of the characteristic of this aquaculture with specific production for each area and countries.
- Freshwater aquaculture in concentrated on a very limited number of species (trouts, carps and tilapia), and in the country a large number of species (molluscs, fish, shrimps) is concerned by aquaculture in brakish and seawater.

## II - ANALYSIS ON RESEARCH CAPACITY AND NEEDS IN MEDITERRANEAN COUNTRIES INVOLVED IN MEDRAP II : PRELIMINARY RESULTS

### II.1 - Remarks

Several difficulties have been encountered in the realization of this analysis:

*\* Lack of information:*

Some countries sent very limited informations on their capacity and needs for research

ZONE	COUNTRY	INFORMATIONS GAINED
I	YUGOSLAVIA	A
	BULGARIA	A
	ALBANIA	A
	TURKEY	A
II	CYPRUS	A
	LEBANON	B
	SYRIA	C
III	EGYPT	C
	LIBYA	C
	MALTA	A
IV	MOROCCO	B
	ALGERIA	B
	TUNISIA	A
	PORTUGAL	C

A= COMPLET

B= PARTIAL

C= IMCOMPLET

*\* Detailed research programs*

Very few informations have been gained on detailed description of major on going and planned research programs.

### II.2 - Identification of research topics

After analysis of the results of the survey on "research capacity and needs" within countries involved in MEDRAP II, 6 areas of research of major interest have been identified and classified:

- 1) - *Development and improvement of rearing technics for all species including management, production of Artemia, weaning...*
- 2) - *Basic research on biology of species : reproduction and breeding, pathology, nutrition and genetic (selection of strain, hybridization).*
- 3) - *Diversification of species both in fresh and seawater*
- 4) - *Environnemental aspect : Site selection, sanitary quality of products, impact of aquaculture on environnement, treatment of effluent.*
- 5) - *Studies of lagunal ecosystems*

6) - *Offshore-cage culture*

The classification has been chosen to present the situation of on going and planned research programs in each country and geographical area

**II.3 - Principal on-going and planned research programmes conducted in zone 1 (Yugoslavia, Bulgaria, Turkey and Albania) (table 3 and figure 4)**

- Aquaculture production in zone 1

AREA	COUNTRY	SW + BW	FW	TOTAL
I	YUGOSLAVIA	2500	25000	27500
	BULGARIA	850	12000	12850
	ALBANIA	3500	625	4125
	TURKEY	300	3356	3656
	TOTAL	7150	40981	48131

The preliminary synthesis illustrated in table 3 and figure 4 indicate that, except in the case of pathology (Bulgaria and Turkey) or breeding (Turkey and Yugoslavia), ongoing research programmes strongly vary from country to country.

In the contrary, among the programmes which are planned for the future, 3 areas of major interest have been identified:

- *Diversification in 3 countries,*
- *Pathology in 3 countries,*
- *Nutrition in 2 countries,*
- *Environnement in 2 countries,*

Priorities for research in zone 1 are:

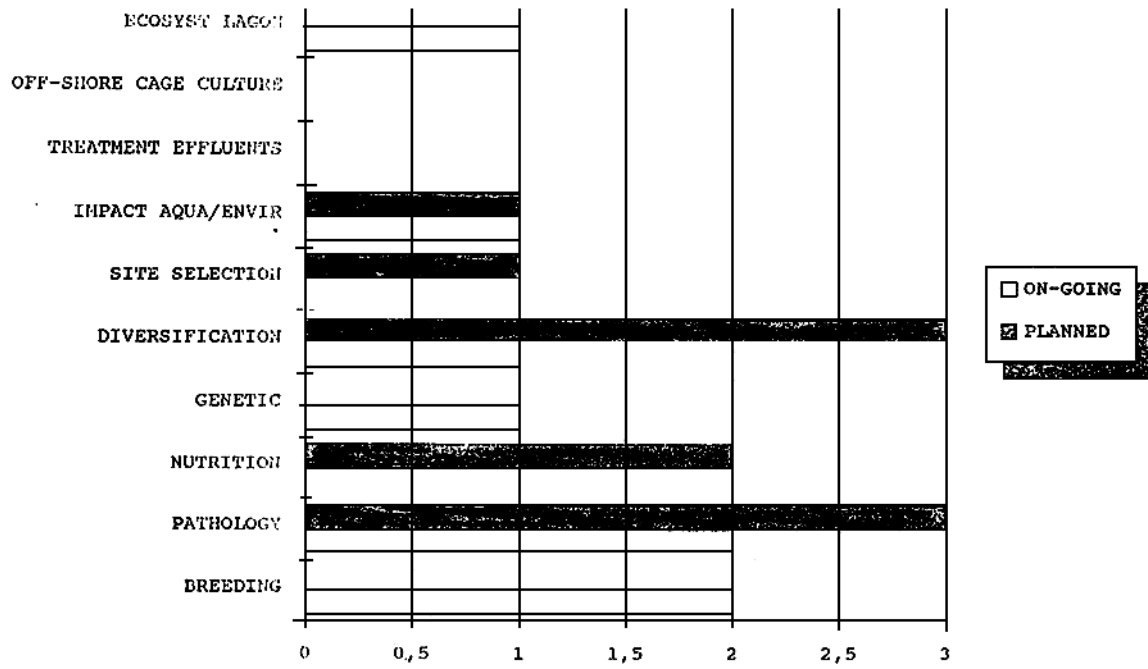
- *Pathology of freshwater and seawater species:* 4 countries
- *Diversification:* 3 countries
- *Breeding and nutrition:* 2 countries
- *Impact aquaculture/environnement:* 2 countries
- *Genetic, site selection and ecosystem in lagon:* 1 country



Table 3 SYNTHESIS OF ON-GOING AND PLANNED PROGRAMME IN ZONE 1

	PROGRAMME	ALBANIA	BULGARIA	TURKEY	YUGOSLAVIA	TOTAL
ON-GOING PROGRAMMES	BREEDING			X(Catfish)	X (SW)	2
	PATHOLOGY		X (SW)	X (Crayfish)		2
	NUTRITION					
	GENETIC				X (Hybri)	1
	DIVERSIFICATION				X (SW)	1
	SITE SELECTION					
	IMPACT AQUA/ENVIR			X		1
	TREATMENT EFFLUENTS					
	OFF-SHORE CAGE CULTURE ECOSYST LAGON	X				1
PLANNED PROGRAMMES	BREEDING					
	PATHOLOGY	X		X	X	3
	NUTRITION			X	X	2
	GENETIC					
	DIVERSIFICATION	X (Mussel)	X (Mussel)	X (FW)		3
	SITE SELECTION	X (Mussel)				1
	IMPACT AQUA/ENVIR				X	1
	TREATMENT EFFLUENTS					
	OFF-SHORE CAGE CULTURE ECOSYST LAGON					

**FIGURE 4 SYNTHESIS OF ON-GOING AND PLANNED RESEARCH PROGRAMME IN ZONE I**



**II.4 - On going and planned research programs in zone II (Cyprus, Lebanon and Syria) (table 4 and figure 5)**

- Aquaculture Production IN Zone II

AREA	COUNTRY	SW + BW	FW	TOTAL
II	CYPRUS	50	73	123
	LEBANON		100	100
	SYRIA		1300	1300
	TOTAL	50	1473	1523

Data concern only Cyprus and Lebanon.

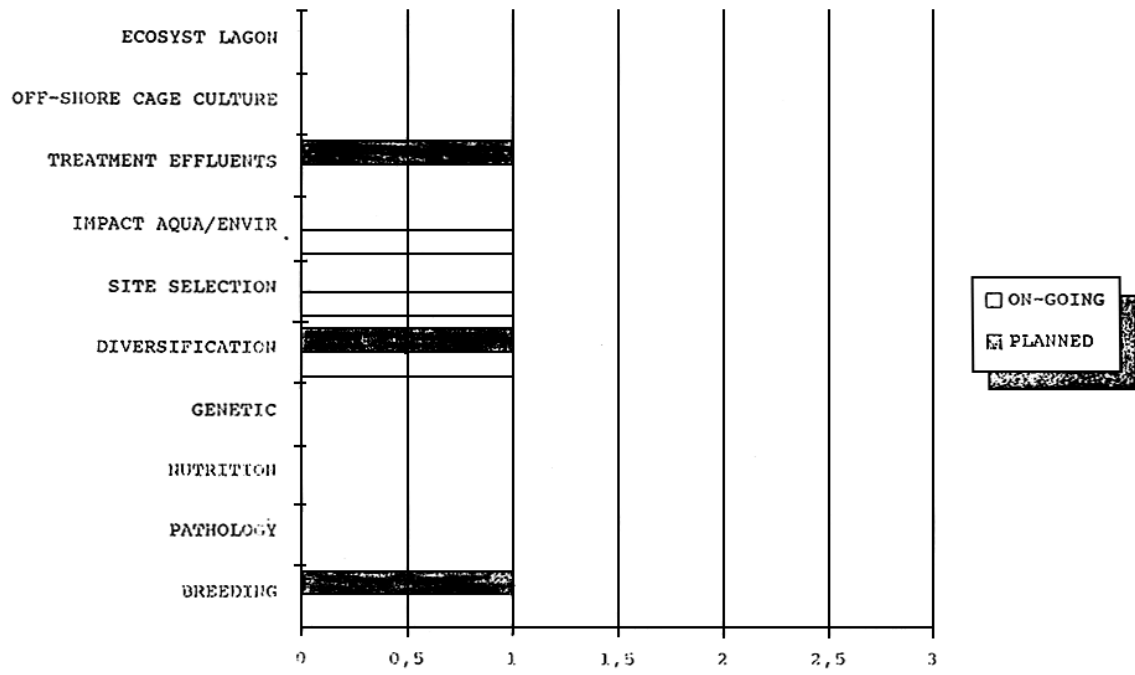
Cyprus concentrates his research effort on diversification and studies on impact of aquaculture on environnement. Lebanon research institute works on site selection. Additional priorities for the futur are breeding and treatment of effluents for Cyprus and diversification on mussels for Lebanon.

Diversification is the only research program of commun interest for both countries.

*Table 4 - SYNTHESIS OF ON-GOING AND PLANNED RESEARCH PROGRAMMES IN ZONE II*

	<b>PROGRAMME</b>	<b>CYPRUS</b>	<b>LEBANON</b>	<b>SYRIA</b>	<b>TOTAL</b>
ON-GOING PROGRAMMES	BREEDING			NO DATA	
	PATHOLOGY				
	NUTRITION				
	GENETIC				
	DIVERSIFICATION	X (SW)			1
	SITE SELECTION		X		1
	IMPACT AQUA/ENVIR	X (SW)			1
	TREATMENT EFFLUENTS				
	OFF-SHORE CAGE CULTURE				
	ECOSYST LAGON				
PLANNED PROGRAMMES	BREEDING	X (SW)			1
	PATHOLOGY				
	NUTRITION				
	GENETIC				
	DIVERSIFICATION		X (Mussel)		1
	SITE SELECTION				
	IMPACT AQUA/ENVIR				
	TREATMENT EFFLUENTS	X (SW)			1
	OFF-SHORE CAGE CULTURE				
	ECOSYST LAGON				

FIGURE 5- SYNTHESIS OF ON-GOING AND PLANNED RESEARCH PROGRAMMES IN ZONE II



**II.5 - On-going and planned research programs in zone III (Egypt, Lybia and Malta)  
(table 5 and figure 6)**

- Aquaculture Production IN Zone III

AREA	COUNTRY	SW + BW	FW	TOTAL
III	EGYPT	44800	43800	88600
	LIBYA	2	30	32
	MALTA	5		5
	TOTAL	44807	43830	88637

Few data are available on this area except in the case of Malta who concentrate his research activity on 4 programs of major interest: nutrition, pathology, genetic and diversification. Lybia only indicate research conducted on nutrition.

Among the planned programme, Egypt indicate strong interest for basic research on biology of the species (breeding, pathology, nutrition and genetic).

Basic research and diversification are the major programmes of research considered in this zone 3.

Table 5 - SYNTHESIS OF ON-GOING RESEARCH PROGRAMMES IN ZONE III

	PROGRAMME	EGYPT	LIBYA	MALTA	TOTAL
ON-GOING PROGRAMMES	BREEDING				
	PATHOLOGY			X	1
	NUTRITION		X	X	2
	GENETIC			X (SexRev)	1
	DIVERSIFICATION			X (SW)	1
	SITE SELECTION				
	IMPACT AQUA/ENVIR				
	TREATMENT EFFLUENTS				
	OFF-SHORE CAGE CULTURE				
	ECOSYST LAGON				
	PLANNED PROGRAMMES	BREEDING	X		X (SW)
PATHOLOGY		X			1
NUTRITION		X			1
GENETIC		X			1
DIVERSIFICATION					
SITE SELECTION					
IMPACT AQUA/ENVIR					
TREATMENT EFFLUENTS					
OFF-SHORE CAGE CULTURE					
ECOSYST LAGON					

**II-6 - On going and planned research programs in zone IV (Marocco, Algeria, Tunisia and Portugal) (table 6 and figure 7)**

Aquaculture production in Zone 4

AREA	COUNTRY	SW + BW	FW	TOTAL
IV	MAROCCO	540		540
	ALGERIA	45	379	424
	TUNISIA	1416	3	1419
	PORTUGAL	7470	978	8448
	TOTAL	9471	1360	10831

On-going research programs varied from country to country in zone IV with basic research on biology of species, diversification and environmental research in Portugal, nutrition and pathology in Tunisia, off-shore cage culture and ecosystem in lagoon research in Algeria, Marocco is concentrating in research site selection.

Among the research programmes proposed for the future, diversification and studies of ecosystem in lagoons are identified as priority.

Classification of priorities for this zone give:

- *Diversification:* 4 countries
- *Breeding:* 3 countries
- *Nutrition:* 3 countries
- *Ecosystem:* 3 countries
- *Off shore aquaculture:* 2 countries
- *Environmental aspect:* 2 countries.



FIGURE 6- SYNTHESIS OF ON-GOING AND PLANNED RESEARCH PROGRAMMES IN ZONE III

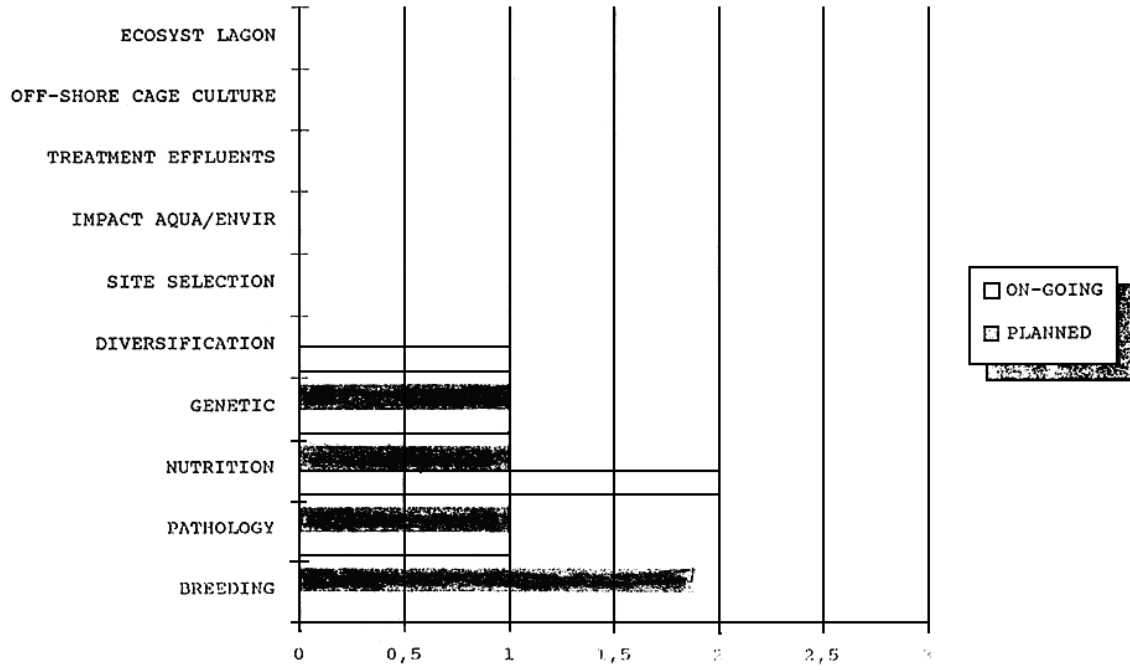
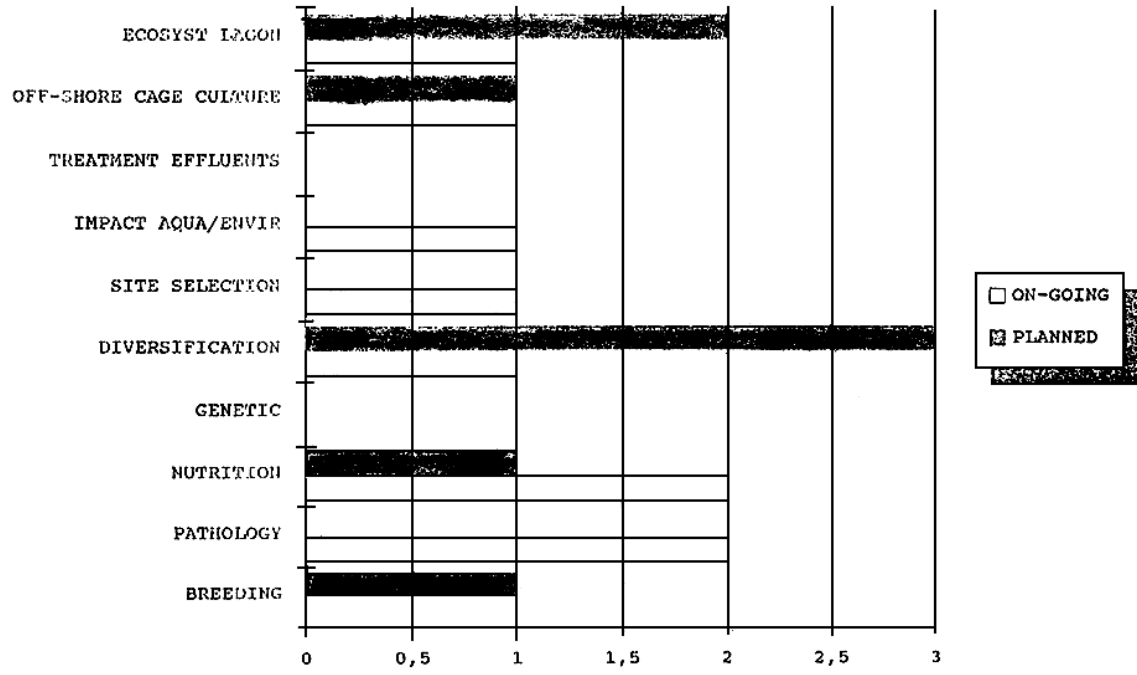


Table 6 - SYNTHESIS OF ON-GOING AND PLANNED RESEARCH PROGRAMME III ZONE IV

	PROGRAMME	MOROCCO	ALGERIA	TUNISIA	PORTUGAL	TOTAL
ON-GOING PROGRAMMES	BREEDING					
	PATHOLOGY			X (SW)	X	2
	NUTRITION			X (SW)	X	2
	GENETIC					
	DIVERSIFICATION				X	1
	SITE SELECTION	X				1
	IMPACT AQUA/ENVIR				X	1
	TREATMENT EFFLUENTS					
	OFF-SHORE CAGE CULTURE			X (Moll)		1
	ECOSYST LAGON			X (FW)		1
PLANNED PROGRAMMES	BREEDING		X			1
	PATHOLOGY					
	NUTRITION		X			1
	GENETIC					
	DIVERSIFICATION	X (Moll)	X	X		3
	SITE SELECTION					
	IMPACT AQUA/ENVIR					
	TREATMENT EFFLUENTS					
	OFF-SHORE CAGE CULTURE				X	1
	ECOSYST LAGON	X		X (FW)		2

**FIGURE 7 SYNTHESIS OF ON-GOING AND PLANNED PROGRAMMES IN ZONE IV**



### **III - PRELIMINARY INVESTIGATION ON IDENTIFICATION OF AREA OF RESEARCH OF COMMUN INTEREST**

A global synthesis including both on-going and planned research programmes is presented in table 7 and is illustrated by figures 8–9.

Although data have to be verified and completed a preliminary classification of commun major areas of research for the countries involved in MEDRAP II is presented:

- 1) *Diversification appeared to be the most important item, identified by 80% of the countries.*
- 2) *Basic research on pathology and nutrition are also considered as priority by 60% of the countries, again 40% for breeding*
- 3) *Environnemental aspects are also nominated by 60% of the countries as priority: impact of aquaculture on environnement (30%) and site selection (20%).*

This classification is illustred in figure №9 which give an idea of the relative importance of the different research programmes (on going-planned) in the geographical zones.

Table 7- GLOBAL SYNTHESIS OF ON-GOING AND PLANNED RESEARCH PROGRAMMES

		ZONE 1				ZONE 2		
		ALBANIA	BULGARIA	TURKEY	YUGOSLAVIA	CYPRUS	LEBANON	SYRIA
	BREEDING			1	1			
	PATHOLOGY		1	1				
	NUTRITION							
	GENETIC				1			
ON-GOING PROGRAMMES	DIVERSIFICATION				1	1		
	SITE SELECTION						1	
	IMPACT AQUA/ENVIR		1			1		
	TREATMENT EFFLUENTS							
	OFF-SHORE CAGE CULTURE							
	ECOSYST LAGON	1						
	BREEDING					1		
	PATHOLOGY	1		1	1			
	NUTRITION			1	1			
	GENETIC							
PLANNED PROGRAMMES	DIVERSIFICATION	1	1	1			1	

	SITE SELECTION	1						
	IMPACT AQUA/ENVIR				1			
	TREATMENT EFFLUENTS					1		
	OFF-SHORE CAGE CULTURE							
	ECOSYST LAGON							







**FIGURE 8 - SYNTHESIS OF ON-GOING AND PLANNED RESEARCH PROGRAMS WITHIN THE MEDRAP II COUNTRIES**

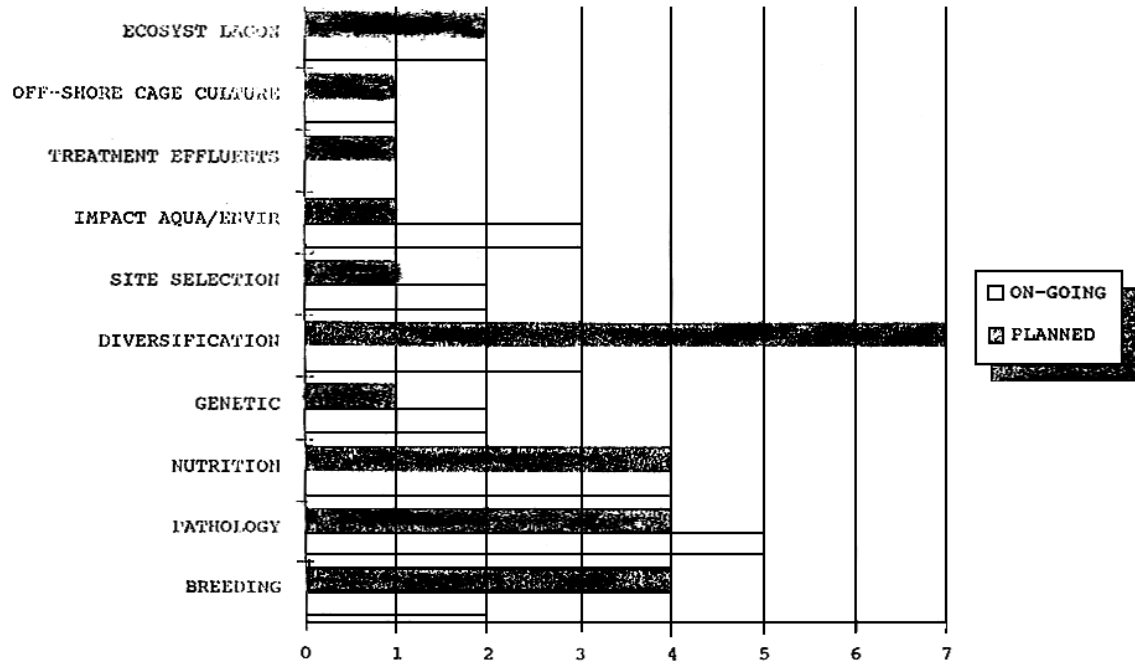
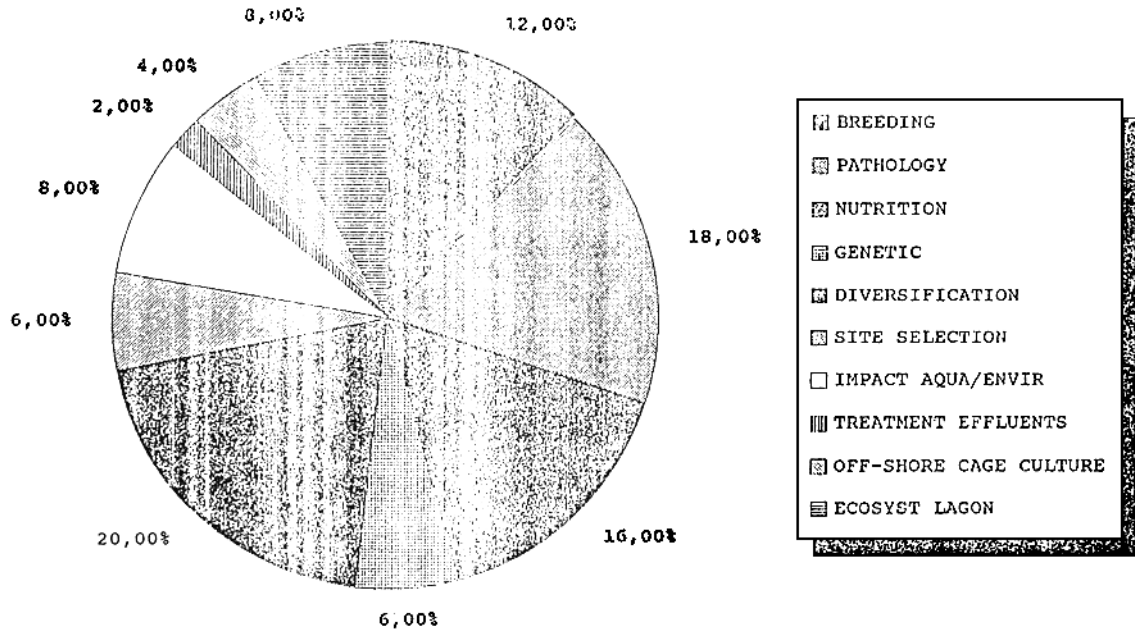


FIGURE 9- PRINCIPAL RESEARCH PROGRAMS WITHIN THE MEDRAP II COUNTRIES



of developing new research programmes.

4. Budget.

*Budgets are generally not indicated except in the case of Albania, Bulgaria and Cyprus.*

5. Conclusions.

*Although difficulties have been encountered to analyse the real capacity of research of the institutes in term of number of researchers facilities equipments, and budget, all countries have a potential of research in Aquaculture which could be developped in common through networking. Detailed informations are nevertheless necessary to examine in detail and select relevant laboratories and teams of research to involve in the sub-net work.*



#### IV EVALUATION OF CAPACITY

**Informations on capacity of research of each country have been summarized in table No. 8**

Data.concern:

- 1) *Number of instituts involved in different fields of Aquaculture Research.*
- 2) *Total number of staffs and researchers when available.*
- 3) *Main facilities and equipments.*
- 4) *Budget.*

The first observation to notice is the lack of complete informations and the difficulty encountered to realise a accurate evaluation, as some countries gave few details on their research institutes.

Nevertheless following preliminary analysis has been done:

- 1) *Institute involved in Aquaculture Research:*  
*Each country has one or two institutes of research, directly dealing with Aquaculture, most of the time affiliated to Ministry of Agriculture and Fisheries, or Ministry of Technology and Silences. Connections with Universities are only indicated by few countries.*
- 2) *Number of staffs involved in Research.*  
*Although data have to be completed, the number of researchers involved in aquaculture Research is important in Yugoslavia (61), Algeria, (44), Tunisia (31) and Morocco (31). In other countries, the number is not excluding 10 to 20 which is relatively low, compared to the Programmes of Research planned to develop in the future.*
- 3) *Facilities and Equipments*  
*Facilities and Equipments don't seem to be a limiting factor as all instituts have numerous laboratories, hatcheries and ponds and equipments to conduct relevant research programmes. Nevertheless, data indicated in the questionnaires are incomplete and no enough precise to be able to evaluate the possibilities*

## PRESENTATION OF EVALUATION OF RESEARCH CAPACITY IN THE MEMBER COUNTRIES

### 1) **National report**

Each National Coordinator will summarize, in 15 minutes, the situation of research conducted in the field of aquaculture, taking into consideration the specificity of his country and its position in the Sub-region.

Referring to the results of the survey on “national capacity and needs”, each presentation will include :

- analysis of the potential research and identification of research teams involved in aquaculture;
- synthesis of major research activities in relation with different species of major interest for aquaculture development;
- summary of the major constraints of aquaculture research.

**Transparencies and slides, with special reference to the National Research Infrastructures, are highly recommended in order to facilitate and simplify the presentations.**

See list of Regional Coordinator attached.

NB : The Sub-regional Coordinator will present the results of research capacity and needs when National Coordinators will not participate in the seminar.

### 2) ***Synthesis by Sub-regional Coordinators.***

Each Sub-regional Coordinator will summarize, in 10 minutes, the principal results of the survey on aquaculture capacities and needs in the Sub-region focusing on :

- situation of aquaculture and prospect;
- priorities in team of research and development in the field of aquaculture;
- research capacity and needs.

These information will help in the redaction of the global synthesis on research capacity in the region made by MEDRAP II Coordination Office and consultant.

**22/10/91**

***SUB-REGION YUGOSLAVIA***

10h30 – 10h45 : YUGOSLAVIA.  
10h45 – 11h00 : BULGARIA.  
11h00 – 11h15 : ALBANIA.  
11h15 – 11h30 : TURKEY.  
11h30 – 11h45 : Synthesis by Sub-regional Coordinator.

***SUB-REGION LIBYA***

12H00 – 15H15 : MALTA.  
12h15 – 12h30 : EGYPT.  
15h30 – 12h45 : LIBYA.  
12h45 – 13h00 : Synthesis by Sub-regional Coordinator.  
13h00 – 15h00 : Lunch.

***SUB-REGION SYRIA***

15h00 – 15h15 : CYPRUS.  
15h15 – 15h30 : LEBANON.  
15h30 – 15h45 : SYRIA.  
15h45 – 16h00 : Synthesis by Sub-regional Coordinator.  
16h00 – 16h30 : Coffee break.

***SUB-REGION ALGERIA***

16h30 – 16h45 : MOROCCO.  
16h45 – 17h00 : ALGERIA.  
17h00 – 17h15 : TUNISIA.  
17h15 – 17h30 : PORTUGAL.  
17h30 – 17h45 : Synthesis by Sub-regional Coordinator.