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Mid-term Review Meeting on the
Progress of the Co-ordinated
Mediterranean Pollution Monitoring
and Research Programme (MED POL)
and Related Projects of the
Mediterranean Action Plan

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ON THE IMPLEMENTATION OF THE

CO-ORDINATED MEDITERRANEAN POLLUTION MONITORING AND RESEARCH PROGRAMME (MED POL)

AND RELATED PROJECTS OF THE MEDITERRANEAN ACTION PLAN

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1. INTRODUCTION

1.1 The United Nations Environment Programme (UNEP) was established in 1972 by the United Nations General Assembly to act as a co-ordinating body within the United Nations system to ensure that comprehensive approaches be developed to deal with the world's most pressing environmental problems.

1.2 While it was recognized that environmental deterioration was far advanced in many areas of the globe, the Mediterranean region was selected by UNEP as a "concentration area" where UNEP would attempt to fulfil its catalytic role in assisting the coastal States in an ambitious and consistent manner.

1.3 After extensive preparatory activities involving a number of United Nations bodies, UNEP convened the Intergovernmental Meeting on the Protection of the Mediterranean (Barcelona, 28 January - 4 February 1975). The meeting was attended by representatives of 16 States bordering on the Mediterranean Sea. ¹⁾ At the end of the two-week meeting they approved an Action Plan ²⁾ consisting of three substantive components:

- legal (framework convention and related protocols)
- scientific (research and monitoring)
- integrated planning

1.4 All components of the Action Plan are interdependent and provide a framework for comprehensive action to promote both the protection and the continued development of the Mediterranean ecoregion. No component is an end in itself. Each activity is intended to assist the Mediterranean Governments in improving the quality of the information on the basis of which they formulate their national development policies. Each should also improve the ability of Governments to identify various options for alternative patterns of development and to make rational choices and appropriate allocations of resources.

1.5 The environmental assessment (scientific) component of the Mediterranean Action Plan has as its over-all objectives:

- to assess the present state of pollution of the Mediterranean Basin,
- to identify the sources, pathways, amounts and effects of pollutants affecting the Mediterranean Sea,

- to establish the trends in the level of the pollution,
- to provide the basis for building predictive models of the biogeocycle of pollutants and of their effects, and
- to present the information thus obtained in such a way that it could be used as a management tool in the control of pollution.

1.6 This document is an administrative progress report on the implementation of the environmental assessment component of the Mediterranean Action Plan. The results obtained through its implementation are incorporated in document UNEP/WG.11/4.

2. BACKGROUND

2.1 As early as 1969 the General Fisheries Council for the Mediterranean (GFCM) of FAO formed a Working Party on Marine Pollution in the Mediterranean which, in co-operation with the International Commission for the Scientific Exploration of the Mediterranean (ICSEM), produced the first comprehensive review of the state of marine pollution in the Mediterranean in 1972.³⁾

2.2 The next important step was the UNEP-sponsored International Workshop on Marine Pollution in the Mediterranean⁴⁾, convened in Monaco (9 - 14 September 1974) by the Intergovernmental Oceanographic Commission (IOC) of UNESCO, GFCM of FAO and ICSEM. This meeting, attended by 40 scientists from Mediterranean research centres, defined pollution of coastal waters as the main environmental problem in the Mediterranean Sea and attributed it to the general lack of adequate systems for the treatment and disposal of domestic and industrial waste, to the input of pesticides and petroleum hydrocarbons, and to the presence of disease-causing micro-organisms. The Workshop also reviewed information on current subregional programmes as well as on existing research and monitoring facilities in the Mediterranean.

2.3 Based on the recommendation of the Monaco Workshop and on a subsequent study of the capabilities of existing national research institutions, conducted by IOC on behalf of UNEP, the 1975 Intergovernmental Meeting in Barcelona approved a Co-ordinated Mediterranean Pollution Monitoring and Research Programme (MED POL) consisting of seven pilot projects and requested UNEP's Executive Director to implement the Programme in close collaboration with the relevant specialized United Nations bodies (GFCM of FAO, IOC of UNESCO, WHO, WMO and IAEA).

- 2.4 The following pilot projects were approved at the Barcelona Meeting as parts of MED POL:
- MED I : Baseline Studies and Monitoring of Oil and Petroleum Hydrocarbons in Marine Waters;
 - MED II : Baseline Studies and Monitoring of Metals, Particularly Mercury and Cadmium, in Marine Organisms;
 - MED III : Baseline Studies and Monitoring of DDT, PCBs and Other Chlorinated Hydrocarbons in Marine Organisms;
 - MED IV : Research on the Effects of Pollutants on Marine Organisms and their Populations;
 - MED V : Research on the Effects of Pollutants on Marine Communities and Ecosystems;
 - MED VI : Problems of Coastal Transport of Pollutants;
 - MED VII : Coastal Water Quality Control.
- 2.5 Following governmental approval for the creation of seven networks of co-operating national research centres to carry out the work on the seven pilot projects, a number of technical meetings were held at which operational documents ⁵⁾ were drawn up and are used as the basic documents in the implementation of the pilot projects.
- 2.6 Each of the operational documents contains a minimal work programme, mandatory for all participants, and an extended programme recommended as desirable for the more advanced research centres. Furthermore, the documents specify the matrix and the pollutants to be monitored, the sampling and analytical methodology to be followed, the procedures of the intercalibration of the analytical techniques, the type of field observations and laboratory experiments, the format and frequency of data reporting, the needs for training and additional equipment and any other question relevant to the execution of the pilot projects.
- 2.7 The pilot projects are being carried out by existing national institutions. Participation in the projects is open to all institutions in the region, subject to nomination by their national authorities (Annex I). At present 76 research centres from 15 Mediterranean countries ⁶⁾ have been identified as active participants in one or more of the pilot projects (Annex II), but additional nominations are still expected. The participation in the pilot projects is not limited to well developed research centres able to deal with the task in a complex way but is open to all institutions capable of limited contribution in order to further their own development.

- 2.8 The monitoring and research activities to be undertaken by the research centres nominated are specified in a signed agreement between them and the relevant specialized United Nations organization co-operating with UNEP on the implementation of the programme. As at the end of June 1977, 78 individual research agreements had been signed, 24 cleared and prepared for signature, while 89 agreements were still being negotiated. UNEP is acting as over-all co-ordinator for the work carried out on the basis of these agreements by the individual research centres to ensure the most effective and harmonious development of the whole research and monitoring programme.
- 2.9 The pilot projects are organized in close collaboration between UNEP and the specialized United Nations bodies (GFCM of FAO, IOC of UNESCO, WMO and WHO) which have a major role in their implementation. Throughout the planning period, and in particular during the whole of the pilot project phase lasting until the end of 1978, a high degree of co-operation has been and is being maintained between UNEP, acting as the over-all co-ordinator, and these specialized United Nations bodies.
- 2.10 Substantive support has already been provided by UNEP, through the co-operating specialized United Nations organizations, to the participants in the programme in order to facilitate or make possible their full participation in the pollution monitoring and research activities. This support includes a large training programme, furnishing of necessary equipment, organization of a permanent intercalibration of analytical techniques mandatory for all participants, and provision of common maintenance services for the more sophisticated instruments used in analytical work. By the end of June 1977, a total of 139 m/m of training and equipment worth \$687,529 has been granted to the participants in the seven pilot projects
- 2.11 As an aid to participants in the programme several technical documents such as bibliographies, manuals and guidelines, have been prepared or are under preparation.
- 2.12 In consultation with the Mediterranean Governments and the specialized United Nations bodies concerned, in August 1976, one research centre in each of the seven networks of co-operating institutions was nominated by UNEP (Annex III) as a Regional Activity Centre (RAC). The role of the RACs is to assist UNEP and the relevant specialized United Nations bodies in the organization and execution of the pilot projects (see 20).
- 2.13 Close collaboration has been established between the Regional Activity Centre for the pilot project on baseline studies and monitoring of oil and petroleum hydrocarbons in marine waters and the Regional Oil Combating Centre (see 15) making use of their complementary role in assessing the extent of the present pollution by petroleum hydrocarbons, in preparing contingency plans for dealing with oil spills and in organizing proper training relevant to their activities.

- 2.14 The first results of the seven MED POL pilot projects have been reviewed at recently convened mid-term review meetings⁸⁾.
- 2.15 The pilot projects of the monitoring and research programme deal mainly with the coastal waters of the Mediterranean, and therefore an additional pilot project (MED VIII) dealing with pollution levels of the open waters and the biogeocycle of the most important pollutants was later added to the original seven projects of MED POL (see 10).
- 2.16 Since 1975 UNESCO and UNEP have been undertaking a project (MED IX) on the role of sedimentation in the pollution of the Mediterranean Sea with special emphasis on the assessment of current knowledge in this field and on the development of guidelines for environmental impact assessment (see 11).
- 2.17 A related project was initiated by UNEP on pollutants from land-based sources (MED X). The project is being carried out in close co-operation with the Governments of the region and a number of specialized United Nations bodies, including the Economic Commission for Europe (ECE), the United Nations Industrial Development Organization (UNIDO), FAO, UNESCO, WHO, IAEA. Its objective is to provide the Governments of the Mediterranean coastal States with information on the type and quantity of pollution from major land-based sources and through rivers, and on the present status of waste discharge and water pollution management practices. The project also provides for the preparation of an inventory of land-based sources of pollutants being discharged into the Mediterranean. It is a concrete example of the linkage between environmental assessment and management in that it is intended to produce data which will assist Governments in the negotiation of the regional Protocol on land-based pollutants. The Protocol should contribute to the application of more efficient waste management practices (see 12).
- 2.18 Recently, in co-operation with UNESCO, plans have been developed to formulate conceptual models for the biogeocycle of selected Mediterranean pollutants, including models for their impact on marine ecosystems. Using data collected through the various pollution monitoring and research activities, these conceptual models should lead to the formulation of predictive models which might be useful tools for making appropriate management decisions (see 14).
- 2.19 Other projects may also be considered, inter alia: (i) to study the question of airborne pollutants, (ii) to evaluate the transfer of pollutants through the air/sea interface, (iii) to assess the potential fisheries resources in the Mediterranean and the effects of pollutants on this potential, and (iv) to develop ecologically sound guidelines and principles for the establishment and management of specifically protected aquatic areas.

- 2.20 A Directory of Mediterranean Marine Research Centres, describing more than 100 institutions was prepared and issued⁹⁾ by UNEP in 1976. A second, up-dated edition of this Directory providing detailed information on more than 140 institutions, (programmes, staff, publications, facilities, etc.) will be issued in July 1977.

3. MED I : BASELINE STUDIES AND MONITORING OF OIL AND PETROLEUM HYDROCARBONS IN MARINE WATERS (IOC/WMO/UNEP)

Description

- 3.1 The pollution of the Mediterranean by oil and petroleum hydrocarbons is a serious problem for beaches and other coastal, recreational areas, and as yet too little is known about the present levels of the pollution and about its effects on the Mediterranean ecosystem. The pilot project involves the visual observation of oil slicks and other floating pollutants, tar ball sampling, survey of tar on beaches and sea-water sampling to analyse the amount and composition of the petroleum hydrocarbons dissolved.
- 3.2 The pilot project is considered as a contribution to the Integrated Global Ocean Station System (IGOSS) organized by the Intergovernmental Oceanographic Commission (IOC) of UNESCO and the World Meteorological Organization (WMO).
- 3.3 The measurement of present levels of petroleum in all its forms in the Mediterranean assumes greater importance in view of the reopening of the Suez Canal to the passage of oil tankers. The value of initiating the pilot project in the Mediterranean region rests mainly on three facts:
- the observational methodology has already been developed (IGOSS),
 - by using a common system of observations the various subregions of the Mediterranean can be readily compared, and
 - within a common system of observation, the Mediterranean can be truly compared with other areas (e.g. the North Atlantic) with quite different oceanographic regimes, in which the possibilities for dispersion and dilution are greater and the possibilities of evaporation generally lower.

Objectives

- 3.4 The results obtained through the pilot project will be used to assess the present level of Mediterranean pollution by petroleum hydrocarbons. They will substantively contribute to the formulation of the contingency plans for action in cases of emergency which are under preparation by the Regional Oil Combating Centre in Malta.

Progress in Implementation

- 3.5 The operational document for this pilot project was developed at a joint IOC/WMO/UNEP Consultation (Malta, 8-13 September 1975)⁵⁾ which was attended by 36 participants from 12 Mediterranean countries.
- 3.6 At present 11 countries¹⁰⁾ have expressed a wish to participate in the pilot project and nominated 26 national laboratories as participants in the network dealing with the pilot project (Annex II; Annex V Fig.1)
- 3.7 The work on this project was started during 1976 and, by the end of June 1977, 9 research agreements had been signed, 3 cleared and are ready for signature, while the remaining 14 research agreements are still being negotiated.
- 3.8 On the basis of the research agreements signed, a training programme has been initiated. To date a total of 16 m/m training has been granted, of which, by the end of June, 1 m/m has been realized. The participating laboratories are aided by field and laboratory equipment, such as fluorescence spectrophotometers, neuston nets, sampling bottles and solvents (see 18).
- 3.9 Methodological guidelines for the implementation of the project, based on those prepared for IGOSS, are under preparation⁷⁾.
- 3.10 The preliminary results obtained through the pilot project were reviewed at the IOC/WMO/UNEP Mid-term Review Meeting⁸⁾, Barcelona, 22 - 26 May 1977 and are incorporated in document UNEP/WG.11/4. The individual summary reports of the participants are attached to this document (Annex IV).

4. MED II : BASELINE STUDIES AND MONITORING OF METALS, PARTICULARLY MERCURY AND CADMIUM, IN MARINE ORGANISMS (FAO(GFCM)/UNEP)

Description

- 4.1 Metals, and particularly heavy metals like mercury, are more or less toxic to man and to practically all marine organisms. They can reach man through the food chain, and the source of greatest concern is, therefore, the level of concentration of such metals in fish, shell-fish and other edible marine organisms.

- 4.2 It is recognized that the Mediterranean is a tectonically rich region and that some metals may have high natural levels and great variations in their concentration in sea-water and sediments. The bluefin tuna, as well as other tuna, is known to accumulate mercury and, although there is no strong evidence that the Mediterranean stock is separate from the Atlantic stock as a whole, Mediterranean tuna apparently have much higher levels than those from the Atlantic.
- 4.3 The pilot project deals primarily with the concentration of selected metals, particularly mercury and cadmium in marine organisms. In addition to these elements the measurement of the levels of copper, lead, manganese, selenium and zinc is recommended, particularly when detection methods providing for multi-elemental analysis are used. The striped mullet, the Mediterranean mussel and the bluefin tuna have been selected for the monitoring programme so that representative ecotypes are included. The sampling frequency is seasonal.

Objectives

- 4.4 The information on the level of selected metals in representative marine organisms is collected primarily to assess the eventual risk stemming from consumption of seafood. Furthermore, data collected through the project will contribute to the understanding of the causes of relatively elevated concentrations of some metals in Mediterranean organisms which, after all, may be due to factors beyond man's control.

Progress in Implementation

- 4.5 The operational document for this pilot project was formulated at a joint FAO(GFCM)/UNEP Expert Consultation (Rome, 23-27 June 1975) ⁵⁾ attended by 35 participants from 13 Mediterranean countries.
- 4.6 Fourteen countries ¹¹⁾ have expressed a wish to take part in the pilot project and nominated 38 national laboratories as participants in the network dealing with the pilot project (Annex II; Annex V Fig.3).
- 4.7 The work on this pilot project started in late autumn 1975 and, by the end of June 1977, 25 research agreements had been signed, 4 cleared and are ready for signature, while the remaining 9 research agreements are still being negotiated.
- 4.8 As part of the pilot project's implementation, a training programme has been initiated. To date a total of 46 m/m has been granted, of which by the end of June 1977, 7 m/m have been realized. In addition, participating research centres will receive, or have already received, various equipment (11 atomic absorption spectrophotometers and others) and material needed for their full participation in the pilot project (see 18).

- 4.9 Guidelines for sampling and analyses of biological material and for the use of biological accumulators in marine pollution monitoring have been prepared⁷⁾ for the use of participants in the pilot project.
- 4.10 A common reference methodology for analytical procedures to be followed in measuring the concentration of metals was adopted by participants in the project. The comparability of the results obtained by the various research centres is assured by a mandatory and permanent intercalibration exercise through which reference materials and standards are distributed to the participants in the project.
- 4.11 The results obtained from the first phase of the pilot project were reviewed at the FAO(GFCM)/UNEP Mid-term Expert Consultation⁸⁾, Dubrovnik, 2 - 6 May 1977 and are incorporated in document UNEP/WG.11/4. The individual summary reports of the participants are attached to this document (Annex IV).

5. MED III : BASELINE STUDIES AND MONITORING OF DDT, PCBs AND OTHER CHLORINATED HYDROCARBONS IN MARINE ORGANISMS (FAO(GFCM)/UNEP)

Description

- 5.1 Similar arguments to those advanced for the monitoring of metals (MED II) apply to chlorinated hydrocarbons. They are persistent, they are usually accumulated by organisms, they are usually harmful to man indirectly, through effects on the stocks of marine organisms he exploits. Even less is known about the present concentrations of these chemicals than about the concentrations of heavy metals. Since virtually all chlorohydrocarbons are generated by man, natural background levels of these substances are not a problem in baseline studies.
- 5.2 The pilot project deals with levels of selected organochlorine compounds which are considered as specially relevant to representative elements of the Mediterranean ecosystem. DDT, PCBs, dieldrin and their metabolites were singled out as falling into this category. Whenever possible, other persistent organic compounds are also identified in analysed samples. The organisms selected as monitoring targets (striped mullet, Mediterranean mussel, pink shrimp) are representative of the different Mediterranean ecotypes, of great economic importance and almost ubiquitous in the whole Mediterranean. The sampling frequency is seasonal.

Objectives

- 5.3 There is no evidence of direct harm to man from the present levels of chlorinated hydrocarbons accumulated through marine food-chains but, due to the nature of these substances, one can reasonably expect

that their build-up may lead to damage of certain components of the marine ecosystems, in particular the crustaceans. Therefore, the results of the project will primarily contribute to the assessment of the present distribution of chlorinated hydrocarbons in the Mediterranean Sea and thus to a better understanding of the eventual risk to which the marine ecosystems may be exposed.

Progress in Implementation

- 5.4 The operational document for the pilot project was developed by the same Expert Consultation ⁵⁾ that formulated the preceding pilot project.
- 5.5 Currently, 13 countries ¹²⁾ have nominated 29 national laboratories to participate in the pilot project (Annex II; Annex V Fig.4).
- 5.6 The first samples to be analysed were collected in late autumn 1975 and, by the end of June 1977, 16 research agreements had been signed, 4 cleared and are ready for signature, while the remaining 9 research agreements are still being negotiated.
- 5.7 Since not too many Mediterranean research institutions have been able to analyse marine samples for chlorinated hydrocarbons, a total of 32 m/m training was granted to the participants in the pilot project and by the end of June 1977 2 m/m of training had been carried through. Six gas chromatographs have been, or soon will be, delivered and installed at selected Mediterranean laboratories in addition to other types of equipment and material necessary for monitoring of chlorinated hydrocarbons (see 18).
- 5.8 Guidelines for sampling and analyses of biological material, and for the use of biological accumulators have been prepared ⁷⁾ for the use of participants in the pilot project.
- 5.9 A common reference methodology for analytical procedures to be followed in measuring the concentration of chlorinated hydrocarbons was adopted by participants in the project. The comparability of the results obtained by the various research centres is assured by a mandatory and permanent intercalibration exercise through which reference materials and standards are distributed to the participants in the project.
- 5.10 The participants in this pilot project reviewed their first results during the FAO(GFCM)/UNEP Mid-term Expert Consultation ⁸⁾ in Dubrovnik, 2 - 6 May 1977. These are incorporated in document UNEP/WG.11/4. The summaries of the reports presented at that meeting are attached to this document (see Annex IV).

6. MED IV : RESEARCH ON THE EFFECTS OF POLLUTANTS ON MARINE ORGANISMS
AND THEIR POPULATIONS (FAO(GFCM)/UNEP)

Description

- 6.1 The marine environment is characterized by relatively constant physical and chemical conditions. Most marine organisms are therefore not adapted to sudden changes in their environmental conditions, to certain substances not normally present in sea-water, or to unusually high concentrations of substances which normally appear only as sea-water microconstituents.
- 6.2 The project does not deal with acute toxicity experiments unless the organisms cannot be kept long enough under culture conditions to allow long-term toxicity tests. Instead, long-term experiments are envisaged with the aim of investigating the sub-lethal effects of potential pollutants, and functional as well as morphological changes.
- 6.3 The experiments are not limited to individual organisms but rather cover populations where subtle changes in the behavioural pattern could serve as early warning signs and lead to the possibility of predicting the moment at which the organisms will be harmed at the population level. The influence transmitted through the trophic chains, particularly in experiments on populations, is not neglected.
- 6.4 Due attention is paid to establishing the most sensitive stages in the life-cycle of the organisms tested. Physiological and biochemical studies are conducted in order to provide information on the mechanisms involved in the effects and transport of pollutants.
- 6.5 Damage to the genetic material of individuals and their populations is also studied.

Objectives

- 6.6 The objective of the project is to develop the necessary scientific background for biological monitoring and to contribute data required as the scientific rationale for the Protocol on Land-Based Sources of Pollution (see 1.3) and for the development of water quality criteria in general. Naturally, these criteria cannot be based solely on biological tests, but the results expected might provide a basis for a better understanding of the potential hazard to the ecosystem, including man, from the increased level of pollutants in the marine environment.

Progress in Implementation

- 6.7 The operational document for this pilot project was developed at a joint FAO(GFCM)/UNEP Expert Consultation (Rome, 30 June - 4 July 1975)⁵⁾ attended by 25 participants from 13 Mediterranean countries.
- 6.8 At present 12 countries¹³⁾ have expressed a desire to participate in the pilot project and nominated 24 national laboratories as participants in the network dealing with the pilot project (Annex II; Annex V Fig.6).
- 6.9 The work on this pilot project started in late autumn 1975 and, by the end of June 1977, 10 research agreements had been signed, 3 cleared and are ready for signature, while the remaining 11 research agreements are still being negotiated.
- 6.10 To facilitate the participation of the nominated research centres in the work, a total of 23 m/m training was granted up to July 1977 of which 5 m/m have been realized. Additional assistance provided to the participants included donation of various specific laboratory equipment (e.g. research microscopes, analytical balances, and laboratory centrifuges) and material (see 18).
- 6.11 Several manuals have been developed⁷⁾ as guidelines for the participants in the pilot projects.
- 6.12 At the FAO(GFCM)/UNEP Mid-term Expert Consultation⁸⁾ in Dubrovnik, 9 - 13 May 1977, the results of the first phase of the project were reviewed and are incorporated in document UNEP/WG.11/4. The individual summary reports are attached to this document (Annex IV).

7. MED V : RESEARCH ON THE EFFECTS OF POLLUTANTS ON MARINE COMMUNITIES AND ECOSYSTEMS (FAO(GFCM)/UNEP)

Description

- 7.1 Theoretically several types of marine communities and ecosystems could be studied in the framework of this pilot project. For practical purposes, the project deals with natural marine communities and ecosystems under stress in coastal waters, including lagoons and brackish coastal lakes, in areas where ecosystem changes may be anticipated as a consequence of man's activities, and with ecosystems in relatively unpolluted areas, such as marine parks, for reference.

- 7.2 Ecosystems are particularly investigated in areas which have been repeatedly studied in the past in order to detect long-term changes.
- 7.3 To the largest possible extent the ecosystems are studied as integral units, taking into account the dynamic interactions among their various components. Special attention is paid to the role of those organisms which are used in the monitoring pilot projects (MED II and MED III), in the transport of pollutants through the trophic levels (see 4 and 5).
- 7.4 The parameters and effects to be studied vary, depending on the community and ecosystem. The most common ones are: community structure, functional indices and body burden of pollutants.

Objectives

- 7.5 The over-all objective of the project is to provide information on the structural and functional state of Mediterranean marine communities and ecosystems as the basis for analysing the trends in their changes. Furthermore, it is expected that through this project a methodology could be developed and tested for the possible use of observed community and ecosystem modifications in determining the waste-receiving capacity of various parts of the Mediterranean, and maybe of the Mediterranean Sea as a whole. In connection with these objectives the project will directly contribute to the development of principles and guidelines for the selection and management of specially protected marine areas.

Progress in Implementation

- 7.6 The operational document for this pilot project was formulated at the same Expert Consultation ⁵⁾ that developed the previous pilot project.
- 7.7 At present, 12 countries ¹⁴⁾ have expressed a wish to participate in the project and nominated 21 national laboratories as participants in the network dealing with the pilot project (Annex II; Annex V Fig.6).
- 7.8 The work started in late autumn 1975 and, by the end of June 1977, 11 research agreements had been signed, 4 cleared and are ready for signature, while the remaining 7 research agreements are still being negotiated.
- 7.9 The training programme for participants in this pilot project is under way. A total of 16 m/m training up to June 1977 was agreed upon of which 1 m/m has already been fulfilled. Further assistance is provided to many of the participants in this project by donation of various equipment and material, which include such items as salinometers, dredge samplers, portable pH meters and many others. (see 18).

- 7.10 The FAO(GFCM)/UNEP Mid-term Expert Consultation⁸⁾ held in Dubrovnik, 9 - 13 May 1977, reviewed the first results of the pilot project which are incorporated in document UNEP/WG.11/4. The summary reports of the participants at the meeting are attached to this document (Annex IV).

8. MED VI : PROBLEMS OF COASTAL TRANSPORT OF POLLUTANTS (IOC/UNEP)

Description

- 8.1 The general pattern of sea surface transport in the Mediterranean is cyclonic (counterclockwise) in both the eastern and western basins. Pollutants discharged into coastal waters tend to be transported along the coasts, thus restricting advection from the coasts towards the open sea. At the same time, floating marine litter and tar balls in the open sea tend to be centrifuged towards the coasts. Water leaves the Mediterranean at depth and enters at the surface through the Straits of Gibraltar. Since the majority of pollutants are most abundant in the upper layers of the sea, the loss by transport through the Straits is relatively small. The average residence time of entering sea-water is estimated to be about 80 years, on the basis of the general hydrography of the Mediterranean and of mass transport measurements in the Straits, although the duration probably ranges from a few to several hundred years.
- 8.2 Although the general nature of the mass transport of sea-water in the Mediterranean is reasonably well understood, the knowledge of local circulation patterns is still meagre. The former may serve in studies of the distribution of pollutants entering the sea via the atmosphere, but the latter is much more important in studies of the distribution of pollutants entering the sea via rivers.
- 8.3 As part of this project the water circulation in coastal areas and the exchange of water between the coastal and off-shore regions is investigated. Special attention is paid to the movement of the surface layer as this contributes considerably to the rapid spread of certain pollutants (e.g. petroleum hydrocarbons, floating litter, etc.).

Objectives

- 8.4 The main objective of the pilot project is to provide the necessary information on the physical processes contributing to the transport of pollutants in the Mediterranean Sea and thus to facilitate the interpretation of data obtained through the other pilot projects when the Mediterranean models of the pollutants' biogeocycles are formulated and tested.

Progress in Implementation

- 8.5 The operational document for this pilot project was developed in Msida by the same Expert Consultation⁵⁾ that formulated the pilot project on Baseline Studies and Monitoring of Oil and Petroleum Hydrocarbons in Marine Waters (MED I).
- 8.6 At present 12 countries¹⁵⁾ have expressed a desire to participate in the project and nominated 23 national laboratories as participants in the network dealing with the pilot project (Annex II; Annex V Fig.7).
- 8.7 The work on this project started in 1976 and, by the end of June 1977, 7 research agreements had been signed, 6 cleared and are ready for signature, while the remaining 10 research agreements are still being negotiated.
- 8.8 The need for training was early recognized and as an aid to the participants in the project 6 m/m of training were granted up to the end of June 1977, of which 1 m/m has been realized. As a further aid, current meters, salinometers and other types of equipment were, or soon will be, put at the disposal of the institutions participating in the project (see 18).
- 8.9 Methodological guidelines for the implementation of the project are under preparation⁷⁾.
- 8.10 The first results of the project were reviewed and discussed at the IOC/WMO/UNEP Mid-term Review Meeting⁸⁾ in Barcelona, 23 - 27 May 1977 and are incorporated in document UNEP/WG.11/4. The individual summary reports of the participants at the meeting are attached to this document (Annex IV).

9. MED VII : COASTAL WATER QUALITY CONTROL (WHO/UNEP)

Description

- 9.1 The serious and rapidly growing pollution of the coastal waters of the Mediterranean is having an increasing impact on the social and economic well-being of the countries bordering it. In addition to the millions of inhabitants living along the coastline of the Mediterranean, millions of tourists spend their holidays on the shores of this sea, and there is a considerable potential for exchange of disease-causing micro-organisms.
- 9.2 The present situation constitutes a significant health hazard in many places: salmonellosis, dysentery, viral hepatitis and poliomyelitis have all been endemic in the Mediterranean area, and during recent years there have been a number of cholera outbreaks. There is a distinct need for better statistics concerning correlation between diseases and coastal water pollution. There is ample evidence that contaminated shellfish are an important concern

to public health. The risk of infection from swimming and other recreational activities in coastal waters is enhanced in certain areas by the absence or inadequacy of beach sanitary facilities. Thus, the actual and potential health effects are of prime importance.

- 9.3 Using a commonly agreed methodology the project initiates a sanitary and health surveillance of coastal recreational waters and of shellfish-growing waters in selected coastal areas. Microbiological indicators are used as the most significant indicators of the quality of seafood and coastal waters.
- 9.4 Scientific studies are prepared on the epidemiological evidence of effects on health caused by inadequate sanitary conditions in coastal areas.

Objectives

- 9.5 The over-all objective of the project is to produce statistically significant data, scientific information and technical principles which are required for the assessment of the present levels of coastal pollution as it concerns human health and are indispensable for the rational design and efficient implementation of national programmes for the control of coastal pollution from land-based sources in the Mediterranean area.

Progress in Implementation

- 9.6 The operational document for this pilot project was prepared at a joint WHO/UNEP Expert Consultation (Geneva, 15-19 December 1975) ⁵⁾ attended by 35 participants from 15 countries.
- 9.7 At present 9 countries ¹⁶⁾ have expressed a desire to participate in the project and nominated 28 national institutions as participants in the network dealing with the pilot project (Annex II; Annex V Fig.5).
- 9.8 The work on this pilot project started in late autumn 1976 and, by the end of June 1977, 28 research agreements were still being negotiated. Assistance to the research centres participating in the project will be provided as soon as the agreements have been signed.
- 9.9 Primarily for the use of participants in the project, but also with a view to wider use in the Mediterranean, guidelines were prepared and adopted by participants in the project ⁷⁾ for monitoring public health aspects of coastal water quality.
- 9.10 A document on health criteria and epidemiology of health risks related to beach and coastal pollution has been prepared ⁸⁾ in order to promote the scientific studies required and develop reliable data for application in the field. Interim microbiological criteria for coastal waters have been adopted by participants in the project and were recommended to be used in assessment of the coastal water quality.

- 9.11 A report on principles and methodology for coastal marine pollution control planning resulted from a Workshop ⁷⁾. The report contributes to the over-all assessment of the pollution situation of the Mediterranean and to the intergovernmental consultation on the Protocol on Land-Based Sources of Pollution.
- 9.12 The first results of the project were reviewed at the WHO/UNEP Mid-term Review Meeting ⁸⁾ in Rome, 30 May - 1 June 1977 and are incorporated in document UNEP/WG.11/4. The summaries of the participants' individual reports are attached to this document (Annex IV).

10. MED VIII : BIOGEOCHEMICAL STUDIES OF SELECTED POLLUTANTS IN THE OPEN WATER OF THE MEDITERRANEAN (IAEA/IOC/UNEP)

Description

- 10.1 Heavy metals and chlorinated hydrocarbons are two types of pollutants identified in all oceans. Although the edges of the ocean are the most polluted, being the areas most affected by man's activities, the levels in the open Mediterranean are important for purposes of comparison with other seas and oceans and with the levels found in coastal waters to ascertain the degree of degradation of the Mediterranean as a whole.
- 10.2 By measuring the amounts of heavy metals and chlorinated hydrocarbons in water, sediments, biota and, in some cases, the air, one can define transport pathways and reservoirs in the open Mediterranean. This should provide the unifying concept that will help understand the MED II and MED III results in the coastal area.
- 10.3 The programme requires a large amount of ship-time to define the fate of these pollutants in the open ocean. It further requires the close co-operation of certain other Mediterranean laboratories to assist in all the analyses and sampling requested.
- 10.4 Data obtained through the project, combined with those which will be collected through the other Mediterranean projects, will provide a sound basis for a mode on the biogeochemical cycle of pollutants in the Mediterranean (see 13).

Objectives

- 10.5 The immediate goal of the project is to obtain data on pollution in open waters of the Mediterranean which are necessary for the assessment of the total present load of pollutants in the Mediterranean, and, in particular, for an understanding of the dynamics of pollutants (entry, transport, transformation and decay) and thus complement the coastal monitoring undertaken by the original MED POL pilot projects.

- 10.6 Long-term goals are to carry out objective assessments of problems affecting the marine environment and its living resources and to contribute to the development of a programme for monitoring of marine pollution and its effects on marine ecosystems.

Progress in Implementation

- 10.7 The project formally started in October 1976 as a specific extension of an earlier programme of work.
- 10.8 In addition to the IAEA International Laboratory of Marine Radioactivity in Monaco which is the co-ordinator and the largest participant in the project, co-operative programmes have been formally inaugurated with a number of Mediterranean Laboratories ¹⁷⁾ to assist in the collecting analyses, and interpretation of the open ocean data.
- 10.9 The major problems were how to organize the necessary ship-time to carry out more or less synoptic analyses in the entire Mediterranean, and to get the necessary equipment through the bidding, ordering, setting-up and calibration stages in good time to take care of the onslaught of samples, all at relatively short notice.
- 10.10 Three cruises have been completed by scientists from Egypt, Greece, Monaco, Turkey and Yugoslavia. The ATLANTIS II cruise from Suez to Malta (19-26 April 1977) collected 36 open ocean samples at various depths and 10 samples of sediments from 4 stations. The KANE cruise (11-18 April 1977) from Greece to Monaco collected over 100 water samples from the surface down to the bottom. The HAYES cruise from Greece to Corsica has just been completed (13-23 June 1977). Data analyses from the first two cruises are in full swing. The bulk of the data will be ready by the end of the year.
- 10.11 For the near future two additional cruises are planned: an eight-day cruise in the Eastern Mediterranean (SHIKMONA) and a cruise in the Western Mediterranean (CORNIDE DE SAAVEDRA).

11. MED IX : ROLE OF SEDIMENTATION IN THE POLLUTION OF THE
MEDITERRANEAN SEA (UNESCO/UNEP)

Description

- 11.1 The comparison between dissolved and particulate elemental concentrations in the aquatic environment shows that most heavy metals and organic pollutants are enriched in the solid phase. Comparison of the relative amounts of pollutants transported in river waters and in the suspended sediments clearly shows the importance of the latter for any waste load assessment.

- 11.2 In addition to natural particulates from various origins, secondary enriched particulates such as pesticides fixed on clay minerals and organic matter eroded and carried by rivers increase their contaminated load. Pollutants from sewage and industrial wastes may be adsorbed on to suspended particles or directly discharged in particulate form into the receiving waters.
- 11.3 Development of common procedures for representative sampling of river-suspended sediments is initiated under this project. Also, compatible methods for separation of solids, analytical extraction and determination need to be established and agreed upon. Pollutants of concern are various organics and heavy metals.
- 11.4 In addition to the river-dissolved pollution load estimates carried out under project MED X, a selection has been made of Mediterranean rivers to be sampled and analysed for substances carried by suspended sediments. Results will be used in the over-all assessment of pollutants contributed by major rivers.

Objectives

- 11.5 The ultimate objective of the project is to allow for an over-all assessment of the total pollution load of the Mediterranean by including pollutants associated with suspended river sediments through the collection of a first set of river-sediment pollution data.

Progress in Implementation

- 11.6 The project was initiated in October 1975 as part of the programme of scientific support to the Mediterranean Action Plan. It was subsequently integrated into the activities carried out under project MED X.
- 11.7 A scientific study was prepared on the assessment of knowledge and development of guidelines for environmental impact assessment relevant to the role of sediments in pollution studies and to the sediment-pollutant interactions. It also describes sampling and analytical procedures.
- 11.8 A meeting of experts of Mediterranean countries, convened in December 1976, identified the relative importance of particulate pollutants in the total pollutant load of rivers. The meeting agreed upon a list of substances to be measured and suggested a small number of rivers to be sampled for suspended sediments analysis. The establishment of a five-year monitoring programme was also agreed upon.

- 11.9 In order to unify as much as possible the methods used, a description was prepared in 1977 on sampling methods and on the simplest available analytical procedures for determining heavy metals and chlorinated hydrocarbons in sediments.
- 11.10 Collection of sediment samples and analytical determinations are currently being carried out on a restricted number of rivers. In some cases, sediment samples are sent to the International Laboratory of Marine Radioactivity (IAEA, Monaco), for extraction and analysis. In addition, technical and financial assistance is being provided to the countries requesting it. However, the difficulties encountered during the sampling pretreatment and analytical work, particularly to avoid contamination, lead to a very restricted number of analyses.

12. MED X : POLLUTANTS FROM LAND-BASED SOURCES IN THE MEDITERRANEAN
(WHO/ECE/UNIDO/FAO/UNESCO/IAEA/UNEP)

Description

- 12.1 The main land-based sources of pollution of Mediterranean coastal waters are municipal sewage and industrial effluents discharging through rivers or directly to the sea. Pollution is aggravated in the Mediterranean, which is an almost entirely enclosed area, by very small tidal effects, long periods of calm weather and relatively high ambient temperatures.
- 12.2 As part of the agreed Mediterranean Action Plan²⁾, in order to achieve a comprehensive picture of all major pollution inputs into the Mediterranean from land-based sources, several tasks are undertaken within this project:
- preparation of an inventory of land-based sources of pollutants discharging into the Mediterranean;
 - assessment of the nature and quantity of pollutants from coastal sources;
 - assessment of the nature and quantity of pollutants carried by major rivers;
 - review of present waste disposal and pollution management practices.
- 12.3 This project is closely linked to the pilot projects of MED POL and to the legal components of the Mediterranean Action Plan. In particular, it provides technical background information for the preparation of the protocol on the protection of the Mediterranean from land-based sources of pollution, for the forthcoming projects on integrated planning for the development of the region, and for the project on coastal water quality control (MED VII).

- 12.4 The project covers those coastal zones of the Mediterranean proper which directly influence the quality of the marine waters by the discharge of liquid, dumping of solid or emission of gaseous wastes.
- 12.5 The project is implemented jointly by six United Nations agencies in co-operation with UNEP.

Objectives

- 12.6 The ultimate objective of the project is to provide the governments of the Mediterranean coastal states, as the sole beneficiaries of the project, with appropriate information on the type and quantity of pollution inputs from major land-based sources and rivers, and on the present status of waste discharge and water pollution management practices. This information, combined with that collected through the MED POL pilot projects on the biogeocycles, levels and effects of various pollutants on human health and marine ecosystems will be used to assist the Mediterranean Governments in their negotiation of the Protocol for the Protection of the Mediterranean Sea Against Pollution from Land-Based Sources (see UNEP/WG.11/Info.5).

Progress in Implementation

- 12.7 The document specifying all project operations was prepared by a series of inter-agency consultations and agreed upon among the six co-operating agencies and UNEP.
- 12.8 Concurrence of Mediterranean governments for participation in the project was sought by UNEP in March 1976 and the majority of the riparian countries designated a special contact point for this task. UNEP focal points provided the contact in the remaining countries.
- 12.9 The project is a joint undertaking to which each co-operating agency contributes according to its field of expertise and geographical representation as follows:
- municipal waste sources, including tourist development areas, disposal and management practices are investigated by WHO;
 - industrial waste sources, disposal and management practices are covered by ECE and UNIDO respectively;
 - assessment of pollution stemming from agricultural run-off is undertaken by FAO;
 - waste loads carried by rivers as well as the contribution of suspended sediments are studied by UNESCO;

- the amount of radio-active discharges in the Mediterranean is subject to an IAEA assessment.
- 12.10 During the first phase of project implementation ending October 1976 common methodology was developed for the collection of compatible data from Mediterranean countries. This includes standard forms for reporting on municipal, industrial and agricultural pollution sources as well as on rivers and nuclear installations.
- 12.11 During the second phase of the project, ending July 1977, sectoral surveys of existing information on all the above-listed categories of pollution sources are being conducted in almost all countries concerned, either directly through collaborating national institutions or with the assistance of consultant missions. Detailed source inventories have been established which will contribute to the assessment of the contribution of pollutants from land-based sources to the total pollution load of the Mediterranean.
- 12.12 A comprehensive summary report providing a quantitative picture of all waste sources and pollutant categories for the entire basin is currently in preparation. The draft of this joint report will be submitted to a meeting of governmental experts in September 1977. The report will also discuss the technical annexes of the protocol on land-based sources of pollutants.
13. MODELLING OF MARINE SYSTEMS IN THE FRAMEWORK OF MED POL (UNESCO/FAO/IOC/UNEP)
- Objectives
- 13.1 It has been generally recognized in the Mediterranean scientific community that a great need exists to explore the functioning of marine ecosystems in all aspects related to their response to the environmental stresses imposed on them. Modelling is the most comprehensive scientific tool for this purpose.
- 13.2 In its broadest sense, modelling could provide an efficient mechanism for the co-ordination, design and balance of sampling programmes such as the one carried out under MED POL and for the assessment of the complex relationship between the effects and causes of marine pollution. Such models could provide the means by which the results of the individual projects of the Mediterranean Action Plan, and MED POL in particular, can be synthesized.
- 13.3 Important problems which could be modelled are: pathways, fate and effects of heavy metals, oil and other organic pollutants on the marine organisms and communities with special emphasis on synergistic effects of various pollutants. Hydrodynamical models

should be the base and an integral part of every comprehensive model of the biogeochemical cycle of pollutants.

- 13.4 The ultimate objective of modelling could be the development of models having predictive capabilities. Such models could be used by the Governments of the Mediterranean States as the most effective management tools in the control of marine pollution from land-based sources.
- 13.5 Recognizing the need for the advancement of modelling, several expert group meetings ¹⁸⁾ were convened by UNESCO with assistance from UNEP, and two specific background papers ¹⁹⁾ on modelling were considered in the framework of the Mid-term review meetings on MED II - V and MED VI.

Implementation

- 13.6 The recommendation, made at the Mid-term review meetings on individual projects of MED POL, is that an interdisciplinary task team should be created to formulate the conceptual models for the most critical Mediterranean pollutants, to develop them into mathematical models using data generated by the various projects of the Mediterranean Action Plan and to test their predictive capabilities.

14. ESTABLISHMENT AND MANAGEMENT OF SPECIALLY PROTECTED AREAS (IUCN/UNEP)

Description

- 14.1 In the framework of the over-all protection of the Mediterranean basin from pollution, certain aquatic (marine and estuarine) and terrestrial (coastal and island) areas deserve and need special protection and management. They are as follows:
- biotopes (habitats) on the maintenance of which the proper functioning of the Mediterranean ecosystem as a whole depends,
 - breeding grounds necessary for the maintenance of exploitable stocks of economically important marine species,
 - natural habitats for birds migrating to, from or through the Mediterranean region,
 - reference areas for scientific research, including monitoring of the levels and effects of pollutants,
 - pools of genetic material and safe "sanctuaries" for endangered indigenous Mediterranean species,
 - areas for public environmental education,

- sites of historical, geographical, archeological, hydrological and ecological interest.

14.2 The existing specially protected Mediterranean zones, such as marine parks, protected wetlands, national parks and other protected areas, do not satisfy the ecological and economic needs of the region, although their number is growing steadily. These needs can be met only through common principles and guidelines for the selection, establishment and management of specially protected areas jointly agreed by the Governments of the region, because their protection should rest on harmonized action taken at national level.

Objectives

14.3 The over-all objectives of activities relevant to the establishment and management of specially protected areas are:

- to develop common principles and guidelines for the establishment and management of specially protected areas and thus to provide the means for the national authorities to take co-ordinated action on the selection of unique or vitally important ecosystems which require special protection, and
- to create a mechanism for co-operation and consultation between the national administrators and scientists responsible for the selection, establishment and management of Mediterranean areas under special protection.

Implementation

- 14.4 A preliminary survey of existing Mediterranean aquatic protected areas (marine and wetlands) was carried out in 1974 by an IUCN consultant on behalf of UNEP. The survey also identified some areas which would deserve special protection.
- 14.5 An expert consultation on Mediterranean Marine Parks and Wetlands ²⁰⁾ was convened by UNEP in Tunis, 12-14 January 1977. The consultation reviewed the first draft technical principles and guidelines for the establishment and management of Mediterranean protected areas and recommended the creation of an Association of Protected Mediterranean Areas, the preparation of a Directory of protected areas, the strengthening of the research on ecological problems and its co-ordination with the relevant MED POL pilot projects, and the further elaboration of principles and guidelines to be submitted to the Governments of the region for their consideration.
- 14.6 As the follow-up of the Tunis meeting, in May 1977 UNEP invited the Mediterranean governments to nominate members for the Association of Protected Mediterranean Areas, and in co-operation with IUCN and FAO took steps to prepare the Directory of Mediterranean protected areas and the principles and guidelines for the selection, establishment and management of Mediterranean protected areas.

15. RELATIONSHIP BETWEEN MED POL AND THE REGIONAL OIL COMBATING CENTRE (IMCO/UNEP)

Description

- 15.1 In connection with the problems of accidental spills of oil or other harmful substances in the Mediterranean, Governments at the Conference of Plenipotentiaries of the Coastal States of the Mediterranean Region, for the Protection of the Mediterranean Sea (Barcelona, February 1976) ²⁾ decided to establish a Regional Oil Combating Centre in Malta.
- 15.2 The primary objective of the Centre is to help coastal States of the region take co-operative and timely steps to prevent damage to their coastal resources from massive and accidental pollution by disseminating information, preparing contingency plans, maintaining efficient communication systems and encouraging technological co-operation and training programmes in the region.
- 15.3 In December 1976 the Regional Oil Combating Centre was inaugurated.

Objectives

- 15.4 Through the Regional Activity Centre for MED I (see 20) close collaboration will be established between the Regional Oil Combating Centre and the MED I pilot project (see 3). This collaboration will include, in particular:
- exchanging data and information relevant to the level and extent of pollution by oil and petroleum hydrocarbons in the Mediterranean;
 - providing mutual assistance for the preparation of reports, surveys, contingency plans, etc;
 - assisting in the development of training activities;
 - establishing a common data bank;
 - strengthening the capacity of the Regional Oil Combating Centre to act as an International Referral System (IRS) sectoral focal point in connection with oil pollution.

16. INTERCALIBRATION OF ANALYTICAL TECHNIQUES (IAEA/FAO/IOC/UNEP)

Description

- 16.1 In applied studies like pollution studies, which are closely related in many cases to various control measures, the reliability of the data has special importance. In particular, when many laboratories are involved in measuring trace pollutants such as heavy metals, chlorinated and petroleum hydrocarbons by various methods, it is essential to ensure the comparability of the data obtained by different laboratories to deduce any sensible conclusion. This is exactly the case in the assessment of the Mediterranean pollution.
- 16.2 Past experience gained through various intercalibration exercises on the measurements of trace pollutants shows that the data of different laboratories on an identical sample may differ quite often by an order of magnitude and sometimes even by two orders of magnitude. Thus, a joint effort by the laboratories participating in the same projects towards improving the comparability of the data is essential to make the measurements meaningful.
- 16.3 The most effective way to improve and ensure the comparability of the measurements is to organize intercalibration exercises of the measurements of the trace pollutants in question - heavy metals, chlorinated hydrocarbons, oil and petroleum hydrocarbons - among the participating laboratories. By distributing homogeneous samples which have matrices as closely identical to those of the actual samples as possible, and comparing the results obtained by different laboratories, the participating laboratories are able to improve their analytical performances by themselves and eventually ensure the comparability of the data produced as a group.

Objectives

- 16.4 The primary objective of the intercalibration programme is to give specific assistance for analytical quality control to Mediterranean laboratories participating in the pilot projects MED I, MED II and MED III, within the framework of MED POL. Considering the importance of the comparability and reliability of the data produced, the present intercalibration programme is regarded as one of the key elements in the baseline studies and monitoring of the levels of pollutants in the Mediterranean.

Progress in Implementation

- 16.5 The following homogeneous samples for the intercalibration exercises were made available for the participants in MED II and MED III by the IAEA International Laboratory of Marine Radioactivity in Monaco which acts as an intercalibration centre:

- | | |
|-------------------------------|---|
| Oyster homogenate (MA-M-1) | for trace elements and chlorinated hydrocarbons |
| Sea plant homogenate (SP-M-1) | for trace elements and chlorinated hydrocarbons |
| Marine sediment (SD-M-1) | chlorinated hydrocarbons |
| XAD-2 resin | chlorinated hydrocarbons |
- 16.6 In addition to these, the preparation and homogenization of copepod homogenate (MA-M-1) and fish flesh homogenate (MA-A-2) were carried out in 1976 and their homogeneity was tested.
- 16.7 The first step in the implementation of the intercalibration exercise for trace elements was taken by encouraging potential participating laboratories in MED II and MED III to take part in a world-wide intercalibration exercise on oyster sample (MA-M-1). After the official nomination of the research centres participating in the pilot projects their participation in the intercalibration programme became mandatory and additional oyster samples were distributed to those ready for the analysis. By early 1977, 23 laboratories had received oyster samples for intercalibration, 19 of which have reported the results.
- 16.8 These show that comparability of results among the Mediterranean research centres is not very different from the world-wide "consensus values" for Cu, Cd, Hg, although the scatter is greater. The comparability of the Pb results indicate that there is a serious analytical problem in Pb determination.
- 16.9 As the second step of the intercalibration exercise, copepod sample (MA-M-1) and sea plant sample (SP-M-1) were distributed with the US National Bureau of Standards (NBS) orchard leaves sample to the research centres that completed the analysis of the oyster sample. Several results have already been reported and compilation is now in progress.
- 16.10 Results of the intercalibration for chlorinated hydrocarbons are just beginning to arrive.
- 16.11 The Marine Laboratory of Duke University, North Carolina, USA, has prepared and will distribute to all participants in MED I a suitable reference sample (chrysene) for intercomparison of dissolved/dispersed petroleum hydrocarbons.

17. COMMON MAINTENANCE SERVICES (IAEA/UNEP)

Description

- 17.1 The proper maintenance and rapid repair of the often very sophisticated analytical laboratory instruments or field equipment used in various pilot projects of the MED POL are of great importance for the day-to-day work of the laboratories using them. As laboratories in many Mediterranean countries cannot rely on the efficiency of maintenance services provided by local representatives of the producers of these instruments and equipment, the only way to ensure a smooth flow of data is by organizing help to the disadvantaged participants in MED POL.
- 17.2 The common maintenance services are provided by an electronics engineer operating from the IAEA International Laboratory of Marine Radioactivity in Monaco. For the most part they take care of the routine maintenance and repair of atomic absorption spectrophotometers, gas chromatographs, fluorimeters and recording current meters given to the research centres participating in MED I, MED II, MED III and MED VI.
- 17.3 Request for assistance should be addressed to UNEP's Co-ordinating Unit for MED POL (see 20.2) directly or indirectly through the specialized United Nations organization responsible for the technical operation of the pilot projects.

Objective

- 17.4 To ensure the cost-free routine maintenance and repair of laboratory and field equipment provided to the research centres participating in MED POL if these services are not available locally.

Progress in Implementation

- 17.5 An electronics engineer was recruited in October 1976 and has received specific additional training at the factories producing the equipment (atomic absorption spectrophotometers, gas chromatographs, recording current meters).
- 17.6 Up to the end of June 1977, through the assistance of the common maintenance services, six atomic absorption spectrophotometers and gas chromatographs have been installed at research centres in various parts of the Mediterranean and several calls for repair services have been, or soon will be, answered.

18. ASSISTANCE TO PARTICIPANTS IN MED POL

18.1 The study of the capabilities of existing national research institutions, conducted by IOC on behalf of UNEP in 1974, indicated the need to assist institutions in many less developed Mediterranean countries in order to make possible their full participation in the MED POL pilot projects.

18.2 UNEP funds were therefore made available to selected participants in the MED POL pilot projects through the specialized United Nations bodies responsible for the technical implementation of the pilot projects.

18.3 Assistance was primarily given in equipment and training needed for the fulfilment of the mandatory parts of the pilot projects.

Training

18.4 Training is provided only on direct request from the participants in the pilot projects. It is carried out in the Mediterranean research centres or during joint cruises, thus strengthening the understanding and working relationship within the Mediterranean scientific community.

18.5 By the end of June 1977, 40 short-term (less than 2 months) and 38 long-term training programmes have been approved. Most of these 78 programmes are in progress or are going to start soon, while 16 programmes have already been successfully carried out. The estimated total cost of the training programmes approved by the end of June 1977 is over \$130,000.

Equipment

18.6 Assistance in the provision of equipment is subject either to successfully completed training of the personnel who will use it or to the availability of local staff familiar with the type of equipment requested.

18.7 Largely based on the requests of the participants in MED POL and on their collective advice regarding the type of equipment considered the most suitable and reliable for Mediterranean conditions, 11 atomic absorption spectrophotometers, 6 gas chromatographs and 17 other instruments worth more than \$5,000 each have been allocated by the end of June 1977, along with a large number of smaller pieces of equipment and expendable supplies. Nine out of the 34 larger instruments have already been installed bringing the total cost of the assistance in equipment close to \$700,000.

19. INFORMATION STORAGE, HANDLING AND DISSEMINATION

19.1 The research centres participating in the baseline studies and monitoring pilot projects of MED POL (MED I, II, III and VII) agreed to carry out the "minimal" programmes described in the operational documents ⁵⁾ and in the manuals and guidelines ⁷⁾ relevant to these pilot projects. The basic elements of these minimal programmes are the same for all participants in a given pilot project. They specify the frequency of sampling, the sampling procedure, the size and nature of the samples, the treatment of the samples prior to their analysis, the pollutant to be analysed and the format of the data-reporting.

19.2 For each pollutant a reference analytical method was selected and its use is promoted by granting training and equipment, if necessary, to institutions from less developed countries. Institutions using a different analytical method from the one recommended as the reference method are encouraged to use their own method, and a permanent intercalibration exercise (see 16) takes care of the comparability of the data reported.

19.3 In addition to the "standard" data obtained through the minimal programmes of the baseline studies and monitoring pilot projects, data on the levels and effects of other pollutants in a variety of marine matrices and on the coastal transport processes contributing to the distribution and influencing the fate of many pollutants are also reported by the participants in the pilot projects. The methodology for the generation and reporting of these data is not standardized although initial steps have been taken to develop "reference" analytical or observation methodology.

Data storage and handling

19.4 Data obtained through each pilot project are reported periodically to the specialized United Nations body bearing the technical responsibility for the implementation of the project and through it to UNEP acting as the Secretariat of the Barcelona Convention (see 20). The rough estimate of the total number of primary data collected through MED POL is 1.5 million data items per year.

19.5 At the request of the participants in MED POL the original (primary) data reported are treated as confidential. These data are processed and evaluated by the relevant United Nations bodies with the assistance of the appropriate Regional Activity Centres (see 20) but are not otherwise distributed, published or reported in their original form without the approval of the research centre that has submitted them.

- 19.6 To date no facilities have been established for the centralized archiving and processing of data from all projects of the Mediterranean Action Plan. This has already proved to be a serious disadvantage when a composite evaluation of the degree of pollution in the Mediterranean was attempted. A solution to the problem could be found in a regional data repository which would have full data-processing capability, making possible systematic archiving, statistical analyses and usage of data for modelling, and which would be required to respect the confidentiality of the original data (see 19.5). Such a regional data repository will be necessary and must be provided with adequate resources. It could be set up:
- at an existing national data centre entrusted with a regional role,
 - at the World Oceanographic Data Centre B (Moscow),
 - at an existing data centre attached to one of the United Nations bodies involved in the implementation of the Action Plan (FAO, UNESCO, UNEP), or
 - at a new data centre created and operated by the Secretariat of the Barcelona Convention.

For further details see UNEP/WG.11/Info. 6.

News-letters

- 19.7 Information of interest to participants in certain pilot projects has been disseminated through news-letters issued by FAO(GFCM) and IOC.
- 19.8 Plans to initiate a news-letter giving news of all the activities of the Mediterranean Action Plan are under consideration. This news-letter could be issued as a joint publication with Co-operative Investigations in the Mediterranean (CIM).

Directories

- 19.9 To facilitate contacts between the Mediterranean scientists, a Directory of Mediterranean Marine Research Centres⁹⁾ was issued in 1976 bringing full details (programmes, staff, publications, facilities, etc.) on 50 marine research institutions. An up-dated version of the Directory, covering about 118 institutions will be ready for distribution later this year. It is planned that the next edition of the Directory will be expanded to include additional institutions engaged in fisheries research and in research relevant to public health.
- 19.10 A Directory on specially protected Mediterranean aquatic and terrestrial (island and coastal) areas is under preparation in collaboration with IUCN.

Bibliographies

- 19.11 As part of the MED POL activities two bibliographies have been prepared by FAO(GFCM) and IOC. These bibliographies, in spite of some overlapping, covered only part of the available scientific literature relevant to the protection of the Mediterranean. Therefore, the preparation of a consolidated and comprehensive Mediterranean bibliography is contemplated, probably based on an expanded Aquatic Sciences and Fisheries Information System (ASFIS) or other similar systems.

20. INSTITUTIONAL ARRANGEMENTS

UNEP's Co-ordinating Unit

- 20.1 UNEP, as the organization responsible for carrying out the secretariat functions of the Convention for the Protection of the Mediterranean Sea against Pollution adopted at the Conference of Plenipotentiaries of the Coastal States of the Mediterranean Region for the Protection of the Mediterranean Sea (Barcelona, 2 - 16 February 1976), is responsible for the implementation of the Mediterranean Action Plan (see 1.3 and 1.4).
- 20.2 To ensure the harmonious development of the environmental assessment component of the Mediterranean Action Plan, a Unit, responsible for the over-all co-ordination of the work undertaken by national institutions in the framework agreed at the 1975 Barcelona Conference²⁾, was established at the Geneva Office of UNEP in September 1975.
- 20.3 This Environmental Assessment Unit works in close co-operation with selected specialized United Nations organizations which, on behalf of UNEP, are responsible for the technical operation of the individual projects and maintain the day-to-day direct contacts with the national institutions participating in the work.
- 20.4 Negotiations are under way with the Government of Monaco to transfer the Unit to Monaco.

Regional Activity Centres for MED POL

- 20.5 In consultation with the Governments of the Mediterranean States and with the specialized United Nations bodies concerned, in August 1976, seven national marine research centres were nominated by UNEP as Regional Activity Centres (RAC) for the seven pilot projects of MED POL (see 2.12 and Annex III).

- 20.6 The selection of the RACs was based on their technical competence taking into account the need for equitable geographical distribution.
- 20.7 The role of the RACs is to assist UNEP and the relevant specialized United Nations bodies in the organization and execution of the pilot projects. Under general guidance from UNEP the technical operation of the RACs is entrusted to the relevant specialized United Nations organization (GFCM of FAO, IOC of UNESCO and WHO).
- 20.8 The ultimate aim is to create, through the RACs, potential nuclei for centres which may eventually play a regional role in co-ordinating the work in the post-pilot-project phase of the programme.

21. PLANS FOR FUTURE DEVELOPMENTS

- 21.1 Although all the various activities listed in the previous chapters of this document were initiated by the Intergovernmental Meeting on the Protection of the Mediterranean in Barcelona (see UNEP/WG.11/Info.4), due to operational reasons they did not start simultaneously.
- 21.2 As some of these activities, in particular those reviewed in chapters 3-11 and 16-18, require a high degree of co-ordination and frequently need simultaneous measurements, observations and data-reporting, it is envisaged that the duration of these activities, operated now as pilot projects, will be extended until the end of 1978.
- 21.3 If progress continues at the present pace, it can be expected that by the end of 1978, under the over-all co-ordination of the Secretariat of the Barcelona Convention, the following will be accomplished:
- a) A stronger integration of the various projects implemented as part of the environment assessment component of the Mediterranean Action Plan will be achieved to make possible a comprehensive contribution to the other components of the Action Plan and thus provide the indispensable scientific basis for management or the legal initiatives the Contracting Parties to the Barcelona Convention may wish to take. More specifically, the Regional Oil Combating Centre (see 15) will be assisted in preparing contingency plans for emergency situations; hazard profiles will be prepared for substances of interest to the protocols on dumping and on land-based sources of pollution; proposals will be developed for standards applicable to the quality of recreational waters and seafood; principles and guidelines will be prepared for the assessment of the Mediterranean's water-receiving capacity, for the control of pollution from land-based sources, and for the selection, establishment and management of specially protected Mediterranean areas.

- b) Based on national research centres participating in various pilot projects, the institutional network needed for systematic and reliable Mediterranean-wide data-reporting on the levels and effects of pollutants will be completed.
- c) A report on the state of pollution of the Mediterranean Sea will be prepared using primarily the results obtained through the pilot phase of the various projects launched as part of the environmental assessment component of the Mediterranean Action Plan, although data available from other sources will be also used. In order to gain experience and to initiate discussion on the layout and content of the report a draft preliminary report has been prepared and is submitted to this meeting as document UNEP/WG.11/4.
- d) Using the experience and results obtained during the pilot phase of the continuing monitoring and research activities, a 3-5 years' pollution monitoring programme will be elaborated and prepared for adoption by the Contracting Parties of the Barcelona Convention. The proposed programme would be based on the established network of collaborating national institutions (see 21.3 b) and would include monitoring of the levels and effects of the most important Mediterranean pollutants in strategically selected locations and matrices as well as research directly supporting the monitoring component of the programme. The design of the programme should make analyses of the trends in levels and effects of pollutants in the Mediterranean possible, as well as the formulation of models on their biogeochemical cycles and on their expected environmental (and socioeconomic) impact on the Mediterranean ecoregion.

21.4 In order to achieve the goals summarized in 21.3 the following activities should be completed by the end of 1978:

- a) Designation of additional research centres potentially able to participate in the pollution monitoring and research projects should be made in geographic zones at present inadequately covered.
- b) The research centres which at present do not have either sufficiently trained personnel or the equipment for their full participation in the programme should be strengthened.
- c) The collaboration between research centres should be reinforced and, in view of the complementary nature of the data generated through various pilot projects, further efforts should be made to achieve a cross-sectoral approach to the assessment of the origin, amounts, levels, pathways and effects of Mediterranean pollutants.

- d) The methodology used by participants in the various pilot projects assessing the levels and effects of pollutants is already well harmonized and, whenever necessary, unified. Nevertheless, as the results of the monitoring and research activities may have legal implications for the Contracting Parties of the Barcelona Convention an officially acceptable set of reference methods for Mediterranean marine pollution studies should be prepared.
 - e) More experience should be gained in organizing and carrying out joint oceanographic cruises which would increase the number and quality of data on the open waters of the Mediterranean and could be used, on request by the relevant national authorities, to provide additional data for certain coastal waters.
 - f) The input of riverborne and airborne pollutants into the Mediterranean should be assessed, because by the end of 1978 this may turn out to be the major unknown factor needed to assess the state of pollution in the Mediterranean basin.
 - g) A central data repository and processing facility, satisfying the requirements of the Mediterranean Action Plan, should be selected and operated on a trial basis.
 - h) The build-up of modelling capabilities of the Mediterranean scientists should be promoted using the central data processing facility as their technical basis. Initial targets for modelling may include pathways, fate and effects of heavy metals, oil and chlorinated hydrocarbons with hydrodynamic models constituting the common basis for each model.
- 21.5 It can be expected that the Barcelona Convention together with one or more of the related Protocols will enter into force in 1977. This will bring about the first meeting of the Parties to the Convention in 1978 and could well coincide with the completion of the pilot project phase of the environment assessment activities. The meeting should present an opportunity for intergovernmental consideration and decision on the establishment of an operational phase thereafter.
- 21.6 During 1978, and in particular during the operational phase, increasingly responsible roles will have been assumed by national institutions on whose co-operative endeavours the successful implementation of the programme depends. Although additional international financial and other support may be sought, the ultimate aim is to make the programme self-supporting within the regional context, that is to say, not only to develop institutional capabilities to perform the required tasks, but to support these activities with training, provision of equipment, and other forms of assistance from within the region.

- 21.7 As the Mediterranean regional activity becomes self-supporting, UNEP will continue to retain a strong interest, due both to its responsibility as the organization responsible for the secretariat functions of the Convention and to UNEP's global responsibilities to which the Mediterranean programme is a major contribution. On a continuing basis UNEP will ensure that data and information generated within this region are compatible with those from other regions of the world. Steps have already been taken to initiate comprehensive action plans in other regions: the Persian/Arabian Gulf, the Caribbean Sea, the West African Coast and East Asian Waters. The comprehensive approach developed in the Mediterranean area will be used as a model for programmes aimed at the protection and development of these regions; however, it is recognized that the approach used in the Mediterranean region cannot be copied mechanically in all areas and that each region must develop its own Action Plan based on variations in the state of knowledge, the information and human resources available, and other regional characteristics.

FOOT-NOTES

- 1) Algeria, Egypt, France, Greece, Israel, Italy, Lebanon, Libyan Arab Jamahiriya, Malta, Monaco, Morocco, Spain, Syrian Arab Republic, Tunisia, Turkey, Yugoslavia
- 2) Report of the Intergovernmental Meeting on the Protection of the Mediterranean (Barcelona, 28 January - 4 February 1975) UNEP/WG.2/5, Annex, UNEP, 1975 - also as UNEP/WG.11/Info.4
- 3) The State of Marine Pollution in the Mediterranean and Legislative Controls. GFCM.Stud.Rev.51.FAO, 1972.
- 4) Report of the IOC/GFCM/ICSEM International Workshop on Marine Pollution in the Mediterranean (Monaco, 9 - 14 September 1974), IOC Workshop Report No. 3, UNESCO, 1975.
- 5) Report of the FAO(GFCM)/UNEP Expert Consultation on the Joint Co-ordinated Project on Pollution in the Mediterranean (Rome, 23 June - 4 July 1975), FAO, 1975.

Report of the IOC/WMO/UNEP Expert Consultation on the Joint Co-ordinated Project on Pollution in the Mediterranean (Msida, 8 - 13 September 1975), IOC/MPP/3, UNESCO, 1975.

Report of the WHO/UNEP Expert Consultation on Coastal Water Quality Control Programme in the Mediterranean (Geneva, 15 - 19 December 1975), EHE/76.1, WHO, 1976.
- 6) Algeria, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Malta, Monaco, Morocco, Spain, Tunisia, Turkey and Yugoslavia.
- 7) Guidelines for the Use of Biological Accumulators in Marine Pollution Monitoring, Manual of Methods in Aquatic Environment Research, Part 2, FIRI/T 150, FAO, 1976.

Sampling and Analyses of Biological Material. Manual of Methods in Aquatic Environment Research, Part 3, FIRI/T 158, FAO, 1976.

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Guidelines for Health Related Monitoring of Coastal Water Quality, WHO, 1977.

Health Criteria and Epidemiological Studies related to Beach and Coastal Water Pollution, WHO, 1977.

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Health Criteria and Epidemiology of Health Risks Related to Beach and Coastal Pollution, WHO, 1977.

Report on Principles and Methodology on Coastal Pollution Control Planning (WHO/UNEP Workshop on Coastal Water Quality Control, Athens, 27 June - 1 July 1977), WHO, 1977.

- 8) Report of the Mid-term Expert Consultation on the Joint FAO(GFCM)/UNEP Co-ordinated Project on Pollution in the Mediterranean (MED II, III, IV and V), Dubrovnik, 2 - 13 May 1977.

Report of the IOC/WMO/UNEP Mid-term Review Meeting for the Pilot Projects MED I and MED VI, Barcelona, 23 - 27 May 1977.

Mid-term Review of the Joint WHO/UNEP Co-ordinated Pilot Project on Coastal Water Quality Control in the Mediterranean (MED VII), Rome, 30 May - 1 June 1977.

- 9) Directory of Mediterranean Marine Research Centres, UNEP, 1976.

- 10) Cyprus, Egypt, France, Greece, Israel, Lebanon, Malta, Spain, Tunisia, Turkey and Yugoslavia

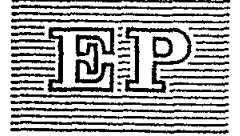
- 11) Algeria, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Malta, Morocco, Spain, Tunisia, Turkey and Yugoslavia
- 12) Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Malta, Morocco, Spain, Tunisia, Turkey and Yugoslavia
- 13) Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Malta, Morocco, Spain, Turkey and Yugoslavia
- 14) Algeria, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Morocco, Spain, Turkey and Yugoslavia
- 15) Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Malta, Morocco, Spain, Turkey and Yugoslavia
- 16) Greece, Israel, Italy, Lebanon, Malta, Monaco, Spain, Turkey and Yugoslavia
- 17) Five institutions from France, Greece, Israel, Malta, Spain
- 18) Workshop on Marine Ecosystem Modelling in the Eastern Mediterranean, Alexandria, December 1974.

Workshop on Marine Ecosystem Modelling in the Mediterranean, Dubrovnik, October 1976.

Expert Consultation Meeting on Marine Ecosystem Modelling in the Mediterranean, Paris, December 1976.

Working Group Meeting on Marine Ecosystem Modelling of the NW Mediterranean, Banyuls-sur-Mer, January 1977.
- 19) "The Use of Modelling of Marine Systems in the Framework of UNEP Monitoring and Research Programmes."

"Modelling of Physical Processes Relevant to Coastal Transport of Pollutants."
- 20) Report of Expert Consultation on Mediterranean Marine Parks and Wetlands (Tunis, 12-14 January 1977) UNEP/WG.615, UNEP 1977



Programme
des Nations Unies
pour l'environnement

United Nations
Environment
Programme



in co-operation with FAO(GFCM), UNESCO, IOC, WHO, WMO, IAEA

Mid-term Review Meeting on the
Progress of the Co-ordinated
Mediterranean Pollution Monitoring
and Research Programme (MED POL)
and Related Projects of the
Mediterranean Action Plan

Distribution
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Monaco, 18 - 22 July 1977

Agenda Item: 3

DRAFT PROGRESS REPORT

ON THE IMPLEMENTATION OF THE

CO-ORDINATED MEDITERRANEAN POLLUTION MONITORING AND RESEARCH PROGRAMME (MED POL)

AND RELATED PROJECTS OF THE MEDITERRANEAN ACTION PLAN

ANNEX I: LETTERS TO THE GOVERNMENTS OF THE MEDITERRANEAN STATES INVITING
NOMINATIONS OF PARTICIPANTS IN MED POL

LETTERS TO THE GOVERNMENTS OF THE MEDITERRANEAN STATES
INVITING NOMINATIONS OF PARTICIPANTS IN MED POL

This Annex reproduces the letters sent on 1 September 1975, 18 December 1975 and 26 March 1976 to all UNEP focal points in Albania, Algeria, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Libyan Arab Jamahiriya, Malta, Monaco, Morocco, Spain, Syrian Arab Republic, Tunisia, Turkey, Yugoslavia and to the national co-ordinators for MED POL in Cyprus, France, Greece, Israel, Italy, Lebanon, Malta and Yugoslavia, inviting the Governments of these States to nominate participants in the Co-ordinated Mediterranean Pollution Monitoring and Research Programme (MED POL).



UNITED NATIONS ENVIRONMENT PROGRAMME
PROGRAMME DES NATIONS UNIES POUR L'ENVIRONNEMENT

page 1-



Cable Address: UNITERRA, Nairobi
Telex No. 22008
Telephone: 339J0

P. O. Box 30562,
Nairobi.

Ref No.

1 September 1975

Sir,

I have the honour to refer to ~~our~~ letter of 22 May 1975 advising you of the Expert Consultation Meeting which was convened in Rome from 23 June to July 1975 jointly by the General Fisheries Council for the Mediterranean (GFCM) of the Food and Agriculture Organization and the United Nations Environment Programme to draw up operational documents for four of the research and pollution monitoring pilot projects of the Action Plan which was approved at the Inter-Governmental Meeting on the Protection of the Mediterranean held in Barcelona, Spain, from 28 January to 4 February 1975. The report of this Consultation, which includes the operational documents for these pilot projects, is attached for your consideration.

The laboratories which expressed readiness to participate in each of the pilot projects are listed in Appendix I of the operational documents. This would, of course, be subject to the approval of the appropriate Government Authorities to which they belong as indicated in paragraph 10 of the Report.

- 2 -

I should be much obliged if you would be good enough to let us know, as soon as possible, but not later than 1 October 1975, which research centres in your country will take part in the project and which research and monitoring programmes they will undertake as part of these pilot projects, and inform us of any assistance they may need to enable them to participate in the programme.

As agreed at the Expert Consultation Meeting, the laboratories listed in Appendix I of the attached report were informed by FAO of the results of the Consultation.

In order to speed up action for the implementation of the project, please send a copy of your reply to the Secretary of the General Fisheries Council for the Mediterranean, FAO, Rome.

Accept, Sir, the assurances of my highest consideration.

M.K. Tolba

M.K. Tolba
Deputy Executive Director

C O P I E



UNITED NATIONS ENVIRONMENT PROGRAMME
PROGRAMME DES NATIONS UNIES POUR L'ENVIRONNEMENT



Cable Address: UNITERRA, Nairobi
Tolox No. 22068
Telephone: 33930

P. O. Box 30562,
Nairobi.

Ref. No.

Le 1er septembre 1975

Monsieur le Ministre,

J'ai l'honneur de me référer à la lettre du 22 mai 1975 vous informant de la réunion d'une Consultation d'experts qui s'est tenue à Rome du 23 juin au 4 juillet 1975, et à laquelle participaient le Conseil général des pêches pour la Méditerranée (CGPM) de l'Organisation pour l'alimentation et l'agriculture et le Programme des Nations Unies pour l'environnement, en vue d'établir les documents opérationnels pour quatre projets pilotes, de recherche et de contrôle de la pollution, du Plan d'action, approuvé lors de la réunion intergouvernementale sur la protection de la Méditerranée qui s'est tenue à Barcelone du 28 janvier au 4 février 1975. Les documents opérationnels pour ces projets pilotes sont inclus dans le rapport de cette consultation que vous trouverez ci-joint.

Une liste des laboratoires prêts à participer à chacun des projets pilotes est donnée à l'annexe I des documents opérationnels. Leur désignation officielle est, bien entendu, laissée à l'approbation des autorités gouvernementales auxquelles ils appartiennent, comme il est stipulé au paragraphe 10 du rapport.

- 2 -

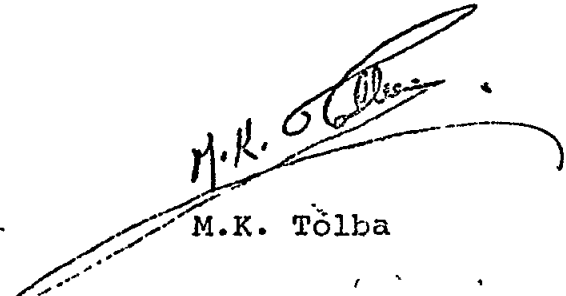
Je vous serais extrêmement obligé de nous faire savoir le plus tôt possible, mais pas plus tard que le 1er octobre 1975, quels centres de recherche participeront au projet et quels programmes de recherche et de contrôle ils entreprendront dans le cadre de ces projets pilotes, ainsi que l'aide dont ils pourraient avoir besoin pour participer au programme.

Comme il a été convenu lors de la consultation d'experts, les laboratoires dont la liste est donnée à l'annexe I du rapport, ont été informés des résultats de la consultation par la FAO.

En vue d'accélérer les actions pour l'application du projet, veuillez envoyer une copie de votre réponse au Secrétaire du Conseil général des pêches pour la Méditerranée, FAO, Rome.

Veuillez agréer, Monsieur le Ministre, les assurances de ma très haute considération.

Le Directeur exécutif adjoint,


M.K. Tolba

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UNITED NATIONS ENVIRONMENT PROGRAMME
PROGRAMME DES NATIONS UNIES POUR L'ENVIRONNEMENT

page 5-



Cable Address: UNITERRA, Nairobi
Telex No 22069
Telephone 33930

P. O. Box 30552,
Nairobi.

Ref. No.

1º de septiembre de 1975

Excelentísimo Señor:

Tengo el honor de hacer referencia a la carta del 22 de mayo de 1975 en la que le informaba de la reunión de consulta de expertos que fue convocada en Roma entre el 23 de junio y el 4 de julio de 1975 por el Consejo General de Pesca del Mediterráneo (CGPM) de la Organización de las Naciones Unidas para la Agricultura y la Alimentación y el Programa de las Naciones Unidas para el Medio Ambiente en forma conjunta, con el fin de elaborar documentos operacionales para cuatro de los proyectos piloto de investigación y vigilancia de la contaminación del Plan de Acción aprobado en la Reunión Intergubernamental sobre la Protección del Mediterráneo celebrada en Barcelona (España) entre el 28 de enero y el 4 de febrero del año en curso. Se acompaña a la presente el informe de esa reunión de consulta, en el que figuran los documentos operacionales para esos proyectos piloto. (Dicho informe ha salido hasta ahora en inglés y francés únicamente.)

En el apéndice I de los documentos operacionales se enumeran los laboratorios que se manifestaron dispuestos a participar en cada uno de los proyectos piloto. Esa colaboración está, por supuesto, sujeta a la aprobación de las autoridades gubernamentales pertinentes de las que dependen, como se indica en el párrafo 10 del informe.

- 2 -


Le agradecería muchísimo que tuviera la amabilidad de hacernos saber tan pronto le sea posible, pero a más tardar al 1^o de octubre de 1975, cuáles son los centros de investigación de su país que han de participar en el proyecto y qué programas de investigación y fiscalización han de emprender como parte de esos proyectos piloto, y de indicarnos la asistencia que puedan necesitar para estar en condiciones de participar en el programa.

Según lo convenido en la reunión de consulta de expertos, la FAO informó a los laboratorios enumerados en el apéndice I del informe que se acompaña de los resultados de la consulta.

A fin de acelerar la adopción de medidas encaminadas a la ejecución del proyecto, sírvase enviar copia de su respuesta al Secretario del Consejo General de Pesca del Mediterráneo de la FAO, en Roma.

Aprovecho la oportunidad para reiterar a Vuestra Excelencia las expresiones de mi consideración más distinguida.

COPIE



M. K. Tolba
Director Ejecutivo Adjunto



Télégrammes: UNATIONS, GENÈVE
Télex: 22.212 ou 22.344
Téléphone: 34 63 11 33 40 63 33 20 00 33 10 00

RÉF. No:
(à rappeler dans la réponse)

Palais des Nations
CH-1211 GENÈVE 10

18 December 1975

Sir,

I have the honour to refer to our letter of 4 September 1975 advising you of the Expert Consultation which was convened in Malta from 8 to 12 September 1975 by the Intergovernmental Oceanographic Commission (IOC) of UNESCO, the World Meteorological Organization and the United Nations Environment Programme. The purpose of this meeting, as you know, was to draw up the operational documents for two of the pollution monitoring and research pilot projects of the Action Plan approved at the Intergovernmental Meeting on the Protection of the Mediterranean held in Barcelona, Spain, from 28 January to 4 February 1975. The report of this Consultation, which includes the operational documents for these pilot projects, is attached for your consideration.

I should be much obliged if you would be good enough to let us know, as soon as possible, but not later than 31 January 1976, which research centres in your country will take part in the pilot projects, which monitoring and research programmes they will undertake as part of these pilot projects and inform us of any assistance they may need to enable them to participate in the programme.

../.

The Mediterranean research centres which may become participants in the pilot projects were informed of the results of the Consultation by IOC.

In order to speed up action for the implementation of the pilot projects, please copy your reply to the Secretary of the Intergovernmental Oceanographic Commission at UNESCO, Paris.

Accept, Sir, the assurances of my highest consideration.

P. S. Thacher
Director
UNEP Office, Geneva

COPIE



Télégrammes: UNATIONS, GENÈVE
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Téléphone: 34 69 11' 33 40 00 33 20 00 33 10 00

Palais des Nations
CH-1211 GENÈVE 10

RÉF. No:
(à rappeler dans la réponse)

le 18 décembre 1975

Monsieur le Ministre,

J'ai l'honneur de me référer à ma lettre du 4 septembre 1975, par laquelle je vous informais qu'allait se tenir à Malte, du 8 au 12 septembre 1975, la Consultation d'experts organisée par la Commission océanographique intergouvernementale (COI) de l'UNESCO, l'Organisation météorologique mondiale et le Programme des Nations Unies pour l'environnement. Cette réunion avait pour objet, comme vous le savez, d'élaborer les plans d'opération de deux projets pilotes concernant la surveillance continue des polluants et la recherche sur les polluants inscrits dans le Plan d'action approuvé à la Réunion intergouvernementale sur la protection de la Méditerranée (Barcelone, 26 janvier - 4 février 1975). Vous trouverez ci-joint, pour examen, le rapport sur la Consultation, qui comprend les plans d'opération des deux projets pilotes.

Je vous saurais gré de bien vouloir me faire savoir dès que possible, et au plus tard le 31 janvier 1976, quels centres de recherche de votre pays prendront part à l'exécution des projets, quels programmes de surveillance continue et de recherche ils entreprendront dans le cadre de ceux-ci, et de quelle assistance ils pourraient avoir besoin pour participer au programme.

Les centres de recherche méditerranéens qui participeront peut-être à l'exécution des projets pilotes ont été informés des résultats de la Consultation par la COI.

En vue d'accélérer l'exécution, je vous serais reconnaissant
d'envoyer une copie de votre réponse au Secrétaire de la Commission
océanographique intergouvernementale à l'UNESCO, à Paris.

Veuillez agréer, Monsieur le Ministre, les assurances de ma très
haute considération.

Peter S. Thacher
Directeur, Bureau du PNUE, Genève

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PROGRAMME

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Palais des Nations
CH-1211 GENÈVE 10

REF. No:
(à rappeler dans la réponse)

el 18 de diciembre de 1975

Excelentísimo Señor:

Tengo el honor de hacer referencia a nuestra carta de 4 de septiembre de 1975 en la que le informaba de la reunión de consulta de expertos que se celebró en Malta entre el 8 y el 12 de septiembre de 1975 y en la que participaron la Comisión Oceanográfica Intergubernamental (COI) de la UNESCO, la Organización Meteorológica Mundial y el Programa de las Naciones Unidas para el Medio Ambiente. Como V.E. sabe, esa reunión tenía por objeto elaborar los documentos operacionales para dos de los proyectos piloto de investigación y vigilancia del Plan de Acción aprobado en la Reunión Intergubernamental sobre la Protección del Mediterráneo celebrada en Barcelona entre el 28 de enero y el 4 de febrero de 1975. Se acompaña adjunto para su consideración el informe de esta reunión de consulta, en el que figuran los documentos operacionales para esos proyectos piloto.

Ruego a V.E. se sirva comunicarnos cuanto antes, y a más tardar el 31 de enero de 1976, qué centros de investigación de su país participarán en los proyectos piloto y qué programas de vigilancia e investigación emprenderán como parte de estos proyectos piloto, e informarnos de cualquier asistencia que esos centros puedan necesitar para estar en condiciones de participar en el programa.

../.

Los centros de investigación del Mediterráneo que pueden pasar a ser participantes en los proyectos piloto fueron informados por la COI de los resultados de la Consulta.

A fin de acelerar las medidas para la aplicación de los proyectos piloto, le agradeceré se sirva enviar una copia de su respuesta a la secretaría de la Comisión Oceanográfica Intergubernamental en la UNESCO, París.

Aprovecho la oportunidad para reiterar a Vuestra Excelencia el testimonio de mi alta consideración.

PS Thacher
P. S. Thacher
Director
Oficina del PNUMA, Ginebra

C O P I E



PROGRAMME DES NATIONS UNIES POUR L'ENVIRONNEMENT
 UNITED NATIONS ENVIRONMENT PROGRAMME



Telephone 34 22 00 90 58 50

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UNEP Geneva Office

Palais des Nations
 CH-1211 GENÈVE 10

Reference:

26 March 1976

Sir,

I have the honour to refer to our letter of 10 November 1975 advising you of the Expert Consultation which was convened in Geneva from 15 to 19 December 1975 by the World Health Organization and the United Nations Environment Programme. The purpose of this meeting, as you know, was to draw up the operational document for one of the pollution monitoring and research pilot projects of the Action Plan approved at the Intergovernmental Meeting on the Protection of the Mediterranean held in Barcelona, Spain, from 28 January to 4 February 1975. The report of the Consultation, which includes the operational document for this pilot project, is attached for your consideration.

I should be much obliged if you would be good enough to let us know, as soon as possible, but not later than 30 April 1976, which research centres in your country will take part in the pilot project, which monitoring and research programmes they will undertake as part of the pilot project and inform us of any assistance they might need to enable them to participate in the programme.

The Mediterranean research centres which may become participants in the pilot project were informed of the results of the Consultation by the World Health Organization.

In order to speed up action for the implementation of the pilot project, please copy your reply to the Division of Environmental Health, World Health Organization, Geneva.

Accept, Sir, the assurances of my highest consideration.

P. S. Thacher
P. S. Thacher
Director
UNEP Office, Geneva

C O P I E



PROGRAMME DES NATIONS UNIES POUR L'ENVIRONNEMENT
UNITED NATIONS ENVIRONMENT PROGRAMME



Telephone 34 22 00 99 59 50
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Cables: UNATIONS, GENEVA

UNEP Geneva Office
Palais des Nations
CH-1211 GENÈVE 10

Reference:

le 26 mars 1976

Monsieur le Ministre,

J'ai l'honneur de me référer à ma lettre du 10 novembre 1975, par laquelle je vous informais qu'allait se tenir à Genève, du 15 au 19 décembre 1975, la Consultation d'experts organisée par l'Organisation mondiale de la santé et le Programme des Nations Unies pour l'environnement. Cette réunion avait pour objet, comme vous le savez, d'élaborer le plan d'opération d'un des projets pilotes concernant la surveillance continue des polluants et la recherche sur les polluants, inscrits dans le Plan d'action approuvé à la Réunion intergouvernementale sur la protection de la Méditerranée (Barcelone, 28 janvier - 4 février 1975). Vous trouverez ci-joint, pour examen, le rapport sur la Consultation, qui comprend le plan d'opération de ce projet pilote.

Je vous saurais gré de bien vouloir me faire savoir aussitôt que possible, et au plus tard le 30 avril 1976, quels centres de recherche de votre pays prendront part à l'exécution du projet pilote, quels programmes de surveillance continue et de recherche ils entreprendront dans le cadre de ce projet, et de quelle assistance ils pourraient avoir besoin pour participer au programme.

Les Centres de recherche méditerranéens qui participeront peut-être à l'exécution du projet pilote ont été informés des résultats de la Consultation par l'Organisation mondiale de la santé.

En vue d'accélérer la préparation de l'exécution du projet, je vous serais reconnaissant d'envoyer une copie de votre réponse à la Division de l'hygiène du milieu, Organisation mondiale de la santé, à Genève.

Veillez agréer, Monsieur le Ministre, les assurances de ma très haute considération.

Le Directeur du Bureau du PNUE à Genève,


Peter S. Thacher

C O P I E

PROGRAMME DES NATIONS UNIES
POUR L'ENVIRONNEMENTUNITED NATIONS ENVIRONMENT
PROGRAMME

Télégrammes: UNATIONS, GENÈVE
Télex: 22.212 ou 22.314
Téléphone: 34 00 11 33 40 09 33 20 00 33 10 00

Palais des Nations
CH-1211 GENÈVE 10

REF. No:
(à rappeler dans la réponse)

26 de marzo de 1976

Excelentísimo Señor:

Tengo el honor de dirigirle la presente en relación con nuestra carta del 10 de noviembre de 1975 en la que le informaba de la reunión de consulta de expertos que convocaron en Ginebra, del 15 al 19 de diciembre de 1975, la Organización Mundial de la Salud y el Programa de las Naciones Unidas para el Medio Ambiente. Como Vuestra Excelencia sabe, esa reunión tenía por objeto elaborar el documento operacional para uno de los proyectos piloto de investigación y vigilancia del Plan de Acción aprobado en la Reunión Intergubernamental sobre la Protección del Mediterráneo celebrada en Barcelona (España), del 28 de enero al 4 de febrero de 1975. Se acompaña adjunto para su consideración el informe de esta reunión de consulta, en el que figura el documento operacional para ese proyecto piloto.

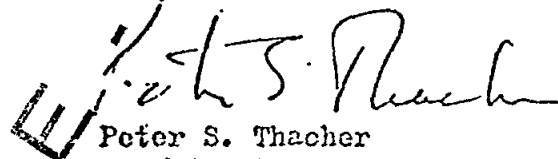
Ruego a Vuestra Excelencia se sirva comunicarnos cuanto antes, y a más tardar el 30 de abril de 1976, qué centros de investigación de su país participarán en el proyecto piloto y qué programas de vigilancia e investigación emprenderán como parte de ese proyecto piloto, e informarnos de cualquier asistencia que esos centros puedan necesitar para estar en condiciones de participar en el programa.

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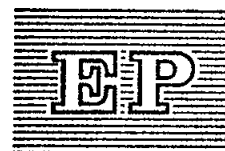
Los centros de investigación del Mediterráneo que pueden pasar a ser participantes en el proyecto piloto fueron informados por la Organización Mundial de la Salud de los resultados de la Consulta.

A fin de acelerar las medidas para la aplicación del proyecto piloto, le agradeceré se sirva enviar una copia de su respuesta a la División de Fomento de la Higiene del Medio, Organización Mundial de la Salud, Ginebra.

Aprovecho la oportunidad para reiterar a Vuestra Excelencia el testimonio de mi más alta consideración.


Peter S. Thacher
Director
Oficina del PNUMA, Ginebra

C O P Y



Programme
des Nations Unies
pour l'environnement

United Nations
Environment
Programme



in co-operation with FAO(GFCM), UNESCO, IOC, WHO, WMO, IAEA

Mid-term Review Meeting on the
Progress of the Co-ordinated
Mediterranean Pollution Monitoring
and Research Programme (MED POL)
and Related Projects of the
Mediterranean Action Plan

Distribution
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1 July 1977

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Monaco, 18 - 22 July 1977

Agenda Item: 3

DRAFT PROGRESS REPORT

ON THE IMPLEMENTATION OF THE

CO-ORDINATED MEDITERRANEAN POLLUTION MONITORING AND RESEARCH PROGRAMME (MED POL)

AND RELATED PROJECTS OF THE MEDITERRANEAN ACTION PLAN

ANNEX II: PARTICIPANTS IN MED POL AND THE STATUS OF THEIR PARTICIPATION

ANNEX III: REGIONAL ACTIVITY CENTRES FOR MED POL PILOT PROJECTS

PARTICIPANTS IN MED POL AND THE STATUS OF THEIR PARTICIPATION

This Annex is the reproduction of computerized information on the participants in the pilot projects of the Co-ordinated Mediterranean Pollution Monitoring and Research Programme (MED POL) which is kept permanently up to date and distributed once a month to the United Nations bodies participating in the implementation of MED POL.

The present reproduction contains information valid on 1 July 1977.

Participating Institution	Project	Principal Investigator	Status of Agreement	Starting Date of Work
ALGERIE				
Centre de Recherches océanographiques et des Pêches Jetée Nord B.P. 90 ALGER	Med II	Mme D. Siblot	signed 18.10.76	Sept. 1976
	Med V	Dr. R. Semroud	signed 18.10.1976	Jan 1977
	RAC V	Dr. R. Semroud	cleared 28.4.77	
tel: 62.73.11, 62.66.59				
Directeur: Dr. Rachid Semroud				
CYPRUS				
Fisheries Department Ministry of Agriculture and Natural Resources Tasmatarchou Poulion 5-7 NICOSIA	Med I	Mr. A. Demetropoulos	signed 23.4.77	May 1976
	Med II	Mr. A. Demetropoulos	signed 11.8.1976	Sept. 1976
	Med III		negotiating	
	Med IV		negotiating	
	Med V	Mr. A. Demetropoulos	signed 11.8.1976	March 1976
	Med VI	Mr. A. Demetropoulos	cleared 28.4.77	
tel: 021-403279				
Mr. Andreas Demetropoulos Fisheries Officer				
EGYPT				
Institute of Oceanography and Fisheries Mediterranean Branch Kayet Bey ALEXANDRIA	Med I	Dr. S.D. Wahby	signed 20.3.77	Jan. 1977
	Med II	Dr. H.I. Emara	signed 23.1.77	Dec. 1976
	Med III	Dr. M. M. Abbas Aly	signed 23.1.1977	Dec. 1976
	Med IV	Dr. H.H. Saleh	signed 23.1.1977	Dec. 1976
	Med V	Dr. M. L. El-Hehyawi	signed 23.1.1977	Dec. 1976
	Med VI	Dr. M.A. Gerges	signed 20.3.77	May 1976
tel: 801-553, 801-449				
Director: Dr. Taleat Hashem				
	RAC VI	Dr. M.A. Gerges	negotiating	

FRANCE

Laboratoire de Chimie
appliquée à l'expertise
Faculté de Pharmacie
Université de Montpellier I
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B.P. 1103
34060 MONTPELLIER, CEDEX
tel: (67) 635502

Med
I

Prof. R.
Mestres

signed
15.5.77

Nov 1975

Laboratoire central
d'Hygiène alimentaire
Direction des Services
vétérinaires
Ministère de l'Agriculture
43 Rue de Dantzig
75015 PARIS
tel: 5318210

Med
III

Prof. R.
Mestres

signed
22.12.76

Dec. 1976

Directeur:
Prof. Robert Mestres

Laboratoire central
d'Hygiène alimentaire
Direction des Services
vétérinaires
Ministère de l'Agriculture
43 Rue de Dantzig
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Med
II

M. G.
Cumont

signed
14.4.77

March 1977

Directeur:
Dr. Jean Pantaléon

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physique
Muséum d'Histoire naturelle
43-45 Rue Cuvier
75231 PARIS, CEDEX
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Med
VI

negotiating

Directeur:
Prof. Henri Lacombe

Laboratoire de Biologie
et d'Ecologie marines
UER "Domaine Méditerranée"
Université de Nice,
Campus de Valrose,
Avenue de Valrose 26
06034 NICE, CEDEX
tel: 51.91.00

Med
IV

negotiating

Med
V

negotiating

Med
VI

negotiating

Directeur:
Prof. Raymond Vaissière

Centre d'Etudes et de
Recherches de Biologie
et d'Océanographie
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Avenue Jean Lorrain 1
06300 NICE
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Med
I

Dr. M.
Aubert

cleared
31.1.77

Jan. 1977

Med
II

negotiating

Directeur:
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Station marine de
Villefranche-sur-Mer
La Darse
06230 VILLEFRANCHE-SUR-MER
tel: (93) 807165,808112

Med
I

negotiating

Med
VI

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Directeur:
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92502 RUEIL MALMAISON
tel: 967.11.10, 794.02.14

Med
I

Mr. P.
Renault

signed
29.3.77

Jan. 1977

Directeur:
Dr. Jean-Claude Balaceanu

FRANCE (Cont.)

Institut scientifique et technique des Pêches maritimes (I.S.T.P.M.) Centre de Sete 1 Rue Jean Vilar 34200 SETE tel: 74.99.81 Directeur: Dr. Yves Fauvel	Med I		negotiating	
	Med II	Dr. Y. Thibaud	signed 7.9.1976	Sept. 1976
	Med III	Dr. C. Alzieu	signed 7.9.1976	Sept. 1976
Laboratoire Arago de Biologie marine de l'Université de Paris VI 66650 BANYULS-SUR-MER tel: 383009, 383119 Directeur: Dr. Jacques Soyer	Med IV		negotiating	
	Med V		negotiating	
Laboratoire d'Hydrologie, Faculté de Pharmacie Université d'Aix-Marseille II 27 Boulevard Jean Moulin 13385 MARSEILLE, CEDEX 4 tel: (91) 472840 Directeur: Dr. André Arnoux	Med II		negotiating	
	Med III		negotiating	
Laboratoire Solaigue Compagnie nationale d'Aménagement de la Région du Bas-Rhône-Languedoc 685 Route d'Arles 30000 NIMES tel: (66) 846001 Directeur: Dr. Jean Laporte	Med I		negotiating	
	Med II		negotiating	
	Med IV		negotiating	
	Med V		negotiating	
Station marine d'Endoume et Centre d'Océanographie Rue de la Batterie-des-Lions 13007 MARSEILLE tel: 521294 Directeur: Prof. Jean-Marie Pérès	Med I		negotiating	
	Med II		negotiating	
	Med III		negotiating	
	Med IV	Dr. G. Bellan	cleared 7.10.76	Oct. 1976
	Med V	(a)Dr. F. Blanc et Dr. M. Leyreau (b)Dr. D. Bellan- Santini	(a) signed 13.12.1976 (b) signed 13.12.1976	(a) Jan. 1977 (b) Jan. 1977
	Med VI		negotiating	
	RAC IV	Dr. G. Bellan	negotiating	
	Med I	Dr. A. Cornu	negotiating	
Service de Chimie analytique Département de Chimie appliquée Centre d'Etudes nucléaires de Grenoble B.P. 85 X 38041 GRENOBLE, CEDEX tel: (76) 974111 Chef du Service Dr. Aimé Cornu				

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Med I Melle M. Gauthier negotiating

Centre de Pierrelatte
 Commissariat à l'Energie
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 PIERRELATTE 26
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 Directeur:
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Med II negotiating
 Med III negotiating

Centre de Marcoule
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 B.P. 106
 BAGNOLS-SUR-CEZE (Gard)
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 Directeur:
 Mr. Belot

Med II negotiating
 Med III negotiating

Centre de Faible Radioactivités
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 B.P. No. 1
 91190 GIF-SUR-YVETTE
 Directeur:
 Dr. Jacques Labeyrie

Med VIII Dr. R. Chesselet negotiating

GREECE

Institute of Oceanographic
 and Fisheries Research
 Ministry of Culture and Science
 Agios Kosmas-Eliinikon
 ATHENS
 tel: 9820211
 Director:
 Dr. Alexander Stephanidis

Med I Dr. E.M. Verykokakis signed 18.5.77 Jan 1977
 Med II Dr. F. Voutsinou signed 20.4.77 Dec. 1976
 and Dr. J. Satsmadjis

Med III negotiating

Med IV negotiating

Med V Dr. C. Bogdanos signed 20.4.77 Dec. 1976
 and Dr. A. Zarkanellas

Med VI Dr. E.M. Papageorgiou signed 18.5.77 Jan 1977

Zoological Laboratory and
 Museum
 University of Athens
 Panepistimiopolis-Kouponia
 ATHENS 621
 tel: 743.217
 Director:
 Prof. Dr. Vassili Kiortsis

Med IV Dr. M. Moraitou signed 27.4.77 April 1977
 and Apostolopoulou
 Med V Dr. C. E. Vamvakas signed 27.4.77 Feb 1977

GREECE (Cont.)

The Department of Zoology University of Thessaloniki THESSALONIKI tel: 2392.2449 Director: Prof. Dr. Marios E. Kattoulas	Med IV		negotiating	
	Med V	a) Dr. M.E. Kattoulas	cleared 4.3.77	Dec. 1976
		b) Dr. M.E. Kattoulas	cleared 4.3.77	Dec. 1976
Radioanalytical Laboratory Radiochemical and Nuclear Analysis group Department of Chemistry Nuclear Research Centre "Demokritos" Aghia Paraskevi Attikis, ATHENS tel: 6513111 ext. 336-335 Head of the Laboratory: Dr. Apostolos P. Grimanis	Med I	Dr. N. Mimicos	negotiating	
	Med II	Dr. A.P. Grimanis and Dr. C. Papadopoulou	signed 20.4.77	Oct. 1975
	Med VIII	Dr. C. Papadopoulou	negotiating	
General Chemical State Laboratory Research Division Ministry of Economic Affairs 16 A. Tsofha Street 604 ATHENS tel: 6428211 Head, Division of Research: Dr. M. Katsikopoulos	Med II	Dr. D. G. Marketos	signed 28.4.77	June 1976
Department of Food Hygiene Faculty of Veterinary Medicine Aristotelian University of Thessaloniki THESSALONIKI tel: 31.2392.2305 Director: Prof. Dr. Achilles G. Panetsos	Med II	Dr. Prof. A.G. Panetsos	cleared 4.3.77	March 1977
	Med III	Dr. Prof. A.G. Panetsos	cleared 4.3.77	March 1977
	Med VIII		negotiating	
Laboratory of Hygiene Medical School Aristotelian University of Thessaloniki THESSALONIKI tel: 2392-2339 Director: Prof. Dr. Theodore Edipides	Med III		negotiating	
	Med VII		negotiating	
Laboratory of Analytical Chemistry Faculty of Physics and Mathematics University of Thessaloniki THESSALONIKI tel: (031) 2392-2482 Director: Prof. Dr. George Vasilikiotis	Med II	Dr. Prof. G. Vasilikiotis	cleared 4.3.77	Feb. 1977
	Med III	Dr. Prof. G. Vasilikiotis	cleared 4.3.77	Feb. 1977
Benaki Institute of Phythopathology 8 Delta Street ATHENS tel: 8012376 Director: Dr. Dimitrios S. Vassilopoulos	Med III	Dr. N. Adam	signed 21.4.77	March 1977
	Med IV	Dr. R. Fytizes	signed 21.4.77	March 1977

GREECE (Cont.)

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 Aristotelian University of
 Thessaloniki
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 Prof. Nicholas E. Alexandrou

Med I Prof. N.E. Alexandrou negotiating

Directorate of Public Health
 Ministry of Social Services
 Aristotelous 17
 ATHENS (T.T. 103)

tel:

Director:
 Dr. Meropi Violaki

Med VII Dr. J. Papadakis negotiating Nov. 1976
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 Dr. S. Thalassinou

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 Hydraulic Works
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Med VI Prof. Dr. Th. S. Xanthopoulos negotiating

ISRAEL

Israel Oceanographic and
 Limnological Research Ltd.
 Tel Shikmona
 P.O. Box 1793
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tel: 04.539.258

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 Mr. Yohay Ben-Nun

Med I Dr. O.H. Oren negotiating

Med II Dr. O.H. Oren signed 14.9.1976 Oct. 1975

Med III Dr. R. Ravid signed 14.9.1976 Oct. 1975

Med IV Dr. I. Shimoni signed 21.9.1976 Sept. 1976

Med V negotiating

Med VI Dr. A. Hecht cleared 14.2.77 May 1976

Med VIII Dr. O. H. Oren negotiating

Environmental Health Laboratory
 Hadassah Medical School
 Hebrew University
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 JERUSALEM

tel: 238-821

Director:
 Dr. Hillel I. Shuval

Med VII negotiating

Environmental Engineering
 Laboratories
 Technion - Israel Institute of
 Technology
 Technion City
 HAIFA 32000

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Head:
 Prof. Menahem Rebhun

Head of Microbiology Section:
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 Abu Kebir,
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 VII

negotiating

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Public Health Laboratory
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 P.O. Box 9526
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 VII

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Director:
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ITALY

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 Fish Culture
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 Via del Verdi 75
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Med
 VII

negotiating

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 Prof. Sebastiano Genovese

Laboratory of Hydrobiology and
 Fish Culture
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 53100 SIENA

Med
 II

Prof. Dr. A.
 Renzoni

signed
 1.9.1976

sept. 1976

tel: (0577) 288428

Director:
 Prof. Dr. Aristeo Renzoni

Observatory for Experimental
 Geophysics - Marine Laboratory
 Viale Romolo Gessi 4
 TRIESTE

Med
 VI

Dr. E.
 Accerboni

cleared
 28.4.77

June 1977

tel: (040) 28716

Director:
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 Riva Sette Martiri 1364/A
 30122 VENICE

Med
 III

Dr. V.U.
 Fossato

cleared
 22.6.76

July 1976

tel: (041)787622

Director:
 Prof. Dr. Bruno Battaglia

Marine Contamination Laboratory
 CNEN-EURATOM
 19030 FIASCHERINO (La Spezia)

Med
 II

Dr. A.
 Brondi
 Dr. M.
 Stoeppler

cleared
 22.6.76

Dec. 1975

tel: (0187) 966496/7

Director:
 Dr. Aldo Brondi

Med
 IV

negotiating

ITALY (Cont.)

Centre for Study and Research
 in Sanitary Engineering
 Institute of Water Supply and
 Wastes Disposal
 University of Naples
 Via Claudio 21
 80125 NAPLES

tel: 620344

Director:
 Prof. Luigi Mendia

Med
 VII

negotiating

Centre for Radiochemistry
 and Activation Analysis - CNR
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 University of Pavia
 12 Viale Taramelli
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tel: (0382) 31-200/24-605

Director:
 Dr. Mario A. Rollier

Med
 II

Prof. E.
 Orvini

signed
 16.9.1976

Sept. 1976

Group for Oceanographic
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 Institute of Hydrobiology
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 University of Genova
 Via Balbi 5
 12126 GENOVA

tel: (010) 280-955

Chairman:
 Prof. Norberto della Croce

Med
 II

Prof. R.
 Capelli -

signed
 3.2.1977

Dec. 1976

Med
 VI

Prof. I.
 Dagnino

cleared
 28.4.77

Institute of Hygiene
 University of Trieste
 Via dell'Istria 65/1
 TRIESTE

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Director:
 Prof. Luigi Majori

Med
 VII

negotiating

Istituto Superiore di Sanità
 Viale Regina Elena 299
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tel:

Director:
 Dr. Francesco Pocchiari

Med
 VII

negotiating

RAC
 VII

Dr. F.
 Pocchiari

signed
 15.6.77

Institute for Water Research - CNR
 Via Reno 1
 00198 ROME

tel: (06) 84-48-741

Director:
 Prof. Roberto Passino

Med
 VI

Prof. R.
 Passino

negotiating

Med
 VII

negotiating

Zoological Station of Naples
 Viale Comunale
 8012 NAPLES

tel: 406222/406347

Director:
 Prof. Alberto Monroy

Med
 V

negotiating

Med
 VII

negotiating

Station for Marine Biology
 Institute of Zoology and
 Comparative Anatomy
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 Via dei Verdi 75
 98100 MESSINA

tel: 81-27-21

Director:
 Prof. Arturo Bolognari

Med
 II

Dr. I.
 Moio

signed
 23.11.1976

Dec. 1976

ITALY (Cont.)

Institute of Zoology
 "Federico Raffaele"
 University of Rome
 Viale dell'Università 32
 00185 ROME
 tel: 4958259/4958254
 Director:

Med
 VII

negotiating

Institute of Hygiene
 University of Genova
 Via A. Pestore 1
 16132 GENOVA
 tel:
 Director:
 Prof. F. L. Petrilli

Med
 VII

negotiating

LIBAN

Centre de Recherche marine de
 Jounieh
 Conseil national de la Recherche
 scientifique
 B.P. 11-8281
 BEYROUTH
 tel: 933162

Med
 I

Dr. H.H.
 Kouyoumdjian

signed
 19.5.77

first half
 1977

Med
 II

Dr. H.H.
 Kouyoumdjian

signed
 19.5.77

Med
 III

Dr. H.H.
 Kouyoumdjian

signed
 19.5.77

Président du Conseil:
 Dr. Joseph Naggear

Med
 IV

negotiating

Med
 V

negotiating

Med
 VI

negotiating

Med
 VII

negotiating

MALTA

The University of Malta
 MSIDA
 tel: 36.450
 Rector Magnificus
 Prof. Edwin J. Borg-Constanzi

Med
 I

Prof. V.
 Ferrito

signed
 23.3.77

July 1976

Med
 II

Dr. A.
 Storace

signed
 30.7.76

Sept. 1976

Med
 III

Dr. J. V.
 Bannister

signed
 30.7.76

Sept. 1976

Med
 IV

Dr. L.J.
 Saliba

signed
 30.7.76

July 1976

Med
 VI

Dr. D.A.
 Havard

signed
 22.3.77

Feb. 1976

Med
 VII

negotiating

Med
 VIII

Dr. J. V.
 Bannister

negotiating

RAC
 I

Prof. V.
 Ferrito

cleared
 28.3.77

MALTA (Cont.)

The Bacteriological and Chemical
 Laboratories
 Public Works Department
 c/o Malta College of Arts,
 Science and Technology
 MSIDA

Med
 VII

negotiating

tel:

Director:

Public Health Laboratory
 Health Department
 15 Merchants Street
 VALLETTA

Med
 VII

Dr. L.J.
 Spiteri

negotiating

tel: 24071

Senior Public Health
 Laboratory Officer:
 Dr. Lawrence J. Spiteri

MONACO

Centre scientifique de Monaco
 Administration:
 16 Boulevard de Suisse
 Monte Carlo

Med
 VI

Dr. A.
 Vatrican

cleared April 1977
 28.4.77

Laboratoires:-
 Avenue Saint-Martin
 MC-MONACO-VILLE

Med
 VII

negotiating

tel: (93)302154/301514

Président du Conseil
 d'Administration:
 S.E.M. C.C. Solamito

MAROC

Institut des Pêches maritimes
 Rue de Tiznit
 B.P. 21
 CASABLANCA

Med
 II

Melle H.
 Idrissi

signed March 1977
 17.5.77

tel: 678.11

Med
 III

Melle H.
 Idrissi

signed March 1977
 17.5.77

Directeur:
 Dr. Mohamed Azzou

Med
 IV

negotiating

Faculté des Sciences
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 RABAT

Med
 II

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Med
 III

negotiating

Doyen:
 Prof. Dr. Drissi Khalil

Med
 IV

negotiating

Med
 V

negotiating

SPAIN

Instituto de Investigaciones Pesqueras Paseo Nacional S. N., BARCELONA 3	Med I	Dr. M. Calderon	signed 9.5.77	Jan. 1975
tel: 31 06 450	Med II	Dr. A. Ballester	signed 22.7.1976	Jan. 1976
Director: Dr. Buenaventura Andreu	Med III	Dr. J.M. Franco	signed 28.7.1976	Jan. 1976
	Med IV	Dr. R. Establier	signed 28.7.1976	Jan. 1976
	Med V		negotiating	
	Med VI	Dr. A. Cruzado	signed 2.3.1977	March 1976
	Med VII		negotiating	
	Med VIII	Dr. A. Ballester	negotiating	

Laboratorio del Mar Menor Instituto Espanol de Oceanografia P.O. Box 22 SAN PEDRO DEL PINATAR (Murcia)	Med I		negotiating	
tel: (968) 57.05.29	Med II		negotiating	
Director: Dr. Argeo R. de Leon	Med III		negotiating	
	Med IV		negotiating	
	Med VI		negotiating	
	Med VII		negotiating	

Laboratorio Oceanografico de Balears Instituto Espanol de Oceanografia P.O. Box 291 PALMA DE MALLORCA	Med I		negotiating	
tel: 230737	Med V		negotiating	
Director: Dr. Miguel Duran				

Laboratorio Oceanografico de Malaga Instituto Espanol de Oceanografia Paseo de la Farola 27 MALAGA	Med VI		negotiating	
tel:				
Director: Mr. Natalio Cano				

Los Laboratorios y Servicios de la Jefatura Provincial de Sanidad Avenida Maria Cristina, s/n TARRAGONA	Med VII		negotiating	
tel:				
Director:				

Los Laboratorios y Servicios de la Jefatura Provincial de Sanidad Puente del Carmen 30 MALAGA	Med VII		negotiating	
tel:				
Director:				

TUNISIE

Institut national scientifique
et technique d'Océanographie
et de Peche
SALAMMBO

tel: 275.632

Directrice:
Madame Founoun Ktari

Med I	Mr. M.H.A. Salem	cleared 2.4.77	June 1977
Med II	Mr. M.H.A. Salem	signed 5.11.76	Jan. 1977
Med III	Mr. M.H.A. Salem	signed 5.11.76	Jan. 1977

TURKEY

Hydrobiological Research Institute
Faculty of Science
University of Istanbul
Rumelihisari
ISTANBUL

tel: 65 15 11

Director:
Dr. Prof. Lutfi Birand

Med II	Mr. I. Artuz	signed 15.4.77	Dec. 1976
Med III	Mr. I. Artuz	signed 15.4.77	Dec. 1976
Med IV	Mr. I. Artuz	signed 15.4.77	Jan. 1977

Marine Sciences Department
Middle East Technical
University
ANKARA

tel: 232120

Chairman:
Prof. Dr. Turgut I. Balkas

Med I	Prof.Dr. T.I. Balkas	signed 28.2.77	June 1976
Med II	Prof.Dr. T.I. Balkas	signed 3.9.1976	Sept. 1976
Med III	Dr. T. Soylemez	signed 3.9.1976	Sept. 1976
Med VI	Dr. U. Unluata	signed 10.5.77	
RAC III	Dr. T. Soylemez	negotiating	

Institute of Hydrobiology
Faculty of Science, Ege University
Mithatpasha Cad. No. 564
IZMIR

tel:

Director:
Prof. Remzi Geldiay

Med II	Dr. H. Uysal	signed 14.4.77	March 1977
Med IV	Dr. H. Uysal	signed 14.4.77	Feb. 1977
Med V	Dr. A. Kocatas	signed 14.4.77	Jan. 1977

General Directorate of Aquatic
Resources
Ministry of Food,
Agriculture and Livestock
Yuksel Cad. 9
ANKARA

tel:

Director:
Dr. Adnan Ozturk

Med II	Mr. A. M. Atahan	cleared 4.3.77	March 1977
Med III	Dr. S. Tunali	cleared 4.3.77	March 1977
Med IV	Mr. G. Gettin	cleared 4.3.77	after the completion of the training
Med V	Mr. M. Sarp	cleared 4.3.77	after the completion of the training

TURKEY (Cont.)

Environmental Engineering Department Middle East Technical University Inönü Bulvarı ANKARA	Med I		negotiating	
	Med II		negotiating	
tel:	Med VI		negotiating	
Chairman: Prof. Dr. S. Erol Ulug	Med VII		negotiating	

YUGOSLAVIA

Laboratory for Trace Element Analyses Department of Physics and Mathematics Faculty of Industrial Pedagogy University of Rijeka Omladinska 14 RIJEKA	Med I	Dr. V. Valkovic	negotiating	
	Med II	Dr. V. Valkovic and Dr. A. Ljubicic	signed 14.9.1976	March 1976
tel: (051) 23.296				
Head: Prof. Dr. Vlado Valkovic				

Institute for Oceanography and Fisheries Rt. Marjana P.O. Box 114 SPLIT	Med I	Dr. J. Dujmov	negotiating	
	Med II	Prof. Dr. M. Buljan	signed 10.2.1977	March 1977
Tel: 46.682				
Acting Director: Dr. Mira Zore-Armanda	Med III	Dr. T. Vucetic	signed 10.2.1977	March 1977
	Med IV	Dr. R. Muzinic	signed 10.2.1977	March 1977
	Med V	Dr. T. Pischer- Petkovic	cleared 25.4.77	April 1977
	Med VI	Dr. M. Zore-Armanda	signed 3.3.1977	Jan. 1977
	Med VII	Dr. S. Sobot	negotiating	Nov. 1976

The Biological Institute Ivrđava Sv. Ivana P. O. Box 39 DUBROVNIK	Med III	Mr. V. Sipos	signed 13.10.1976	Sept. 1976
	Med IV	Dr. F. Krsinic	cleared 23.6.77	Nov. 1976
tel: (050) 27-937	Med V	Dr. A. Benovic	signed 27.1.1977	Nov. 1976
Director: Prof. Dr. Tomo Gamulin				

YUGOSLAVIA (Cont.)

Center for Marine Research
 "Rudjer Boskovic" Institute
 P.O. Box 1016, Bijenicka 54
 ZAGREB

tel: (041) 38.541/424.355

Director:
 Prof. Dr. Petar Strohal

Med I	Dr. V. Pravdic	cleared 31.1.77	Jan. 1977
Med II	Dr. M. Branica	signed 24.9.1976	Sept. 1976
Med III	Mr. N. Smoljaka	signed 24.9.1976	June 1976
Med IV	Dr. B. Kurelec	signed 24.9.1976	June 1976
Med V	Dr. D. Zavodnik	signed 24.9.1976	July 1976
Med VI	Dr. Lj. Jeftic	cleared 14.2.77	Jan. 1977
Med VII	Ms. D. Fuks	negotiating	
RAC II	n.d.	signed 21.4.77	

Marine Biological Station
 Institute of Biology
 University of Ljubljana
 P.O. Box 16
 PORTOROZ

tel: (066) 73-073

Director:
 Prof. Dr. Miroslav Zei

Med II	Prof.Dr. S. Gomiscek	signed 23.8.1976	June 1976
Med III	Ms. N. Neith- Avcin and Dr. J. Cencelj	signed 23.8.1976	June 1976
Med V	Dr. J. Stirn	signed 23.8.1976	Sept. 1976
Med VII	Ms. M. Lenceric	negotiating	

REGIONAL ACTIVITY CENTRES (RAC) FOR MED POL PILOT PROJECTS

1. For pilot project on Baseline Studies and Monitoring of Oil and Petroleum Hydrocarbons in Marine Waters:

University of Malta
Msida
Malta

Responsible for RAC I : Prof. V. Ferrito

2. For pilot project on Baseline Studies and Monitoring of Metals, particularly Mercury and Cadmium, in Marine Organisms:

Centre for Marine Research
"Rudjer Boskovic" Institute
Rovinj/Zagreb
Yugoslavia

Responsible for RAC II : not determined

3. For pilot project on Baseline Studies and Monitoring of DDT, PCBs and Other Chlorinated Hydrocarbons in Marine Organisms:

Marine Sciences Department
Middle East Technical University
Mersin/Ankara
Turkey

Responsible for RAC III : Prof. Dr. T. I. Balkas

4. For pilot project on Research on the Effects of Pollutants on Marine Organisms and their Populations:

Station Marine d'Endoume
Marseille
France

Responsible for RAC IV : Prof. J.-M. Pérès

5. For pilot project on Research on the Effects of Pollutants on Marine Communities and Ecosystems:

Centre de Recherches Océanographiques
et des Pêches
Alger
Algérie

Responsible for RAC V : Dr. R. Semroud

6. For pilot project on Problems of Coastal Transport of Pollutants:

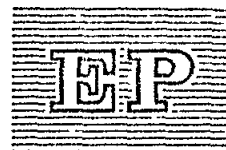
Institute of Oceanography and Fisheries
Mediterranean Branch
Alexandria
Egypt

Responsible for RAC VI : not determined

7. For pilot project on Coastal Water Quality Control:

Istituto Superiore di Sanità
Roma
Italia

Responsible for RAC VII : Dr. F. Pocchiari



Programme
des Nations Unies
pour l'environnement

United Nations
Environment
Programme



in co-operation with FAO(GFCM), UNESCO, IOC, WHO, WMO, IAEA

Mid-term Review Meeting on the
Progress of the Co-ordinated
Mediterranean Pollution Monitoring
and Research Programme (MED POL)
and Related Projects of the
Mediterranean Action Plan

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DRAFT PROGRESS REPORT

ON THE IMPLEMENTATION OF THE

CO-ORDINATED MEDITERRANEAN POLLUTION MONITORING AND RESEARCH PROGRAMME (MED POL)

AND RELATED PROJECTS OF THE MEDITERRANEAN ACTION PLAN

ANNEX IV: SUMMARY REPORTS OF PARTICIPANTS IN CO-ORDINATED MEDITERRANEAN POLLUTION
MONITORING AND RESEARCH PROGRAMME (MED POL)

1. INTRODUCTION

This Annex contains the summary reports of research centres nominated as participants in the Co-ordinated Mediterranean Pollution Monitoring and Research Programme (MED POL).

The reports were submitted by the principal investigators of the signed or negotiated research agreements. The editing of the reports was done by the specialized UN bodies to which the reports were submitted.

For convenience, the reports are arranged in order of the MED POL pilot projects and within these projects by countries in alphabetical order.

The names of the principal investigators and the research centres are indicated in front of each summary report.

2. REPORTS

2.1 MED I : Baseline Studies and Monitoring of Oil and Petroleum Hydrocarbons in Marine Waters: (IOC/WMO/UNEP)

A. DEMETROPOULOS
Fisheries Department
Ministry of Agriculture and Natural Resources
NICOSIA
Cyprus

Work on this project started in September 1976. It has been limited to tar collection on beaches and visual observation of oil slicks. The other elements of the operational plan will be followed after completion of training and delivery of equipment.

Three stations were set up for tar collection (in Limassol Bay, Larnaca Bay and north of Paphos). Samples are taken every 9th and 10th day. Arrangements for reporting on oil slicks were made with Cyprus Airways, the British Royal Air Force Bases in Cyprus and a number of fishermen.

In addition to these observations we are also collecting complementary data covering basic oceanographic parameters in Limassol Bay. It is expected that this activity will be extended to Larnaca Bay.

It is intended to increase the number of stations for tar collection to six and to take a number of parallel samples to increase the statistical validity of sampling.

Results from surveys of tar on beaches are available, but not yet processed. The degree of pollution cannot yet be assessed quantitatively. In Limassol, and, to a lesser degree in Larnaca Bay, there is oil pollution from ships. At Paphos the pollution, which consists of tar and floating debris, is less than at the other two places.

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S. D. WAHBY
Institute of Oceanography and Fisheries
Mediterranean Branch
ALEXANDRIA
Egypt

The sampling of tar on beaches started in February 1977. Average accumulation is about 4 g/m per day.

The collection of floating tar balls started in May 1977 and is being done as frequently as possible. Observations of oil slicks are made on all cruises.

Dissolved/dispersed hydrocarbons and particulate petroleum residues will be analysed as soon as the necessary training and equipment has been received.

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R. MESTRES
Laboratoire de Chimie appliquée à l'expertise
Faculté de Pharmacie
Université de Montpellier I
MONTPELLIER
France

The programme of analysis currently being followed by the laboratory deals with the investigation of the level of hydrocarbons in the waters sampled in the region of Banyuls-sur-Mer.

The samples arrive at the laboratory already prepared; they are kept refrigerated at 4°C until the time of analysis, which is done as soon as possible.

Extraction is done with carbon tetrachloride; the analysis itself is made by infra-red spectrophotometry (in the absence of a spectrofluorimeter).

The results obtained to date indicate a constant level of pollution between 0.1 and 0.7 mg/l of seawater, which is relatively low in comparison with other coastal areas.

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E. M. VERYKOKAKIS

Institute of Oceanographic and Fisheries Research
Ministry of Culture and Science
Agios Kosmas-Ellinikon
ATHENS
Greece

Unfortunately, due to technical difficulties in connection with the equipment for fluorescence analysis, the determination of dissolved hydrocarbons in sea water has not yet started. However, it is envisaged that the analysis will start early in June using an MPF-4 model PERKIN ELMER fluorescence spectrophotometer, which was acquired recently for the project. Sampling will take place at seven stations.

As regards observations of oil slicks, some data have already been collected by other Greek public services which will continue to gather more data. The laboratory is in contact with these services for a co-ordinated effort in this part of the project.

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N. MIMICOS

Radioanalytical Laboratory
Radiochemical and Nuclear Analysis Group
Department of Chemistry
Nuclear Research Centre "Demokritos"
ATHENS
Greece

Work on analysis of dissolved/dispersed petroleum hydrocarbons has recently started. Samples have been taken from Patraikos and Messiniakos gulfs as well as from Kriti Rodhos and Lesvos islands.

Because of malfunctioning of the existing fluorometer the analysis of the collected samples was made by I.R. spectrophotometry (no clean-up procedure was followed).

The other operational aspects of MED I will be executed as soon as feasible.

In the gulf of Patraikos (seven stations) and off the east coast of Lesvos (six stations) values of dissolved/dispersed hydrocarbons were reported between 0.1 and 0.5 ppm. Along the western part of the northern coast of Kriti the levels were slightly, but not significantly, higher.

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N. E. ALEXANDROU
Laboratory of Organic Chemistry
University of Thessaloniki
THESSALONIKI
Greece

At the end of 1976 measurements were started to assess the extent of petroleum hydrocarbon contamination in Thessaloniki and Cavala harbor and in Strymonicos bay. Samples were taken from six stations in Thessaloniki Harbor and Strymonicos bay respectively.

No significant differences in the oil concentrations between the three areas were observed. The average values were 1.5 mg/l, 2.6 mg/l and 1.1 mg/l for Thessaloniki and Cavala harbor and Strymonicos bay respectively. The sampling error obscured the expected variation in oil content due to sea currents and depths.

Since no fluorescence spectrophotometer was available, infra-red spectrophotometry was used. Samples were extracted with CCl_4 and the u C - H absorption at 2930 cm^{-1} was measured without prior clean-up.

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O. H. OREN
Israel Oceanographic and Limnological Research Ltd.
HAIFA
Israel

Several monitoring and research projects are already completed, being carried out or being planned, e.g.:

- quantity of tar on beaches of the Mediterranean Coast (from El Arish to Rosh Hanikka) was sampled every two weeks between spring 1975 and winter 1976. The study is completed, but will be repeated later for comparison. The mean amount of tar found was 3625 g/m of shore. There was on the average a decrease of tar from April 1975 to January 1976 and thereafter a tendency to increase;
- identification of source of tar balls on beaches (completed, but will be repeated); the centrally located beaches had layer quantities of tar, probably due to tanker operations in the vicinity;
- identification of source of tar balls in the open waters of the Levant Sea;
- changes in crude oil composition due to evaporation and other processes.

The preliminary results on experiments during 17 days for light crude oil and 40 days for heavy crude oil gave interesting indications on the changes that take place in crude oil dispersed on the surface of the sea. Several problems in interpretations of the results arose, and additional studies are being planned to solve these.

In the beginning of June the following studies will be initiated:

- distribution of petroleum hydrocarbons and tar balls on the surface and petroleum hydrocarbons in surface water, in the Levant Sea;
- petroleum hydrocarbons in the sediments of the Eastern Mediterranean.

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H. KOUYOUMDJIAN
Marine Research Centre of Jounieh
National Council for Scientific Research
BEIRUT
Lebanon

The development of the activities foreseen under the pilot project has met a number of obstacles beyond local control. However, efforts are being made to establish a programme for observation of oil and for tar ball sampling. A research vessel is now available and analysis for dissolved/dispersed hydrocarbons can start when a fluorescence spectrophotometer has been received.

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V. FERRITO
The University of Malta
Department of Chemistry
MSIDA
MALTA

Tar on beaches has been determined in three sampling areas starting in April 1977. In one zone no tar balls were found. In two other zones the amount of tar ranged from 1.0 g/m² to 83.3 g/m² for a 15-day accumulation.

Sampling will continue in the same areas.

* * * * *

M. CALDERON
Instituto de Investigaciones Pesqueras
Laboratorio de Cadiz
CADIZ
Spain

Since 1974 the level of petroleum hydrocarbons dissolved and dispersed in surface sea water have been monitored in Cadiz Bay and Cadiz Port.

Marine pollution (petroleum) at Grao Port (Castellon de la Plana) was monitored from April 1974 to April 1976. The studies consisted of analysis of aromatic petroleum fractions by UV-spectrofluorimetry. Gas-liquid chromatography was used to confirm the results.

The following areas are still being studied:

S. Sebastian, Bilbao, Vigo and the South Coast of Spain from Algeciras (Cadiz) to Ayamonte (Huelva). A further extension is expected to other coastal areas.

In the harbor and bay of Cadiz contamination by petroleum residues is infrequent and occurs under special wind conditions only.

On the western side of the Gadir peninsula appreciable quantities of tar have been frequently observed.

Oil films and slicks have been observed frequently in and outside the harbor, but the amount has not been estimated.

Concentrations of dissolved/dispersed petroleum hydrocarbons show a seasonal variation but remain within non alarming limits.

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T. BALKAS
Marine Science Department
Middle East Technical University
ANKARA
Turkey

The field station of the Centre in Mersin has recently become operational and research related to MED I is expected to start in June 1977.

* * * * *

V. PRAVDIC
Centre for Marine Research
"Rudjer Boskovic" Institute
ROVINJ/ZAGREB
Yugoslavia

Sampling for dissolved/dispersed hydrocarbons has been done at 9 stations in the Rijeka Bay, on a seasonal basis, since June 1976. Determined concentrations ranged from less than 0.001 to 0.72 mg/l although only four samples showed concentrations higher than 0.1 mg/l.

No conclusion can be drawn at present with regard to seasonal variation. The distribution frequency indicates that no significant differences exist between composite and bottom samples. However, this "homogeneity" is a result of unsuitable sampling methods rather than a real state of homogeneous distribution.

Sampling will be continued on a seasonal basis.

Observations have been made of tar balls on beaches but only in a qualitative manner.

Observations of oil slicks are being made occasionally when they occur in the region.

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- 2.2 MED II : Baseline Studies and Monitoring of Metals, Particularly Mercury and Cadmium, in Marine Organisms: FAO(GFCM)/UNEP)

D. SIBLOT
Centre de Recherches océanographiques et des Pêches
ALGER
Algérie

Preliminary sampling in order to ascertain that the sites were properly chosen have been carried out. Mullus barbatus have been collected and frozen for later analysis. At one sampling site Mytilus galloprovincialis/edulis is not available and has been replaced by Perna perna. Most equipment has been received and the AAS will soon be installed.

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A. DEMETROPOULOS
Fisheries Department
Ministry of Agriculture and Natural Resources
NICOSIA
Cyprus

Sampling of Mullus barbatus, Xiphias gladius and Patella spp started in September 1976. Samples are stored deep-frozen awaiting the completion of training and delivery of equipment.

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H. I. EMARA
Institute of Oceanography and Fisheries
Mediterranean Branch
ALEXANDRIA
Egypt

The agreement has been signed and training arranged for the principal investigator in another participating research centre. The equipment will be delivered following the completion of the training. Some difficulties may be encountered in obtaining the required species and Sardinella spp has been suggested as a substitute.

* * * * *

Y. THIBAUD
Institut Scientifique et Technique des Pêches Maritimes (I.S.T.P.M.)
Centre de Sète
SETE
France

Mercury residues reported for this project were based on June-December 1976 sampling. While there appears to be a direct relationship between size (weight) and mercury value in tuna, the relationship is not apparent with the mussel. In mussel there appears to be considerable variation in residue level between sampling areas.

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G. CUMONT
Laboratoire central d'hygiène alimentaire
Ministère de l'agriculture
PARIS
France

Samples of more than 700 specimens of Thunnus thynnus and Thunnus alalunga have been analysed for Hg. The structure of the bluefin tuna population in the Mediterranean has also been studied. The results show values for the Mediterranean that are often 3 to 4 times higher than those for Atlantic specimens.

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A. P. GRIMANIS/C. PAPADOPOULOU
Radioanalytical Laboratory
Radiochemical and Nuclear Analysis Group
Nuclear Research Centre "Demokritos"
ATHENS
Greece

Mercury, cadmium and zinc were determined in Mullus barbatus, Parapenaeus longirostris, Mytilus galloprovincialis and Xiphias gladius by neutron activation analysis. Specimens of M. barbatus were collected from three stations in the Saronikos Gulf during winter 1975-76, spring, summer and autumn 1976. Specimens of P. longirostris and M. galloprovincialis were collected from one station during winter 1975-76 and summer 1976. All cadmium values in M. barbatus were found to be less than 0.2 ug/g dry weight.

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F. VOUTSINOU and J. SATSMADJIS
Institute of Oceanographic and Fisheries Research
ATHENS
Greece

Cadmium was determined in Mullus barbatus, Parapenaeus longirostris and Mytilus galloprovincialis by atomic absorption spectrophotometry. Samples were collected seasonally in the Saronikos Gulf from autumn 1975 to winter 1976. Most cadmium values for M. barbatus and P. longirostris were found to be less than 0.2 ug/g dry weight while the values for M. galloprovincialis showed a greater variation.

* * * * *

D. G. MARKETOS
General Chemical State Laboratory
ATHENS
Greece

Samples were collected from three sampling stations in the Saronikos Gulf in autumn 1976. Mercury was determined in Mullus barbatus. Preliminary results for total Hg were reported.

* * * * *

A. G. PANETSOS
Department of Food Hygiene
University of Thessaloniki
THESSALONIKI
Greece

Mercury levels in autumn 1975 and throughout 1976 for Mytilus galloprovincialis indicated wide variability. Mullus barbatus analyses

were reported for 3 stations for spring and winter collections. They contained very low levels. Twenty eight Thunnus thynnus were analysed from 2 sampling stations - for March and September collections. These values were also relatively low.

* * * * *

G. VASILIKIOTIS

Laboratory of Analytical Chemistry
University of Thessaloniki
THESSALONIKI
Greece

Samples of Mullus barbatus, Thunnus thynnus and Mytilus galloprovincialis collected at 7 stations from September 1975 until December 1976 were analysed in duplicate for mercury, cadmium and lead. Most mercury values in Mytilus were low (<0.1 mg/kg) with the highest below established standards. Levels of mercury in Mullus were comparable to those in Mytilus. Thunnus values were also low, with no values as high as 0.1 mg/kg. Cadmium values were similar to those for mercury.

* * * * *

O. H. OREN

Israel Oceanographic and Limnological Research Ltd.
HAIFA
Israel

The agreement has been signed and the equipment is installed and operational. The analytical work has started and the institute has participated in the intercalibration exercise. As Mytilus galloprovincialis is not available, Donax sp. has been substituted.

* * * * *

R. CAPELLI

Group for Oceanographic Research - Genova
Institute of Hydrobiology and Fish Culture
GENOVA
Italy

Data from two projects dealing with the accumulation of heavy metals were reported. An investigation of the distribution of heavy metals (Hg, Cd, Cu, Zn, Pb, Mn, Co, Cr, Ni) in different organs of Engraulis encrasicolus was completed. The variation of concentration of metals with collected period (seasonal) and between areas within Mytilus galloprovincialis samples has also been completed.

(i) Engraulis

Concentration of heavy metal residues within Engraulis seems to show a direct relationship between size and mercury and cadmium concentration.

This relationship is not seen with copper, cobalt, nickel or zinc. Zinc gut, gill and muscle levels are apparently higher in the smaller fish. Gill and gut levels are often high indicating perhaps contamination from exposure to the environment, rather than deposition and storage of residues. Liver levels are commonly high for those residues which are absorbed into the blood (mercury, cadmium and copper).

(ii) Mytilus

Seasonal sampling of Mytilus in the Gulf of La Spezia indicates that between January and June the highest levels of cadmium, copper and zinc were found in February and March. Manganese, cobalt, chromium and nickel had the same trends. There was no apparent relationship between water and tissue concentrations of these metals. Mytilus tissue levels did illustrate a pattern that might be related to the movement of contaminated sediment by the current along the northeast shore of the Gulf. These data from the eleven stations emphasize the difficulty of establishing the state of pollution of an area, even a restricted one, such as a port, by considering values from the analysis of samples from a too restricted (number of stations) monitoring effort.

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A. BRONDI/M. STOEPLER
Marine Contamination Laboratory, CNEN-EURATOM
FIASCHERINO
Italy

Mercury values for marine organisms sampled by this laboratory between October 1975 and July 1976 were reported. Delay in the installation of the AAS has postponed the analysis of elements other than mercury. Most organisms were analysed individually rather than pooled in order to determine the variation between individuals from the same sample. Mercury determinations have been completed for edible tissue from 275 individuals of 17 species.

Instrument and pretreatment error (variation) were estimated from replicates of analytical determinations and of pretreatments. The coefficient of variance between instrument determinations ranged from 2.5 to 10%; 10 of 13 replicates showed less than 4% variation. Samples of Penaeus, Sepia and Mullus barbatus all show wide variation between individuals. Samples of Sepia, Octopus (arms), Mullus barbatus, Sardinia pilchardus and Crenilabrus tinca had relatively high values. Marked differences existed between areas for samples of Mytilus, Mullus and Crenilabrus.

High values were associated with both high trophic level predators and filter feeders (increased consumption of particulate matter with adsorbed metals). Cadmium, copper and lead in coastal waters of the Ligurian and Tyrrhenian Seas were investigated at 225 stations. Water values were

high in very clear water, while low in areas rich in algae or suspended particulates. It is suggested that studies should attempt to describe the fate of metals associated with algae, sediment and suspended particulates. Cadmium levels were similar to those reported for the Northwest Basin and the north Adriatic, while lead was an order of magnitude lower than in the north Adriatic.

* * * * *

E. ORVINI

Centre for Radiochemistry and Activation Analysis - CNR
Institute of General Chemistry
University of Pavia
PAVIA
Italy

Analyses of this research centre have been confined to the determination of mercury, zinc, arsenic and selenium residues in the flesh of tuna collected by the CNEN laboratory of Fiascherino. These few samples show no apparent relationship of the concentration of these elements with either size or area collected.

* * * * *

A. RENZONI

Laboratory of Hydrobiology and Fish Culture
Institute of Comparative Anatomy
University of Siena
SIENA
Italy

Six elements were monitored in Mullus barbatus and Nephrops norvegicus from a single site in autumn 1976. There was no relationship between residue concentrations and size within the rather homogeneous groups sampled. Considerable variation existed between individuals, especially with mercury levels which vary by factors of 5 (Mullus) and 8 (Nephrops). Although both species concentrated mercury, levels in Mullus were considerably higher than in Nephrops. Nephrops concentrated zinc, copper and manganese at levels several times greater than those found in Mullus. Mullus from 3 sites in spring 1977 were also analysed.

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L. MOIO

Station for Marine Biology
Institute of Zoology and Comparative Anatomy
University of Messina
MESSINA
Italy

Collection of samples started in December 1976. Sampling areas are located on Sicily and on the Calabrian coast as far as possible away from

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massive pollution sources. The number of sampling sites has been increased as some species were not readily available at all sites. Hg, Cd, Pb and Cu will be undertaken as soon as the analysis digestion unit is received and the graphite furnace is installed.

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H. H. KOUYOUMDJIAN
Marine Research Centre of Jounieh
National Council for Scientific Research
BEIRUT
Lebanon

Monitoring could not be initiated during 1976. The agreement has been sent to the centre for signature. Preliminary surveys reveal that some difficulties may be encountered in obtaining certain species.

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A. STORACE
The University of Malta
MSIDA
Malta

Analysis has not begun; it is hoped that specimens collected in September 1976, December 1976 and March/April 1977 will be analysed by summer 1977. Frozen specimens being held are hake (Merluccius merluccius), striped mullet (Mullus barbatus) and horse mackerel (Trachurus mediterraneus). Mytilus have been available and collection of Patella lusitanica and P. coerulea began in March. It was hoped that Xiphias gladius might also be available for collection in March/April.

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H. IDRISSE
Institut des pêches maritimes du Maroc
CASABLANCA
Maroc

The agreement has been signed with FAO(GFCM) and arrangements for training and delivery of equipment are under way. The sampling programme has recently been initiated and samples are stored deep-frozen. Some earlier results on content of Hg and As in seawater and Sardina pilchardus were submitted.

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A. BALLESTER
Instituto de Investigaciones Pesqueras
BARCELONA
Spain

Mercury values reported were from analyses of organisms samples from June 1975 until March 1976. Firm conclusions can only be made after a well designed and executed sampling programme (adequate sample number by size, class and area) and statistical analyses are completed. Mercury values appear to vary with species, habitat, trophic level and growth. High levels reported for Thunnus Thynnus and Scyliorhinus canicula could be explained by individual variation (S.c. sample size = 1), trophic level, distribution and/or season (only collected one period in one area), or by size (no small individuals sampled). Individual variation cannot be defined when composite or too few samples are used. An attempt to relate size to mercury residue has been made. Difference between collecting areas is generally one of the more apparent relationships. This variation between areas is one of the reasons why values from different areas cannot generally be pooled for analysis. As stated above interpretative use of results is most easily justified where the sampling and analysis have been well planned and executed.

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T. I. BALKAS
Department of Marine Sciences
Middle East Technical University
ANKARA
Turkey

Analytical results for 6 specimens of Mytilus sp. collected at Gemlik on the Sea of Marmara in August 1976 and composite samples of red mullet, shrimp and crab collected in the vicinity of Mersin were reported. All levels were relatively low with cadmium and copper showing an apparent direct relationship between concentration and specimen size.

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I. ARTUZ
Hydrobiological Research Institute
University of Istanbul
ISTANBUL
Turkey

The agreement was recently signed. Collection of samples has started. Analyses will start when equipment has been installed.

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H. UYSAL
Institute of Hydrobiology
Ege University
IZMIR
Turkey

The agreement was recently signed. Preliminary collection of Mytilus galloprovincialis, Mullus barbatus, Muqil cephalus and Carcinus mediterraneus at the sampling sites has been carried out. Analyses will start when the equipment has been installed.

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A. M. ATAHAN
General Directorate of Aquatic Resources
Ministry of Food, Agriculture and Livestock
ANKARA
Turkey

Collection of samples has started. The analytical work will be carried out at the Marine Science Department METU (Ankara), Mersin.

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S. GOMISCEK
Marine Biology Station
University of Ljubljana
PORTOROZ
Yugoslavia

Analyses of marine organisms had not begun (all equipment had not been installed), although preparations (including installation, purchase of chemicals, glassware, standards and literature review) have been performed. Local analysts have been trained and preparations have been made to receive trainees from laboratories of other participating countries.

Analysis was scheduled to begin in May 1977, the sampling programme has been under way since September 1976 with additional samples in November 1976 and February 1977 in both clean and polluted areas in the Gulf of Trieste. Samples were quick-frozen and are stored at -20°C . Mullus barbatus or M. surmuletus were difficult to collect in many sampling localities and it was suggested that M. barbatus be replaced with the common and readily obtained Pagellus erythrinus. It was also suggested that Sardina pilchardus, an important and common pelagic Mediterranean fish, be, together with the tuna, an obligatory monitoring species.

Multielement analysis (Hg, Se, As, Cu, Zn, Pb, Mn, Fe, Cd, Cr, Sb) has been performed on water, sediment, plankton and other selected organisms, using AAS, polarography and NAA in an attempt to understand the distrib-

ution of these compounds in the Gulf of Trieste. Mercury residues in mussel are most reeresentative with normal concentrations 0.01 - 0.04 mg/kg (wet weight), however, those in areas under the influence of the Soca (Isonzo) and Tagliamento Rivers have higher concentrations. Similar trends were seen in sediments and preliminary analyses of fishes.

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V. VALKOVIC and A. LJUBICIC
 Laboratory for Trace Element Analysis
 Department of Physics and Mathematics
 University of Rijeka
 RIJEKA
 Yugoslavia

Samples of Mytilus galloprovincialis from 4 sites were collected and analysed for Fe, Cu, Zn, As, Br, Sr and Pb in 1976.

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M. BRANICA
 Centre for Marine Research
 "Rudjer Boskovic" Institute
 ROVINJ
 Yugoslavia

Samples of Mytilus galloprovincialis taken in March 1977 from 6 different regions in the North Adriatic together with sea water, were analysed for Cd, Pb, Cu and Zn.

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M. BULJAN
 Institute for Oceanography and Fisheries
 SPLIT
 Yugoslavia

Analysis of heavy metals in sea water using polarography has started. Samples of Mytilus galloprovincialis and Mullus barbatus were collected in March 1977 and stored deep-frozen.

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2.3 MED III : Baseline Studies and Monitoring of DDT, PCBs and
Other Chlorinated Hydrocarbons in Marine Organisms:
(FAO(GFCM)/UNEP)

M. M. ABBAS ALY
Institute of Oceanography and Fisheries
Mediterranean Branch
ALEXANDRIA
Egypt

The agreement has been signed and the principal investigator has been scheduled for training in another participating research centre. Equipment will be delivered following the completion of the training. Some difficulties may be encountered in obtaining the required species and Sardinella spp and other species of Mytilus have been suggested as substitutes.

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C. ALZIEU
Institut scientifique et technique des pêches maritimes (I.S.T.P.M.)
Centre de Sète
SETE
France

Chlorinated hydrocarbon analyses were performed on portions of the Mytilus galloprovincialis and Mullus barbatus samples utilized for mercury analyses. Relatively high PCB levels were analysed. Chlorinated hydrocarbon levels in Leucate Lagoon were notably lower than at other sampling stations.

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A. G. PANETSOS
Department of Food Hygiene
University of Thessaloniki
THESSALONIKI
Greece

DDT, aldrin and PCBs were determined in Mytilus galloprovincialis, Mullus barbatus and Thunnus thynnus during autumn 1975 and winter 1976. Some preliminary results were reported.

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R. RAVID
Israel Oceanographic and Limnological Research Ltd.
HAIFA
Israel

The agreement has been signed and the analytical work will start soon.
Some difficulties have been encountered with analytical techniques.

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V. U. FOSSATO
Institute of Marine Biology - CNR
VENICE
Italy

Mytilus sp., Carcinus mediterraneus and Mullus barbatus were monitored for chlorinated hydrocarbon residues in the Gulf of Venice and near Ancona in 1976. Results indicate that PCB residues are the most important at both stations. BHC, aldrin, dieldrin, DDT and its metabolites were also found in the samples. In this group DDT was the most abundant residue in the filter-feeding Mytilus and sediment-feeding Mullus, while its metabolite DDE was more abundant in Carcinus. The PCB Arochlor 1260 was not reported in Mytilus samples, although present in all other samples. Arochlor 1260 and 1254 were present in approximately equal amounts in Mullus, while in Carcinus the ratio was 1:3. In the Mullus sample collected near La Spezia in February 1976 Arochlor 1260 concentration was more than 7 times greater than the 1254 content. Levels in this sample and in the tuna from near Trapani are more than double those found in Gulf of Venice samples.

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H. H. KOUYOUMDJIAN
Marine Research Centre of Jounieh
National Council for Scientific Research
BEIRUT
Lebanon

Monitoring was not initiated during 1976. The agreement has been sent to the centre for signature. Preliminary surveys reveal that there might be some difficulties in obtaining certain species.

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J. V. BANNISTER
The University of Malta
MSIDA
Malta

Samples collected in September 1976 were analysed while visiting the Istituto di Biologia del Mare CNR (Venezia). Levels in all samples were relatively low, especially those from Merluccius.

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H. IDRISSE
Institut des pêches maritimes du Maroc
CASABLANCA
Maroc

The agreement has been signed with FAO(GFCM) and arrangements for training and delivery of equipment are under way. The sampling programme has recently been initiated and samples are stored deep-frozen.

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J. M. FRANCO
Instituto de Investigaciones Pesqueras
BARCELONA
Spain

Intensive sampling of four species (Mytilus edulis, Carcinus mediterraneus, Mullus barbatus and Sardina pilchardus) in the Castellon and Barcelona areas was conducted in 1976.

Seasonal evaluation was facilitated by five Castellon sampling periods. In Mullus barbatus there appears to be a clear seasonal pattern of chlorinated hydrocarbons accumulation. In Castellon Mullus all chlorinated hydrocarbons reached an annual peak in December/January which decreased to a low in September before high levels again appeared in December fish. In the Castellon region the high levels in December/January can be related to the higher fat content of Mullus during that period. Barcelona Mullus have much higher residues, with the highest values at Montgat. DDE values for Sardina in the Castellon area followed the same seasonal pattern shown by Mullus, however this was not seen for the other chlorinated hydrocarbon residues because of their elevated levels in the June sample. Here again fat analyses do nothing to clarify the data interpretation. Sardina, as with Mullus, had higher concentrations of chlorinated hydrocarbon in the Barcelona area, especially PCBs at Montgat.

Mytilus and Carcinus results are more complex. Although DDT and its metabolites are present in lower levels than the fishes, PCB levels are uniformly high for all areas in Carcinus. In Mytilus while DDT values decreased to their lowest values in June, the PCB values increased at Castellon over this period. Seasonal differences in the accumulation and metabolism of these compounds may become clear after further sampling and analyses.

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T. SOYLEMEZ
Marine Science Department
Middle East Technical University
ANKARA
Turkey

The results for December 1976 samples of shrimp, crab legs and red mullet collected in the vicinity of Mersin were reported. Concentrations of chlorinated hydrocarbons, particularly Arochlor 1260 and the variation between shrimp samples were notable.

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I. ARTUZ
Hydrobiological Research Institute
University of Istanbul
ISTANBUL
Turkey

The agreement has recently been signed. Collection of samples has started. Analyses will be completed after equipment has been installed and training of principal investigator is completed.

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S. TUNALI
General Directorate of Aquatic Products
Ministry of Food Agriculture and Livestock
ANKARA
Turkey

Collection of samples has started. The analytical work will be carried out at the Marine Science Department METU (Ankara), Mersin.

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V. SIPOS
The Biological Institute
DUBROVNIK
Yugoslavia

Results of monitoring activities at three stations were reported. PCB levels in net zooplankton and Mullus surmuletus were the most notable results. Other chlorinated hydrocarbon values were relatively low.

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J. CENCELJ
Marine Biological Station
University of Ljubljana
PORTOROZ
Yugoslavia

Results obtained from 1974-76 were reported. Concentrations of DDT and lindane in sediments and zooplankton from the open waters of the Adriatic as well as in fish and molluscs from the north Adriatic were presented. A limited number of PCB analyses had also been performed. No PCBs and only trace amounts of DDT were found in sediments of the open Adriatic. Close to sewage discharges relatively high levels of DDT were found. The GC provided has been installed and is operational. Preliminary analysis with this instrument of DDT, dieldrin and PCBs in Mytilus galloprovincialis has been performed.

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T. VUCETIC
Institute of Oceanography and Fisheries
SPLIT
Yugoslavia

Sampling started in March 1977 at three sampling stations. Mullus barbatus, Mytilus galloprovincialis, Portunus depurator, Pachygrapsus marmoratus, Xanto hydrophilus, zooplankton and sediments were sampled. Some analyses were performed at the "Rudjer Boskovic" Institute.

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N. SMODLAKA
Centre for Marine Research
"Rudjer Boskovic" Institute
ROVINJ
Yugoslavia

Samples have been collected and the GC is operational. The analyses will soon be performed.

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2.4 MED IV : Research on the Effects of Pollutants on Marine
Organisms and their Populations: (FAD(GFCM)/UNEP)

H. H. SALEH
Institute of Oceanography and Fisheries
Mediterranean Branch
ALEXANDRIA
Egypt

The agreement has been signed and steps have been taken to provide for training and equipment.

The development and maturation of gonads in Mullus barbatus, Sparus auratus, Solea spp. and Mugil spp. will be investigated from collections at sampling areas utilized in the pilot projects for monitoring of pollutants and ecosystem studies.

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G. BELLAN
Station marine d'Endoume et centre d'océanographie
MARSEILLE
France

(1) Toxicity

In the Endoume laboratory the emphasis has been on a definition of methodology. Assays examining differential effects on development in echinoids began in early 1976; results will soon be available. The in vitro methodology for the study of the interaction of pollutants (especially heavy metals and detergents) with ambient parameters (i.e. salinity) using urchin (Paracentrotus lividus) larvae is under way; the flow-through system for this programme has only recently become operational. These studies are being completed in close collaboration with other investigations studying recolonization of portable substrates in natural habitat. Static bioassays are being performed to determine the sensitivity of Scolecopsis fuliginosa and Capitella capitata to salinity and detergents as well as investigation of their potential synergistic action. These results are being evaluated using the statistical methods of Bliss and Life-Markins. Preliminary tests have shown a well defined tolerance limit with little variability in the level initiating mortality.

Several species of polychaetes, molluscs and amphipods will be exposed to various pollutants in the flow-through system, which is capable of varied and controlled salinity of the sea water, providing a changing environment similar to estuarine conditions. This system will improve the ability to evaluate toxicity results based on in vitro and in situ tests. The goal is to improve the relationship between laboratory data and field observations.

(ii) Development, Reproduction and Population Genetics

The study of the developmental process may reveal sublethal effects of pollution that could seriously reduce community productivity and/or eliminate populations. The time sequence for development of eggs, fertilization, cleavage, gastrulation and larval stages has been determined for Paracentrotus lividus. Percent success and frequency of anomalies at each stage have also been determined. Statistical analysis has proven difficult with the method of Prentici (1976) currently being attempted. The results of this effort should be available in spring 1977.

(iii) Morphology and histopathology

Sublethal levels of pollutants are also being investigated for potential morphogenic, histopathological and teratogenic effects.

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R. FYTIZAS
"Benaki" Institute of Phytopathology
ATHENS
Greece

The toxicity of Paraquat to three marine organisms, a fish (Mugil cephalus), a gastropod (Murex brandaris) and a decapod (genus Pagurus) has been investigated. The study has two aspects. In the first part survival times were determined at levels of 10, 5, 2.5 and 1 mg/l and pathological changes described. The second part determined the accumulation capacity of organisms and the herbicide distribution in different tissues and organs of M. cephalus. It has been shown that marine organisms are more sensitive to Paraquat than fresh water fish. At a concentration of 10 mg/l, M. cephalus survival did not exceed one hour; at 1 mg/l, maximum survival was 17 days. Decapods were more sensitive to Paraquat than gastropods. Although less vulnerable than M. cephalus to acute poisoning, Pagurus was more sensitive to repeated exposure. Exposure concentrations were too high to provide information on potential long term (chronic) effects.

Histopathological analysis revealed the existence of serious lesions in various organs of M. cephalus. In the branchiae, besides changes frequently noticed with other toxic agents, a typical lesion has been observed, i.e. sclerosis of external extremities of branchial cilia. This lesion is similar to that provoked by the same herbicide in the lungs of mammals. When survival time was long enough, large round wounds were observed on the abdominal skin of fish.

As regards accumulation and distribution of Paraquat, much larger amounts were found in Pagurus; this appears to be related to the high sensitivity of this small crustacean to repeated exposure.

In M. cephalus, the largest amounts of Paraquat were found in the digestive tract and skin; the lowest values in muscles.

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M. MORAITOU-APOSTOLOPOULOU
Zoological Laboratory and Museum
University of Athens
ATHENS
Greece

Amongst the proposed pollutants, Cu^{2+} in the form of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ was initially investigated. The effects of various concentrations of Cu^+ on planktonic copepods Acartia clausi and Oncaea mediterranea have been studied. These organisms were first exposed to low concentrations of Cu^+ (0.00025 ppm to 0.009 mg/l) in order to detect the possible effects of such sublethal doses.

Except for the lowest dose (0.00025 mg/l) a decrease in the survival time has been observed under laboratory conditions with a decline of motility and a lowering of the production rate of genital products.

Copepods are currently being tested with higher doses (0.027 ppm to 0.054 mg/l) of Cu^{2+} .

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T. SHIMONI
Israel Oceanographic and Limnological Research Ltd.
HAIFA
Israel

Heterozygosity and genetic variation may increase fitness and provide genetic flexibility to deal with environmental uncertainty. A reduction in heterozygosity, which might result from a less diverse environment (as with increased pollution), may result in a population more susceptible to reduction or elimination by subsequent environmental alteration. Population genetics studies of Balanus amphitrite at three stations in the Bay of Haifa have demonstrated reduced heterozygosity accompanying survival in a more polluted environment. Evidence does not allow a conclusion on the effect of a specific pollutant on these organisms, but rather the effect of a composite of water quality parameters on gene frequencies in their populations.

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L. J. SALIBA
University of Malta
MSIDA
Malta

(i) Toxicity

Acute toxicity of mercury, cadmium and copper to Arbacia lixula, Paracentrotus lividus and Palaemon elegans (newly hatched larvae, product of laboratory breeding) was determined. Twenty-four hour and forty-eight hour LC50 values for mercury on Phaeodactylon tricorutum has also been determined. "Whenever possible" specimens were collected 24-48 hours prior to the experiments. Static assays were performed in 1.0 - 1.5 l beakers. Food was withheld during the test period and 3-4 replicae were run on each assay. The mortality data were plotted on log probability paper and analysed by students' T-test or ANOVA. Twenty-four, 48 and 72 h LC50s for mercury (mercuric sulphate) were respectively 1.5, 0.5 and 0.35 mg/l for Arbacia lixula. Preliminary data for Paracentrotus lividus seem similar. The 24 h LC50s for copper (cupric sodium citrate) were 86 mg/l (23°C) for Palaemon elegans larvae. The 48 h LC50 was 25 mg/l at 20 and 23°C. Bioassays are continuing.

(ii) Physiological and Behavioural Effects

Field collected Arbacia lixula and Monodonta articulata were exposed to sublethal levels of mercury (mercuric sulfate) in an attempt to define some physiological indications of reduced fitness. Tests were conducted at 0.1 - 0.5 mg/l Hg⁺⁺ for Arbacia (72 h LC50 0.35 mg/l). These concentrations produced cytolysis and concentration-dependent release of pigment. Monitoring of this pigment (echinochrome, spinochrome, or melanin) in the media may provide an evaluation of sublethal exposure. An "adhesion distress syndrome" was observed during other tests at a lower concentration (0.002 mg/l). These experiments are continuing with animals exposed to 0.002 to 0.05 mg/l Hg⁺⁺ and tested with varied "pulls" to measure the effect on adhesion of the tube-feet to the substrate.

Activity of Monodonta exposed to 0.2 - 1.0 mg/l Hg⁺⁺ in 250 ml beakers and monitored for 24 h periods was measured using a specially developed "aktograph". Effect on activity was concentration dependent and expressed by an increase in emersion time and reduced waterline activity. Exposure to 0.2 mg/l reduced oxygen consumption to nearly 1/3 of the control value with further decrease with increase in exposure concentration. These experiments are also continuing.

(iii) Development, Reproduction and Population Genetics

Mercury studies on the reproduction and development of the algae Phaeodactylon tricorutum have recently begun. This algae is being successfully cultured and seawater controls have been evaluated with regard to total number of cells (Coulter counter), total volume, as well as chlorophyll and protein content.

Work has been completed on effects of some heavy metal salts (Cu, Pb, Zn) on egg hatching, growth rate and acclimation in Artemia salina. Similar studies are under way using mercury and cadmium salts.

Preliminary results indicate that both are more toxic than copper and that lower levels must be tested. Inhibiting of hatching and inability to acclimate were noted at 0.001 mg/l Hg⁺⁺ and Cd⁺⁺.

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R. ESTABLIER
Instituto de Investigaciones Pesqueras
BARCELONA
Spain

(i) Toxicity

Acute toxicity (24 h LC50) of Penaeus kerathurus larvae to mercury, cadmium and copper was determined. Values were characterized by great variation which pointed to the need for increased precision and extension of these studies. The larvae originated from 7 different hatches and although variation was great between larval stages, it also existed between identical stages of different hatches. For mercury (methyl mercuric chloride and mercuric chloride), the LC50s ranged from 3.5 to 12.4 for the former and 4.5 to 12.7 ug/l for the latter. The values for cadmium (cadmium chloride) were 0.72 to 1.33 mg/l, while the copper (cupric sulphate) values were 63 to 132 ug/l. The 24 and 48 h LC50 for Penaeus kerathurus and Palaeomonetes varians larvae, juvenile and adults, as well as adult Sparusauratus will be determined for mercury, cadmium and copper.

(ii) Pollutant Dynamics

Heavy metal accumulation and both short and long-term effects in the fishes Sparus auratus, Muqil auratus and Halobatrachus didactylus were studied. Exposure to mercury, cadmium and copper did not exceed 0.1, 1.0 and 3.0 ug/l respectively. Water levels of these contaminants were monitored by AAS analysis. The fish were acclimated to the 36% filtered seawater for ten days before exposure. Two-thirds of the water was exchanged every 48 hours; on long-term studies fish were fed two hours before this water change. Fish used for short-term studies were not fed.

Cadmium concentration in Halobatrachus didactylus exposed for 96 hours to 50 mg/l was greatest in the intestine (39 ug/kg), kidney (13) and liver (5); lower levels were found in the blood (1.2) and muscle (0.2).

Mercury concentrations in Halobatrachus didactylus exposed for 49 days to 0.1 mg/l were 50.3 ug/kg in liver and 9.6 in muscle; 25 and 10 times respectively the control values.

Mugil auratus were sampled after 10, 24, 35, 46 and 57 days exposure to 0.1 mg/l mercury. The tissue from 3 fish was pooled for each analysis. Mercury levels in the gill did not increase after the first week's exposure (9 mg/kg, 100 x control values). Other tissues continued to increase in concentration over the 57 day exposure. Muscle levels increased by a factor of 20, to 2.2 mg/kg; by contrast, gut levels increased 70 times, to 20 mg/kg, while liver levels increased by a factor of 500, to over 100 mg/kg.

Sparus auratus exposed to 0.2 mg/kg copper (cupric sulphate) for 77 days had little increase in gill or muscle copper, but intestine values doubled (2.4 mg/kg), as did milt (8.9). Liver values were greater than five times the control value at 20.1 mg/kg.

(iii) Morphology and Histopathology

Histological studies of tissues from fishes - Sparus auratus, Mugil auratus and Halobatrachus didactylus - exposed to mercury, cadmium and copper were made for possible pathological effects of media contaminated with sublethal levels. Tissues being evaluated were blood, liver, kidney and intestine.

Halobatrachus didactylus exposed to 0.1 mg/l mercury for 49 days (n = 6) were characterized by intestine with hyperchromatism of nuclei and apical cytoplasm and increased thickness of the villi. Mugil auratus exposed for 57 days to 0.1 mg/l Hg^{++} ($HgCl_2$) had livers with vacuolization and modification of paranchymal cords and intestines with thickened epithelium, disorientation of nuclei, vacuolization and increase in cells in the villi.

Halobatrachus were exposed to 50 mg/l cadmium for 96 hours in April, June and September. Although sample size was only 3, the following effects were observed: (1) erythrocytes with varied shape, vacuolization, pycnosis and haemoglobin content; (2) intestinal epithelium with altered nuclear orientation, vacuolization, hypochromatism and necrosis; (3) liver with increased reticular trabeculi and nuclei, and (4) kidney tubules with nuclear disorientation, hypochromatism, reduced lumen or dilated and full of amorphic mass (with eosinophils and signs of degeneration).

Sparus auratus exposed to 0.2 mg/l Cu^{++} for 77 days produced disorganization of the epithelium and basal membrane of the intestine, as well as increased epithelium thickness.

Photomicroscopy was utilized with selected tissue sections to record the effects discussed above.

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H. UYSAL
Institute of Hydrobiology
Ege University
IZMIR
Turkey

The agreement was signed recently and the experimental work has started. Bioassays for mercury, cadmium, copper and zinc will be done with Mytilus galloprovincialis, Paracentrotus lividus, Carcinus mediterraneus and Mugil cephalus. Analytical studies accompanying these experiments will start as soon as the AAS to be provided is operational.

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I. ARTUZ
Hydrobiological Research Institute
University of Istanbul
ISTANBUL
Turkey

The agreement has recently been signed and the Institute has started to investigate different marine organisms for toxicity testing. Water samples have been collected from different sources (i.e. papermill and pesticides industry waste water) and short-term static tests have been performed with Trachurus mediterraneus, Carcinus mediterraneus and Mytilus galloprovincialis. Other tests could not be performed until equipment was received. A difficulty with these experiments was the reaction of the organisms to the different pH levels and salinities in the waste water.

Samples used in the toxicity tests for heavy metals and pesticides have been stored deep-frozen until the AAS and GC equipment is operational.

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B. KURELEC
Centre for Marine Research
"Rudjer Boskovic" Institute
ROVINJ
Yugoslavia

The philosophy of this laboratory in the study of biological effects of pollutants commences from the rationale that any change in the environment results in a number of measurable alterations of a physiological and biochemical steady state, i.e. that an environmental stressor causes a number of symptoms which constitute the stress syndrome. A measurable change in the PS (programmed biosynthesis of DNA, RNA, proteins) may indicate such a syndrome of stress; therefore, the processes of the PS may offer a biochemical index of stress.

Fishes metabolize the aryl hydrocarbon benzo(a)pyrene by a microsomal mixed-function oxidase. This aryl hydrocarbon hydroxylase has been induced in the liver and gills of Salmo trutta and Mallotus villosus by exposure to petroleum (Payne and Penrose, 1975). Measurements of the activity of this enzyme appears to be a good monitor for marine petroleum pollution, as a sublethal effect that can be quantified. Induction of benzo(a)pyrene hydroxylase (BPH) may be related to (1) potential carcinogenic threat to fish of petroleum pollution, (2) the "taint" problem as a means of quantifying exposure to petroleum products, (3) chronic effects on growth, reproduction, behaviour, and their ecological implications.

In an effort to substantiate the utility of this assay for sublethal effects of petroleum pollution, studies were initiated at "Rudjer Boskovic" Institute. Blennius pavo, a stationary tide-pool fish common in the Mediterranean, Sardina pilchardus, a pelagic fish, and Microcosmos sulcatus, a benthic protochordate, have been monitored in these investigations.

Laboratory induction of BPH in Blennius pavo, collected from unpolluted areas, resulted in maximum elevation of enzyme activity after 14 days. These induced levels were still present 30 days after termination of exposure to petroleum products. Three days exposure produced increase in BPH activity. Induction appears to be an all-or-none response; a dose response was not demonstrated. BPH activity was not detected in exposed Microcosmos.

Field monitoring of BPH activity in Blennius from the Rovinj area was correlated with known pollution levels. In these field tests it was felt that enzyme activity might be a reflection of pollution level (concentration dependent). Aromatic pesticides and PCBs may also induce elevation of BPH activity. In addition, changes in nutrition and hormonal balance have been shown to alter levels of activity of microsomal mixed-function oxidases, such as BPH. On the basis of this knowledge the effect of an oil pollution incident in the Northern Adriatic was investigated by monitoring BPH activity in the liver of Blenniidae. New Year 1977 an oil spill caused an increase in the BPH activity which reached a peak on the 23rd day (representing a 20-fold increase of the background level), followed by a decrease in activity until a new background level (4 to 5 times the original background) was reached on the 45th day. This new background level has been constant with subsequent sampling (throughout April - 4 months after the accident). This is the first case history of an oil spill followed up by this biochemical monitoring technique - induction of BPH activity.

The investigation of γ -glutamyl cycle enzymes in natural phytoplankton populations and their role in amino-acid transport was also completed in the frame of this pilot project. This enzyme system is thought to have an important role in utilization of dissolved free amino-acids (DFAA). DFAA in Northern Adriatic waters are also being monitored

by this laboratory. The correlation of pollution with changes in the Y-glutamyl cycle enzymes of DFAA in sea waters could provide early notice of decreases in primary production cycles of the sea. This enzyme system has been demonstrated in natural populations of nereids and the sponge, Geodia cydonium. DFAA represent an especially nutritious source for protein synthesis and constitutes about 5 per cent of the sea's dissolved organic matter (DOM). To place this in perspective, it should be noted that the sea's total organized matter is estimated to be 0.33% of the mass represented by DOM. Experimental work based on these observations is underway.

The study of detergent effect on programmed biosynthesis in the regenerating sponge (Geodia cydonium) produced an in vitro effect at the lowest treatment level for which effects have been demonstrated. The lowest treatment level, previously demonstrated to produce an in vitro biological effect, was 10 mg/l on enzyme systems (alkaline phosphatase being the most sensitive), 1 mg/l on isolated cells or organs, and 0.1 mg/l on physicochemical systems. This study, utilizing the uptake of labelled radio precursors by the sponge, demonstrated a decreased uptake in the acid-soluble fraction at 0.1 mg/l, while incorporation into the acid-insoluble fraction was altered at 0.01 mg/l. Alteration in nucleic acid (DNA and RNA), as well as protein content, was observed in the detergent-exposed sponge cultures. Sodium dodecylsulphate (SDS), an anionic detergent, and a 1:1 mixture of two commercial laundry detergents were used at concentrations from 10^{-9} g/ml to 10^{-5} g/ml. The detergents were taken up but not metabolized by the sponge. Commercial detergents were only 10 percent as active as SDS, but demonstrated similar effects.

The effect of lead on the 5 aminolevulinate dehydrogenase activity in Mugil capito was studied on 6 specimens exposed to a concentration of 500 ug/l. Results demonstrate a 37% decrease in the ALA-D activity after one week of exposure, 65% decrease after two weeks and stabilisation of the activity during the third and fourth week. Preincubation of blood samples with 10^{-3} M zinc acetate resulted in expected restoring effect on the ALA-D activity.

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R. MUZINIC
Institute for Oceanography and Fisheries
SPLIT
Yugoslavia

Some preliminary observations have been made on the influence of captivity in the sea bream (Sparus auratus) and its behaviour under aquarium conditions. Anaesthesia experiments with benzocaine and quinaldine were started to determine the concentrations appropriate for handling the fish. Some observations on the mortality of juvenile grey mullets (Mugil spp.) in aquaria have also been carried out.

Studies on the sublethal effects of lead on the activity of the 5-aminolevulinate dehydrogenase in adult Scyliorhinus canicula were started. For the in vitro experiments blood of several fish was pooled. A relationship between the enzyme activity and the concentration of the lead acetate was found. In the in vivo experiments the lead acetate was given by intraperitoneal injections. Each concentration was tested in individual fish. The data show some relation between the lead acetate concentration and the enzyme activity.

Development of continuous-flow equipment for long-term toxicity tests with heavy metals has been undertaken.

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T. GAMULIN
The Biological Institute
DUBROVNIK
Yugoslavia

Research is under way on the distribution and bioaccumulation of DDT and the PCB Arochlor 1254 on laboratory cultures of zooplankton. Introduction of these pollutants is through cultured marine phytoplankton. It is hoped that this work will increase the understanding of some of the problems associated with the investigation of accumulation, metabolism and effects of chlorinated hydrocarbons on marine diatoms. These problems include the very low solubility of these compounds in water and their high adsorption affinity with solid phases.

The results of the investigation of the distribution of DDT and Arochlor 1254 in the experimental system following exposure of phytoplankton have been reported. The distribution of these low solubility compounds seems to be complex and unpredictable in this system. This may indicate the importance of carefully controlling the conditions of introduction of the contaminants into the system. Problems with low yields include volatility and adsorption.

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2.5 MED V : Research on the Effects of Pollutants on Marine
Organisms and their Populations: (FAO(GFCM)/UNEP)

R. SEMROUD

Centre de recherches océanographiques et des pêches
ALGER
Algérie

The effects of the untreated sewage (domestic and industrial) of a city of two million inhabitants on the structure and dynamics of biological communities of the Bay of Algiers are being studied. The relatively unpolluted Bay of Bou Ismail, which is more open and only polluted by a few tourist complexes and agriculture, provides reference values. Emphasis is on the macrobenthos of soft substrate. Species composition, diversity, density, biomass, production potential and dynamics of populations and communities are being determined. Environmental parameters surveyed in conjunction with benthos analysis include sediment granulometry, salinity, temperature, dissolved oxygen and organic content of sediments. Pollutants are being monitored in an attempt to correlate their levels with community changes (responses). Benthos surveys and mapping began in April 1976 using a small dredge; with the acquisition of an orangepeel bucket sampler, quantitative sampling, essential to begin population dynamics studies, began in January 1977. Since that time, 4 samples have been collected from each of the 7 stations monthly. The bucket sampler has not been effective for sandy substrate and at these stations comparative studies on the relative effectiveness of an aspirator are now under way.

The water of the Bay is often turbid and its odour can be detected up to 2 km from the coast, especially in the SE portion of the Bay. Audouinia tentaculata and the molluscs Cardium and Venus serve as good indicators of pollution level. Comparative growth studies are being performed with populations of these molluscs from various project stations.

Statistical treatment of the data includes calculation of abundance, dominance, density and biomass, as well as some indices and coefficients of diversity and affinity. Descriptions of growth, mortality and production utilize the equation of Van Bertalanffy, Ford-Walford method and the diagram of Allen. Samples relevant to population dynamics have not been completely processed.

Cartography of the Bay of Algiers, based on 80 stations between 5 and 100 m, provides the first opportunity for the evaluation of pollution effects. In mid-bay, at depths from 0-20 m, the substrate is fine sand the dominant species are Owenia fusiformis, Cardium tuberculatum, Spisula

subtruncata and Mactra mactra. At the same depth, closer to the city, a muddy-sand substrate contains Owenia fusiformis, Audouinia tentaculata, Diopatra neapolitana and Aonides oxycephala. In the SE portion of the Bay (across the city) in the sandy mud between the rocks on the bottom at 10-15 m Owenia fusiformis, Amphiura chiajei, Nephtys hystericis and Sternaspis scutata predominate. More mud is found as the distant Cape Matifou, on the far side of the Bay, is approached. Detritus is common in the depths around the Cape. Northwest of the Port, at depths of 0-20 m, the substrate is coarse sand. From 20-50 m, it is progressively more muddy. At some stations at 50 m, where the mud is reduced, Audouinia tentaculata becomes more abundant. Most of the deeper areas are pure mud and characterized by rather homogeneous communities of Sternaspis scutata, Alpheus glaber, Gonoplax rhomboides and Nephtys hystericis.

The influence of pollution in the littoral zone, where hydrodynamics reduce the pollutants, was not clearly apparent. Influence at depth and in protected coastal areas was more clear; sedimentation could be correlated with Audouinia tentaculata abundance. In the deeper areas of the Bay communities were represented by a relatively small number of species (Sternaspis scutata being dominant in the mud).

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A. DEMETROPOULOS
Fisheries Department
Ministry of Agriculture and Natural Resources
NICOSIA
Cyprus

An effort is being made to define the effects of pollution on the ecology of Limassol Bay, especially the benthic communities. Limassol Bay contains two commercial ports, a town of 65,000 and light industry - a slaughterhouse and 7 beverage factories (soft drink, wine, spirit and brewery). All wastes are discharged untreated into the bay. Unpolluted Episkopi Bay will be studied for reference values.

Seasonal samples for oceanographic, pollutant, effluent, fishes and sediment and benthos will be collected. Oceanographic values being collected are temperature, dissolved oxygen, salinity, transparency, suspended solids, BOD, nitrites, nitrates, phosphates, and sediment organic content and granulometry. The data for February/March has been processed, but not analysed. Effluent monitoring has also been carried out and values vary greatly with time. Measurements include BOD, pH, conductivity, suspended solids, Cd, Cu, Pb, Zn, Hg, Fe, cyanides and chlorides. Results of the November/December 1976 benthic samples are not available in processed form. Problems have been encountered with diversity and low density of benthos. Biomass calculations are being made.

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M. L. EL-HEHYAWI
Institute of Oceanography and Fisheries
Mediterranean Branch
ALEXANDRIA
Egypt

The agreement has been signed. The collection of samples covers five stations north of Alexandria and in Abu-Gir bay. The selected localities represent different pollution conditions. The analyses of salinity, nutrients, COD, BOD and other parameters was performed. The determination of abundance of 10 zooplankton components including Euterpina, copepods, gastropods, echinoderm larvae and eggs and larvae of fish in the surface water layer show that some species were abundant in localities significant distances from sources of pollution. Waters adjacent to these sources had low numbers or absence of certain species. In early spring 1977 the abundance of copepods in the localities influenced by petroleum hydrocarbons were one third of that in the localities influenced by the paper mill, while the fish eggs were about five times higher. In both cases the abundance was much lower than in the unpolluted localities.

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D. BELLAN-SANTINI
Station marine d'Endoume et Centre d'Océanographie
MARSEILLE
France

Benthic studies

Studies of benthic communities and ecosystems are not only time-consuming in the collection and processing of samples and data, but are also dependent on the passage of time for both temporal and spatial interpretations of the data. Although the studies of this laboratory span a 17-year period, data from areas under investigation in pilot project MED V were begun in late 1975 and early 1976, and interpretable results are not anticipated before 1978.

(i) Hard substrate

Hard substrate analysis is under way in the polluted (domestic, thermal and industrial) Gulf of Fos with comparison of different types of contamination at two depths - less than 3 m and 3-10 m. Analysis of hard substrate benthos from 0-3 m has resulted in a thesis the conclusions of which follow.

This habitat type in the Gulf of Fos can be divided into communities associated with degrees of pollution and different dominant organisms. Cystoseira stricta is dominant in relatively pure water; Mytilus galloprovincialis and Corallina mediterranea are common in moderately polluted areas, and Ulva rigida in heavily polluted waters.

In the Cystoseira stricta community a gradation exists in species composition between the Cape Couronne station and Point Daunelle inside the Gulf. The absence of pure water species (Hyale schmidti, Stenothoe spinimana, Caprella liparotensis and Ischironome lacazei) contributes to a decrease in species diversity at Point Daunelle, where the most pollution-tolerant Jassa falcata and Dynamene edwardsi are found. There is also a decrease in concretion of the substrate. The disappearance of some species (such as Hyale camptonyx and Miniacina miniacea, which contribute to the character of the substrate) at Cape Couronne accompanies increasing pollution at this station. Hyale schmidti, Caprella liparotensis and Jassa falcata are crustaceans that appear to increase with initial stages of pollution. It would be of interest to verify this with pilot project MED II and MED III results.

The Mytilus galloprovincialis and Corallina mediterranea communities, while quantitatively similar with regard to number of species collected, differ in relative importance of molluscs, polychaetes and crustaceans. In the Corallina mediterranea community crustaceans (Leptochelia dubia) are increasing while molluscs and polychaetes have decreased in comparison to the Mytilus galloprovincialis community. Pollution appears less important in that portion of the habitat occupied by the Corallina mediterranea community. In the moderately polluted environment species equilibrium appears to be easily shifted to better adapted species by the presence of a new source of pollution. This phenomenon is verified by the following example. The Corallina mediterranea community exposed to the thermal effluent of the central E.D.F. of Martigues Ponteau has experienced a decrease in number of species present, while the population of Leptochelia dubia and Platynereis dumerilii have increased. Under the influence of this thermal effluent the normal annual population cycles (characterized by increase in June) of Mytilus galloprovincialis and Corallina mediterranea are lost. The more heavily polluted waters, containing the Ulva rigida community, are characterized by both qualitative and quantitative impoverishment of the photophilic algal components. Composition is limited to those most tolerant of pollution and may show pronounced seasonal fluctuations (i.e. Platynereis dumerilii increase in May).

Generally, species distribution in the Gulf of Fos seems correlated with the degree of pollution, with a marked decrease in the number of species with the progression from uncontaminated to polluted waters. Crustaceans are most numerous in unpolluted waters (71% of the community at Cape Couronne and 56% at Point Daunelle) and are the first species to decrease with pollution. Molluscs become more common in moderately polluted areas (37% and 54%). As pollution increases molluscs also decrease and the polychaetes become most numerous (85%). The calculation of Margalef diversity indices demonstrates an inverse relationship between species diversity and pollution. The Sander's degree of affinity supports the relationship between polluted stations which result from increases in the more pollution-tolerant Leptochelia dubia, Mytilus galloprovincialis and Platynereis dumerilii.

The analysis of hard substrate benthos at depths greater than 3 m was begun in 1977. Early results seem to show the increased importance of algal populations in polluted areas with decreases in animal populations.

(ii) Semi-hard substrate

Sessile and motile benthos in Posidonia communities of semi-hard substrate are being compared in unpolluted and polluted areas. These investigations began in autumn 1976; however, the first results have not yet been evaluated.

(iii) Soft substrate

Soft substrates are under study in areas influenced by:

- (a) the introduction of fresh water and desalinization (commercial and natural), together with domestic and industrial pollution in the Berre Lagoon;
- (b) urban sewage (primarily domestic) - spatial and temporal study in the anchorage of Marseille and a part of Cortiou Bay (Cassis), which includes three lines of investigation:
 - (i) the impact of the waste water of one million people,
 - (ii) the impact of developed beaches, and
 - (iii) the influence of sedimentation.
- (c) the colonization of mixed substrate deposits resulting from dredge activities.

Monthly samples from Berre Lagoon where soft substrate benthos is influenced by the introduction of fresh water are being classified and an evaluation of the results will not be available before 1978. Pre-project results in this area have been published by Bellan and Stora (1976 and 1976a).

Sludge and sediment deposits are filling the southern portion of the Bay of Marseille. The effects of this deposition on community structure is under study in two areas of increasing pollution - the Archipelago of Riou and the Bay of Cassis. Classification and evaluation are well under way. Classification of samples in areas receiving dredge spoils is also under way.

(iv) Conclusions

Final conclusions will be based on the entire structure of this project, as well as drawing on the accumulated background of 17 years of benthic study in the area. It is hoped that this background, together with

parallel studies in relatively unpolluted environments will allow differentiation of natural variation with time from the effects of pollution. Simultaneous to the field collections, laboratory toxicological experiments and in situ field observations of experimental organisms will be carried out in an effort to increase the knowledge available for the formulation of conclusions on the effects of municipal and industrial pollution on benthic communities.

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France

Neritic zone studies

The neritic zone SE of Marseille receives from this urban area untreated domestic and industrial waste waters which form an extensive sheet of polluted water moving to the east or west (back towards the Bay of Marseille), depending on prevailing current and winds. Both of these areas are used extensively by summer bathers and their condition is important to the condition of local fisheries as well. During the first phase of the study surface water samples will be taken at 40 stations. A large number of measurements will be done in situ, including chemical analyses, determination and enumeration of plankton composition and bacterial counts. Cartography of these measurements will graphically present the relationships of pollutants (as well as some of their physical, chemical and biological effects), and the evolution of the pollutant dilution in space. In addition, the levels of nutrient salts will be useful in the evaluation of the trophic resources of the area. The structure of planktonic communities, their diversity and relationships with pollutants will contribute to an understanding of the local effects of pollution and eutrophication.

The first samples and measurements will be completed in April/May 1977. A follow-up study will be conducted during 10 days in September/October 1977, the first 5-6 days of which will be devoted to obtaining a better understanding of an ecosystem structure. Initial phases of the investigation will provide data on physical and chemical parameters (salinity, temperature, turbidity, seston, dissolved oxygen, nutritive elements -- P- PO_4 , N- NO_3 , N- NO_2 , N- NH_4 and Si- SiO_2 --), biological parameters (bacterial counts, phytoplankton diversity indices, chlorophyll a and phaeophytin, adenylates -- ATP, ADP, AMP --, organic carbon and zooplankton) and pollutants (aromatic and total hydrocarbons, phenols, detergents, heavy metals -- cadmium, zinc, copper and lead --).

Statistical methods will be used to define the specific structure (spatial and temporal associations and interactions with pollutants) of the planktonic community.

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Greece

Sampling of macrozoobenthos at two areas of the north Saronikos Gulf was completed in March 1977. One area is the site of the sewage outfall of a large metropolitan area; the other is the probable site of a future outfall. Parameters measured were diversity, biomass, density, abundance, as well as grain size, organic carbon content and hydrogen sulfide concentration of the sediment. Temperature, salinity, nutrients, and dissolved oxygen were also taken into account.

Capitella capitata were the most abundant organisms in the area of the outfall sludge field. Few or no other species were present. The clean zone was characteristic of an Eastern Mediterranean oligotrophic habitat. The survey of this clean site provides background data for studies of succession after the outfall operation begins.

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C. E. VAMVAKAS
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Six sites have been selected for the study of fouling communities. One in the Pireus harbour and five in the area near Lavrion harbour, southeast of the Attica peninsula, in depth from 1 to 10 m. Heated water from an energy plant, mining dust and phosphorus from a match factory are influencing the sites near Lavrion harbour.

The biofouling panels are made of polyvinyl chloride or of asbestos and wood. They will normally be changed by scuba divers every month, and during summertime every fortnight. There is another series of panels for longer periods. A parallel study of plankton and soft bottom benthic communities will be undertaken in the same area (Lavrion).

Environmental parameters measured each month are: temperature, salinity, dissolved oxygen, transparency, phosphates, nitrites, nitrates, ammonia, silicates, pH, suspended matter.

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1 July 1977

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A. KOCATAS
Institute of Hydrobiology
Ege University
IZMIR
Turkey

The agreement was recently signed. A map of benthic communities in Izmir Gulf was established in 1972. There has been continuing industrialization with resulting environmental pressure being added to already existing pollution. Industrial and urban wastes are discharged in the gulf without prior treatment.

Main research activities are: (i) physico-chemical factors will be considered, as well as nutrients; (ii) an annual study programme will be undertaken in order to investigate the dynamics of benthic communities on soft and hard substrates. Qualitative and quantitative sampling was completed in early May 1977. Collected material is now being sorted.

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A. BENOVIC
The Biological Institute
DUBROVNIK
Yugoslavia

The agreement has been signed recently and the work has started. Results on zooplankton studies as a baseline for the pilot project are completed. Between 1973 and 1976 several cruises covering the whole Adriatic Sea were performed. The last four years a great number of samples of micro-zooplankton has been collected. The main group studied is the tintinnides group.

The biomass of the zooplankton show the highest values in the Northern Adriatic and along the Italian coast, while a decrease along the Yugoslav coast from north to south is obvious. The qualitative composition of zooplankton show that copepods are the most important group in winter while cladocerans show larger amounts in summer. Larvae and other groups are of importance only locally.

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J. STIRN
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PORTOROZ
Yugoslavia

The disruptive effects of municipal sewage on a sea grass (Cymodocea nodosa and Zosterella noltii) community are being studied in a controlled environmental experiment. In the Lagoon of Strunjan (Gulf of Trieste) two experimental lagoons have been constructed (each 7 x 7 m) containing an undisturbed sea grass community. The city of Piran transports sewage to a 5m³ settling tank in the vicinity; this tank allows primary treatment of the sewage and a pipeline can deliver controlled amounts of its effluent to the experimental lagoon. This lagoon receives 400 l of this primary-treated sewage once a day during the incoming tide; an amount based on hydraulic and tracer observations and calculated to correspond to the load the Gulf of Koper, a shallow bay, would receive under average conditions, from a city of 50,000 inhabitants. The second lagoon serves as a control and receives no effluent. The experiment will run through two annual cycles, September 1976 until September 1978.

In both experimental and control lagoons, as well as a reference station in the open coastal sea, a large number of environmental measurements will be regularly performed. On a continuous or daily basis, meteorological, pluviometric, tidal and salinity values will be recorded. Bi-monthly, 24-hour cycle observations and measurements of the following will occur: (1) hydraulic measurements of exchange rates; (2) spectral and quantum recording of solar activity; (3) thermics and evaporation; (4) salinity-density tidal cycling; (5) pH and Eh of water and sediment; (6) alkalinity, total CO₂, Ca, Mg; (7) oxygen, BOD, H₂S; (8) particulate C, P, N, total seston; (9) organic dissolved C, P, N; (10) inorganic NH₃, NO₂, NO₃, PO₄, SiO₂; (11) density of phytoplankton by groups; (12) chlorophyll a, b, c and metabolites; (13) density and biomass of zooplankton by groups; (14) total bacterial counts with fractionation into physiological groups and identification of Escherichia coli, Streptococcus faecalis, Clostridium spp., Salmonella spp.; (15) sampling of water, sediments and dominant biota for further analyses of pesticides, PCB, heavy metals, detergents and phenols.

The following ecological phenomena are under continuous study by the pilot project research team:

- (a) Succession, standing crop and productivity at the following community levels (analysis on the species level for dominant or characteristic community members): benthic algae and sea grasses, phytoplankton and tychoplagic diatoms, zooplankton, macrobenthic infauna, meiofauna.

- (b) Recruitment of benthic macrofauna
- (c) Modifications of granulometric, mineralogical and chemical composition of sediments
- (d) Basic microbiological processes, particularly nitrogen cycling
- (e) Modifications of fouling processes
- (f) Modifications of community structure and diversity.

Environmental measurements show a number of important modifications of the ecosystem within the experimental lagoon. Effects resemble the "classical symptoms" of accelerated eutrophication, especially near the bottom, and include increased CO₂, decreased dissolved oxygen, negative Eh, presence of H₂S, increased turbidity and seston. Some parameters normally associated with eutrophication were surprisingly of much less significance than expected; these included nutrient levels, DOC, POC, BOD, total bacterial counts, faecal coliforms and phytoplankton standing crop. The most remarkable observation has been the absence of any significant phytoplankton or tychopelagic bloom in spite of obvious over-fertilization by the discharged sewage. Macronutrients have been readily utilized by the massive development of benthic green algae (Ulva rigida, Enteromorpha compressa and others). The explosive growth of these algae took place during the second month of the experiment effectively extirpating all sea grass vegetation, with its related epiflora and fauna, from the experimentally polluted lagoon. The remaining community, of a quite different type, has been described from similar cases of pollution of natural (non-experimental) communities.

Although observations have been made within infaunal assemblages, fouling community and other ecosystem components, it is too early to provide further interpretative data. A more detailed progress report will be available by the end of 1977.

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D. ZAVODNIK
Centre for Marine Research
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ROVINJ
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Phytoplankton/Offshore Waters

Offshore waters west of the Istrian peninsula are influenced by the inflow of the Po river into the Northwest Adriatic Sea, as well as effluents from the west Istrian coast and the Rijeka Bay. This area is the most shallow part of the Adriatic with a sandy detritic or detritus ooze bottom. The inflow of fresh water from the Italian rivers produce a semiestuarine flowing basin environment with inflowing

polluted waters transported to the South Adriatic Sea. Four sampling stations have been established along a transect between Rovinj and the estuary of the Po river. Some hydrological values from past work suggest that the Istrian coast may contribute most of the pollution by metals while the heaviest organic pollution may be contributed by the Italian rivers of the Northwest Adriatic. Investigation of offshore phytoplankton may help to define the relative effects of these sources of pollution.

Hydrographic data, taxonomic analyses of phytoplankton, as well as Chlorophyll a and photosynthetic activity of phytoplankton from May and July 1976 offshore cruises were presented. Chlorophyll and photosynthetic values indicate greatest biomass nearest the Po estuary which also correlates with relative nutrient contribution.

Benthic/coastal communities

Baseline studies of benthic coastal marine communities in the Northern Adriatic with regard to population dynamics and productivity have been under way since 1960. The present project compares communities at Rijeka exposed to industrial effluents from the city and near an oil terminal with stations near Rovinj exposed to mixed municipal (domestic and industrial) effluent in the Bay of Valdibora and the relatively clean Faborsa Bay. This coastal area of West Istria consists of limestone rocks, with sand at 2-10 m and mud at greater depths. Pilot project field work began in late spring and early summer 1976 and benthic sampling has been reported in Rijeka Bay (November 1976). Biomass and photosynthetic activity values have been determined for the eel grass (Cymodocea nodosa) communities at Rijeka and Rovinj. The communities of rocky littoral and coastal terrigenous ooze are also being evaluated.

The composition of the rocky littoral communities near Rovinj (West Istrian coast) and in Rijeka Bay was presented. The dynamics of these communities will be monitored twice a year (summer and winter) at Rijeka and monthly at one of the Rovinj stations. This decision is based on the "identical" composition of the communities, even though both qualitative (i.e. Chthamalus depressus, Littorina neritoides, Rivularia atra, R. mesentherica, Patella lusitanica, Hildenbrandtia prototypus, Cladophora spp. and Ceramium spp.) and quantitative (i.e. Catenella apuntia, Patella coerulea, Lithothamnion Lenormandi and Fucus virsoides) differences appear to exist. Analysis of the sand community was not made; however, in situ measurements of eel grass (Cymodocea nodosa) photosynthetic activity were compared in the investigation of possible pollution effects on the community. The biomass of eel grass at Rijeka is 80-100 g/m². Photosynthetic activity in terms of net production in July and November was respectively 0.25 and 0.10 m/O₂/g/h (respectively, temperatures were 22° and 14.5°C and illumination 64 000 and 20 500 luxes). The comparative values at station RO-1 (Rovinj unpolluted) in the winter were 0.02 ml O₂/g/h, 11.2°C, and 10 000

luxes. The eel grass was unavailable for comparison at the polluted RO-2 station (Rovinj), as it had completely disappeared. Observations of photosynthetic activity will be continued at monthly intervals during 1977 at Rovinj and hopefully seasonally at Rijeka.

Preliminary review of the composition of terrigenous ooze community samples from the Rijeka Bay - both inshore and offshore - was presented. All polychaetes have not yet been identified. The high biomass value (51.47 g wet weight/0.2m²) at station 7 is attributed to the presence of large specimens of the echinoid Brissopsis lyrifera.

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T. PUCHER-PETKOVIC
Institute of Oceanography and Fisheries
SPLIT
Yugoslavia

A cross section of the central Adriatic is under study. Sea dynamics, hydrological factors, primary production, phytoplankton, zooplankton, ichthyoplankton and planktonic bacteria are being recorded. This work has been under way for twenty years. It has therefore been possible to understand the relationship between coastal and offshore ecosystems. The existence in coastal waters of some changes in primary production, community patterns, biomass as well as seasonal fluctuations has been demonstrated.

The following preliminary data pertaining to this programme were collected in March 1977:

- (1) Environmental factors: (i) background hydrographic parameters, temperature, salinity, density, transparency, alkalinity, dissolved oxygen, oxygen saturation; (2) eutrophication indicators: CO₂, phosphates, nitrates, nitrites, ammonia, silicates; (iii) heavy metals: Zn, Cd, Pb, Cu.
- (2) Plankton: (i) phytoplankton: primary production (C¹⁴), numerical abundance, biomass (pigments), structure; (ii) zooplankton: biomass, qualitative and quantitative structure (main groups), especially copepods; (iii) bacteria: biomass of heterotrophic bacteria.
- (3) Benthos: (i) phyto benthos: structure, abundance, biomass; (ii) zoobenthos: structure, abundance, biomass; (iii) ichthyobenthos, structure, abundance, biomass.
- (4) Nekton: (i) plankton stages of small pelagic fish: abundance, distribution; (ii) adult pelagic fish: abundance, population dynamics, distribution.

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2.6 MED VI : Problems of Coastal Transport of Pollutants
(IOC/UNEP)

A. DEMETROPOULOS

Fisheries Department

Ministry of Agriculture and Natural Resources

NICOSIA

Cyprus

Work on this project so far has been limited to two series of stations in the Limassol Bay extending from the shore-line to the 200-metre line. Each series consist of 10 stations. Measurements are made at standard depths and cover basic oceanographic parameters such as salinity, temperature, O_2 , nutrients transparency, suspended solids, sediments and meteorological data. Current measurements so far have been restricted to some drogue observations.

Samples have been taken quarterly starting in November 1976. The monitoring of effluents also started at the same time.

Future work is aimed at increasing the number of stations to 5 and also covering a nearby area polluted by the effluents from the processing of copper ore.

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M. A. GERGES

Institute of Oceanography and Fisheries

Mediterranean Branch

ALEXANDRIA

Egypt

Hydrographic investigations have been carried out along the Egyptian Mediterranean coast from Alexandria to Rosetta where several sources of pollution exist.

Studies have included seasonal observation of temperature, salinity and dissolved oxygen. Other complementary data have been collected and the meteorological conditions have been observed.

A clear picture on the near-coast transport has been revealed from the results of Driftcard experiments using drifters, carried out monthly from May 1976 to March 1977.

Seasonal hydrographic cruises and subsurface current measurement, in addition to continued surface-current studies using drifters, are planned for the next phase of MED VI.

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France

During the month of July 1977 an oceanographic cruise in the Tyrrhenian Sea will comprise hydrographical measurements at 12 stations. The relevant parameters to be studied are: Salinity, temperature, oxygen, nitrates, nitrites, phosphates, silicons, pH and transparency. A bathythermograph will be used and the samples will be taken at depths of 10, 100, 400, 800 and 1500 m.

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VILLEFRANCHE-SUR-MER
France

Studies pertinent to the hydrography of the region were conducted at a network of stations from June 1974 to June 1975; additional information was obtained in a second year ending in June 1976. Because of manpower shortages the data from these studies have not been fully processed, but have been inspected visually to identify permanent features, geographic variability and cycles. The following tentative conclusions seem to be indicated:

- (1) The annual cycle of temperature is clear. In winter the same values were found at all points.

The parameters Si, nutrients, detergents, bacteria and chlorophyll have apparent annual cycles which are less regular than the temperature cycle.

- (2) Geographic variations are most pronounced in the cases of nutrient salts, C.O.D., detergents, bacteria and chlorophyll.
- (3) There are significant vertical gradients in the case of temperature, salinity, nitrates, phosphates and silicons material.
- (4) Normal to the coast there are significant gradients in C.O.D. nutrient salts, detergents, bacteria and chlorophyll.

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E. PAPAGEORGIU

The Institute of Oceanographic and Fisheries Research
ATHENS
Greece

Current measurements in Saronikos Gulf started in 1975. Aanderaa current meters were used, with extra sensors to record temperature, conductivity and depth.

Hourly mean values, graphs, histograms and progressive vector diagrams have been prepared. The flow pattern of surface and bottom currents are similar, but different from the wind pattern. The currents flow towards the northwest. Progressive vector diagrams of the winds indicate a northward direction in the beginning, changing later to an eastward direction.

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A. HECHT

Israel Oceanographic and Limnological Research Ltd.
HAIFA
Israel

Continuous current, temperature and conductivity measurements have been carried out at two stations since the beginning of August 1976. A total of approximately 100.000 measurements have been taken. A preliminary analysis of the data has been carried out, consisting of testing the validity of the data, in so far as possible editing the data and storing them for further analysis. Computer programmes are being prepared for the evaluation of the tidal component of the currents with a view both to estimating their magnitude and to preparing a predictive model. Lack of sufficient tidal and meteorological data preclude a detailed analysis of the residuals, although a spectral analysis of these residuals is envisaged.

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R. PASSINO

Institute of Water Research - CNR
ROME
Italy

In order to understand the hydrodynamic phenomena of coastal-zone pollution due to the discharge of a river into the sea, a study of the discharge of the Tiber was started in September 1976.

An intensive programme of measurements has been carried out:

- (a) In the river: in the two branches of the Tiber to determine their relative discharge and to estimate the intrusion of salt water and the factors that govern it (measurements of salinity, temperature, velocity, dissolved oxygen).
- (b) At sea: in the zone where the two plumes of fresh water occur, currents have been measured along the coast with recording current meters and with drogues. In addition, observations of surface salinity, temperature, chlorophyll and dissolved oxygen have been taken, together with information on the tide, wind and sea state.

A study has been made in the same zone of the possibility of measuring turbidity by means of satellite surveys using radiation in the visible part of the spectrum.

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I. DAGNINO
Group for Oceanographic Research - Genova
Institute of Hydrobiology and Fish Culture
University of Genova
GENOVA
Italy

The oceanographic research of relevance to the pilot project carried out in the coastal waters of the Ligurian Sea has been dealing mainly with:

- the thermohaline properties of surface waters in relation to atmospheric pressure and wind;
- temperature and salinity profiles to study advection and fluctuations superimposed on trends resulting from advection;
- correlation among surface currents, and atmospheric pressure and baric gradient;
- the characteristics of coastal surface currents by optical tracking of drifters, and by release of drift cards;
- the study of surface waves and the testing of a new method of recording wave motion;
- transparency of coastal waters, by means of a new turbidity meter employing solid-state components;

- impact of effluents from large urban concentrations and industrial centres by the study of physical, chemical and biological parameters.

Within the framework of the pilot project the Group will carry out current measurements of hydrological work along transects normal to the Ligurian coast, and is participating in the DRIFTEX operation in the Ligurian Sea.

During November 1973 two series of profiles, all together 110 profiles from 0-750m were taken at a station in the Ligurian Sea. The results showed the importance of wind direction and velocity for sub-surface transport. Internal waves were studied and periods of 3.8 and 13 h were found.

Drift card experiments were made in May and September 1973. They confirmed the cyclonic patten of the littoral current. Results indicated that floating pollutants at a distance of 4NM from the shore at the time of the study could be scattered along 75 NM of the coast. Certain stretches of the coast are more likely to receive such pollutants than others.

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E. ACCERBONI
Observatory for Experimental Geophysics
TRIESTE
Italy

From December 1971 to May 1977 OGS has been developing special programmes on the dynamics of pollution under the sponsorship of the Italian CNR. The last programme started in April 1977 and will probably be included in MED VI.

The following work is undertaken within the frame of MED VI:

- (1) Measurements of currents by means of self-recording currentmeters along the section Ancona - Zadar and in the Gulf of Trieste to collect time-series observations of flux at this open boundary.
- (2) Vertical profiling of temperature, salinity, dissolved oxygen, nutrients, ammonia, alkalinity, borates and some heavy metals along the section Ancona - Zadar and on a network of stations located in the Northern Adriatic.

This data collection was planned in order to have information on fundamental parameters such as circulation, water mass characteristics and chemical properties to assess inputs to the system, and to identify functions to be used in the calibration of a hydrodynamical model.

The main circulation found in the Northern Adriatic Sea is cyclonic because of the prevailing thermohaline conditions. Tidal currents and wind-driven currents are also important. The tidal currents are well known after development of a numerical hydrodynamical model; important components are longitudinal (24 h) and are transversal (12 h), rotating around the amphidromic point 40 NM Southeast of Ancona.

Among the more important wind effects are complete mixing in the Northern Adriatic and large-scale transport in SW direction caused by the Bora Wind.

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D. A. HAVARD
The University of Malta
MSIDA
Malta

The regions of primary interest for study are the East and Southeast coast of Malta from St. Georges Shoal to Benghisa point (including Marsaxlokk bay) and the Comino channels including the south coast of Gozo.

Data on the bathymetry of the area are very detailed; also good continuous meteorological data are available. The seasonal variation of the thermocline is well documented.

As the Maltese Islands are well separated from other land masses, the coastal current system is influenced by the flow of surface water from the Western to the Eastern Basin. This permanent flow which has a value of about 0.2 ms⁻¹ and sets to the S.E. along the Maltese coast, has been confirmed by driftcards results and flowmeter readings in calm weather conditions. It is expected that the presence of islands in this current flow will generate eddies to the South East of the islands. The coastal current system will be more strongly influenced by the changing meteorological conditions than other coastal areas of the Mediterranean, and there is evidence that changes of the order of 0.5 ms⁻¹ do occur at times.

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A. VATRICAN
Centre Scientifique de Monaco
MONTE CARLO
Principauté de Monaco

The problem of the coastal transport of pollutants has been studied as part of various other investigations, and has involved specifically the use of coloured tracers (rhodamine) and surface tracers (polyurethane).

In 1972 a study was made of the hydrologic conditions in a zone some 800 m from the coast on the 90 m isobath, in a project concerning emissions into the sea along the coast of Monaco. This study, using a Plessey 21 recording current meter yielded more than 26,000 data points in a period of 14 months. These data were coded and transmitted to a receiver ashore as they were recorded.

Since 1975 a national programme of surveillance has been developed, including the collection of physical oceanographic data. These now have to be selected, processed and interpreted.

In connection with the DRIFTEX projects, the Centre, together with the Groups at Villefranche and Genova, released driftcards in April during the preliminary exercise in the Ligurian Sea. The returns are now being analysed with the assistance of IOC.

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A. CRUZADO
Instituto de Investigaciones Pesqueras
BARCELONA
Spain

Basic studies performed within the framework of the pilot project are:

- time series at three hydrographic stations located on a section to the SE of the port of Barcelona from May 1975 to November 1976;
- studies on the fresh water plume formed by the Rio Besos. These studies, initiated recently, have mainly been dealing with sampling of sediments in the neighbourhood of the river outlet;
- theoretical studies on the hydrodynamical processes driving coastal circulation:
 - (a) Wind-driven coastal circulation
 - (b) Estimation of currents from the density field.

Complementary studies: These studies, although of direct relevance to the project, have been carried on independently:

- two cruises, covering the whole Catalanian Sea, in October 1976 and March 1977;
- theoretical studies of the diffusion processes as applied to two characteristic phenomena:
 - (a) evolution of the thermocline
 - (b) structure of a polluted plume.

Preliminary results

- the area of the present studies, being rather open to the general circulation pattern in the Catalonian Sea, is flushed by the N to S general current system;
- a stable surface layer is formed by the combined effect of fresh water discharge, especially the northern coast, and the development of a thermocline;
- the predominant wind tends to spread the surface layer towards the E; the pollutants enter a small scale eddy system and recirculate in this direction;
- the frequency of wind variation, both in speed and direction, make the small scale coastal circulation unpredictable. Therefore, small scale current measurements have to be compared with local winds, while the large scale general transport should be associated with the density structure of the whole Catalonian Sea.

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N. CANO
Laboratorio Oceanografico de Malaga
Instituto Espanol de Oceanografia
MALAGA
Spain

In the field of work related to MED VI, studies are being made of the geostrophic currents in the whole of Alboran Sea from the Strait of Gibraltar to the meridian through Oran - Capo de Palos.

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U. UNLUATA
Marine Science Department
Middle East Technical University
ANKARA/Mersin
Turkey

The Mersin field station is presently operational, and the research related to MED VI is planned to start towards the end of June 1977.

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L. JEFTIC
Centre for Marine Research
"Rudjer Boskovic" Institute
ROVINJ/ZAGREB
Yugoslavia

During cruises in Rijeka Bay in June, August, September and December 1976 and March 1977, samples and observations were taken at 22 stations.

The following basic parameters were measured: temperature, salinity, dissolved oxygen, surface currents (driftcards and drifters), subsurface currents (recording current-meters) and meteorological variables.

Temperature and salinity were measured at all stations at standard oceanographic depths. Currents were measured at either two or three depths with self-recording current-meters for a period of at least 24 hours and at most 72 hours (recording every five minutes).

The following complementary parameters were also measured: pH, alkalinity, nitrates, nitrites, ammonia, phosphates, silicates, zinc, cadmium, lead, copper, surface-active substances, dissolved hydrocarbons, phenols, detergents, phytoplankton, zooplankton, benthic communities, total coliforms, faecal coliforms, heterotrophs, etc.

The Centre plans to continue with the above programme on a seasonal basis.

The following conclusions were drawn:

- (1) Exchange of water masses from the Rijeka Bay is mainly through Vela Vrata and Srednja Vrata; the exchange through Tihi Kanal is relatively unimportant.
- (2) Absolute values of currents in Tihi Kanal, Vela Vrata and Srednja Vrata are greater by a factor of 5 than in the rest of the Rijeka Bay. Maximum average current is about 1 knot, and maximum recorded current velocity was 1.6 knots.
- (3) There is no direct correlation between currents in Tihi Kanal and in other channels.
- (4) In the northwestern part of the Bay there is a rather complex movement of water masses, primarily due to the influence of fresh water springs.
- (5) The intensity of currents decreases from the surface to the bottom by a factor of 5.

- (6) There is a transport of water between Vela Vrata and Srednja Vrata. This is proved by driftcards and by surface and subsurface current measurements.
- (7) The bottom layer is rather stagnant; water masses of higher salinity accumulate in this layer.

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M. ZORE-ARMANDA

Institute for Oceanography and Fisheries

SPLIT

Yugoslavia

This research centre is engaged in studies in the following region of the Eastern Adriatic coast: Zadar, Sibenik, Split and Dubrovnik. Earlier investigations have been made in all these areas, and particularly for the Zadar region there is a large quantity of data. A long time-series exists for the Split region.

At present, there are four stations in each region where data have been collected seasonally, including current measurements, turbidity measurements and dye diffusion experiments.

All the stations are placed in areas not deeper than 60 m and less than 2 miles offshore. In the warm period, starting from the middle of April, vertical stratification is well developed. A thermocline occurs at depths between 10 and 20 metres, but often it cannot be clearly determined since there is a temperature gradient from surface to bottom. In the cold period, from October onwards, vertical mixing is strong, and most often no layers can be detected. Summer surface temperatures vary from 22 to 26°C and salinity from 33 to 37.8‰. Winter surface temperatures range between 11 and 14°C. Salinity is highest in October, and lowest in May. Annual fluctuations are rather high.

Current observations indicate the presence of essentially two layers. In the warm period the thermocline separates the surface layer from the bottom layer. This layer shows some specific dynamic properties. In some places, such as Dubrovnik, the bottom layer begins at a considerable depth, and in others (Kastela Bay near Split) it begins at no more than 10 metres depth.

The surface layer is, in the first place, characterised by the predominance of a current in the NW direction. This is the direction of the current entering the Adriatic and circulating along its eastern coast. Western and northern directions also occur frequently. The W direction seems to represent the offshore current connected with the bora (NE wind).

The compensatory currents of the bottom layer flow mostly towards the SE, E and NE; the last two are the shoreward directions. Therefore, two types of circulation occur in the coastal area: one correspondent to the open sea circulation (surface NW and bottom SE direction), and the other occurring between the coastal area and the open sea with offshore flow in the surface layer and shoreward flow in the bottom layer.

The NW direction is predominant in all the seasons. The W direction has the highest frequency in winter, which may indicate its connection with the bora.

Periods of several days are important in the current field. For the time being the character of these oscillations is not clear.

Tidal currents have small velocities. On an average they are 4-5 cm/sec. This is due to the small range of the tides.

Tidal currents are predominantly of a rotating type (current vector perform ellipses). Sometimes they are reversing (e.g. in Zadar channel).

Current velocities in the coastal areas are somewhat lower than those in the open sea. The average speed in the open middle Adriatic is 20 cm/sec.

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2.7 MED VII : Coastal Water Quality Control:
(WHO/UNEP)

T. EDIPIDES (Director)
Laboratory of Hygiene
Medical School
University of Thessaloniki
THESSALONIKI
Greece

For the last ten years, the laboratory has done work on coastal water and shellfish pollution measuring the following parameters:

Coliforms; E. Coli; enterococci; salinity; temperature; turbidity; dissolved oxygen; BOD₅; nitrates; nitrites; heavy metals (Hg, Cd); hydrocarbons; vibrio; salmonella.

The above work is continuing and, in addition, at three stations in the recreational area.

It is planned to extend the work and to include an epidemiological study and studies on viruses in seawater and shellfish.

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J. PAPADAKIS, S. SOTIRACOPOULOU and S. THALASSINOU
Directorate of Public Health
Ministry of Social Services
ATHENS
Greece

A sampling programme around the Attica Peninsula (area of Greater Athens) and the Saronikos Islands has been established. Data for 1975 and 1976 were analysed for faecal coliforms (multiple tube method used).

The following programme is being initiated:

- 1) Monitoring programme covering beach zone and recreational waters.
Frequency of sampling and analysis: as set out in the operational document for MED VII project.

Parameters measured:

- Coastal seawater: temperature, salinity, dissolved solids, turbidity, total coliforms, faecal coliforms (E.coli), faecal streptococci (enterococci);
 - Sediments: organic carbon, chlorophylls, particle size analysis, fungi C. albicans.
- 2) Monitoring programme concerning shellfish covering: water in culture area, sediments and shellfish.

The parameters which will be measured are:

Total coliforms; faecal coliforms; faecal streptococci; and in addition other parameters will be monitored related to epidemiological conditions such as Salmonella and Vibrio (cholerae, NAG, parahaemolyticus).

- 3) Epidemiological-microbiological study of the health risks related to beach and coastal pollution.

A preliminary survey at selected sites to determine water quality indicators with the view of evaluating the feasibility of conducting an epidemiological study in coastal areas of Metropolitan Athens is being implemented.

- 4) A laboratory study of bacterial die-off or disappearance rate in the Saronikos Gulf is being carried out.
- 5) A study of microfauna and periphyton of coastal areas is aimed at assessing the existing situation and the identification of pollution and their possible evaluation.

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H. SHUVAL (Director)
Environmental Health Laboratory
Hadassah Medical School - Hebrew University
JERUSALEM
Israel

The laboratory analysed statistically 14 years data (1963 - 1976) of bacteriological monitoring of the Tel-Aviv bathing waters which handles approximately 10,000 bacteriological test results and the environmental data collected at 17 sampling stations. Coliforms and E. Coli tests are carried out in parallel. The coefficient of correlation between total coliforms and E. Coli is .91. The results of parallel total coliform and E. Coli tests at various beaches also indicate that the guideline currently used in Israel of 2400 coliforms/100 ml is about equivalent to an E. Coli guideline of 1000/100 ml with agreement in 86% of the cases.

Following studies on die-away of coliforms and enteric viruses, new studies to determine the in situ die-away rate of enteric viruses in the sea in the vicinity of the sewage outfall in Tel Aviv are being planned utilizing new sensitive methods for detecting a few viruses in sea water samples of 100-500 litres. Also a study to compare the three standard bacterial tests with enteric virus concentrations at beaches is being planned using these same methods.

An epidemiological study of disease rates among bathers and non-bathers at beaches of varying levels of bacterial pollution in the Tel Aviv area is being planned along the lines recommended by the WHO Expert Consultation on Health Criteria and Epidemiology of Health Risks related to Beach and Coastal Pollution, Athens, 1-4 March 1977.

The laboratory is planning to offer a specialized training course in new techniques for concentrating and detecting viruses in sea water for scientists participating in the MED VII programme. The programme could also include training in methods for detecting microbial aerosols created by sea spray from polluted coastal areas. Training possibilities on an individual basis can also be arranged.

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M. REBHUN (Director)
Environmental Engineering Laboratories
Technion, Israel Institute of Technology
HAIFA
Israel

In the field of marine pollution, the research activities in the Environmental Engineering Laboratories were directed mainly to monitoring sewage outfalls and studying presence, activity and survival of various indicators and pathogenic bacteria (salmonella, Vibrio cholerae) in the marine environment as compared to E. coli bacteriophages and human enteric viruses.

In the MED VII research programme it is proposed to study the fate of bacteria (indicator and pathogenic), E. coli bacteriophages and human enteric viruses in the sea, in the vicinity of two waste water outfalls. One is at the mouth of the Kishon river and the second opposite the Tirat Hacarmel community.

The study will be carried out in five sampling points, two in the Kishon river area, two in the Tirat Hacarmel area and one, the control point, north of the T.H. outfall.

Frequency of sampling will be once a month.

The fate of the following organisms will be studied:

E. coli and bacteriophages; coliform bacteria; faecal streptococci; salmonella; and human enteric viruses.

Since fish living and growing in polluted water may harbour and concentrate bacteria as well as viruses, and therefore constitute a public health hazard, it is proposed to study the recovery of the above-mentioned organisms from various organs of fish living in the vicinity of the outfalls.

It is proposed also to study the recovery of the above-mentioned organisms in the sediments as compared to the water samples taken from the same sampling points.

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Y. YOSHPE-PURER (Director)
The Dr. Felix Public Health Laboratory
Ministry of Health
TEL AVIV
Israel

The Ministry of Health initiated coastal water monitoring in 1950 and established internal guidelines for coastal water quality at 2400 total coliform organisms/100 ml.

The length of the Mediterranean coastline is about 180 km. In 1976 the Ministry of the Interior, on the recommendation of the Ministry of Health, approved 65 public bathing beaches along the Mediterranean; four were closed during the season because of visible signs of pollution and bacterial counts higher than that recommended by the Ministry of Health.

The total number of sea water samples collected during 1976 was 1213 from 47 monitoring stations - 251 during the winter and 462 during the summer (April to September). In addition to total coliform tests on all samples, 900 samples were also tested for faecal coli.

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R. PASSINO

Institute for Water Research - CNR

ROME

Italy

As regards coastal pollution problems the CNR Water Research Institution has initiated an in-depth research programme in the estuarine zone of the river Tiber. The present programme includes physical and chemical as well as micro-biological and biological measurements. Also, eutrophication problems and their effects of coastal water quality are being studied.

For the purpose of project MED VII a pilot zone in front of the mouth of the river Tiber was designated in the course of the first year. About 20 monitoring and sampling sites were established. During the first phase of the problem, surface samples only were taken once or twice a month, but during the coming year, vertical distribution will also be taken into account.

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F. POCCHIARI (Director)

Istituto Superiore di Sanità

Viale Regina Elena 299

ROME

Italy

The zone chosen for the study concerning MED VII Project is the sandy municipal beach of Castel Porziano (about 2 km long). This is located on the Tyrrhenian Sea between the Rome and Torvaianica beaches. The beach is limited by two canals.

Sampling points are situated at a distance of about 400 m from each other along the beach. Two other sampling stations are located in the two canals in order to evaluate their pollution load.

In the above-mentioned area the mandatory part of the programme is carried out. The detection of Salmonella and of anti-coli and anti-Salmonella bacteriophages will be effected as facultative analyses.

The work began in the first days of May 1977, following the methodology for the MED VII Project.

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F. L. PETRILLI (Director)
Institute of Hygiene
University of Genova
GENOVA
Italy

The Institute of Hygiene of the University of Genova has a lengthy tradition in the study of coastal water quality. More recently, detailed studies on the hygienic conditions of coastal waters, with particular regard to the situation in the Ligurian Sea, were extensively reviewed in 1965 and 1972.

The hygienic conditions of the water off the coast of Leghorn, Tuscany, were also investigated two years ago. A survey was also carried out in coastal waters around the Elba Islands by performing bacteriological analysis in situ.

In the field of microbiological monitoring of sea water, an apparatus has been designed for the cumulative sampling of water over a pre-established period.

In particular the problem of the virological monitoring of sea water, as related to the bacteriological parameters of pollution, has been examined. By using the selected polyelectrolyte method, the virological monitoring was carried out on samples of coastal water with various levels of bacteriological pollution.

Additional investigations were carried out to study the problem of virus accumulation and release in clastic sediments of coastal waters.

A series of studies was concerned with detection of microelements in shellfish (Mytilus galloprovincialis) and in crustaceans (Meganyctiphone norvegica) collected in the Ligurian Sea.

Epidemiological surveys have been initiated to try to determine a possible association between sea bathing and a number of diseases. Two groups of school children (10 - 12 years old) were investigated with the help of questionnaires. One of the groups spent its summer holidays at the seaside and the other in the mountains. A statistical study of the two groups based on the completed questionnaires is now in progress.

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S. GENOVESE (Director)
Institute of Hydrobiology and Fisheries
University of Messina
MESSINA
Italy

The coastal areas studied during the last years are as follows:

1974: Saline-Augusta open waters, four cruises (in press with Rev. Intern. Oceanogra. Med.)

1975: Augusta coastal zone, three cruises; Stretto coastal zone, three cruises.

1976: Stretto, two cruises; Milazzo, two cruises.

1977: Stretto, one cruise; Milazzo, one cruise; Augusta coastal zone, two cruises.

The following cruises are planned for 1977: Milazzo, two cruises; Patti, one cruise; Vibo Valentia, one cruise; Augusta coastal zone, two cruises; Augusta open waters, two cruises; Capo Passero, three cruises.

Measured parameters are: temperature; salinity; oxygen; oxygen saturation; pH; total alkalinity; specific alkalinity; Seston 80°C and 800°C gravimetric; ammonia; nitrites; nitrates; phosphates; sulphates; BOD₅; oils/greases; total change of heterotrophic water; total coliforms; faecal coliforms; petroleum bacteria (qualitative for crude oil and quantitative for diesel); total charge of heterotrophic sediments.

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L. MENDIA (Director)
Centre for Study and Research in Sanitary Engineering
Institute of Water Supply and Wastes Disposal
University of Naples
NAPLES
Italy

Specific MED VII analytical activities have not yet started because of organizational difficulties. However, numerous activities have taken place with a view toward the development of the future analytical programme and in the more general field of coastal water quality control.

Analytical methods have been reviewed and discussed with specialist microbiologists and analytical chemists. A critical review of the Draft Guidelines for Monitoring Public Health Aspects of Coastal Water Quality will follow.

Criteria, guidelines and standards for coastal recreational waters and beaches have been discussed at several meetings as well as at the national level. A review of the criteria adopted by EEC has been developed mainly with reference to the present criteria adopted by the Italian authorities.

The possibility of collaborating on the research programme with the Zoological Station of Naples has been discussed with the director, Prof. A. Monroy, and it is expected that an agreement will be reached soon. A joint activity is planned for August to monitor the Bay of Naples. A specialist of the University of Newcastle-upon-Tyne (Mrs. Evison) has been invited to the Zoological Station of Naples to carry on (for the second year) bacteriological monitoring of the Bay. The methodological lines of MED VII will be followed.

Concerning the general problem of the coastal water quality control, a "Strategy for Coastal Management" has been developed which, it is hoped, will bring the problems within reach of solution.

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L. MAJORI (Director)
Institute of Hygiene
University of Trieste
TRIESTE
Italy

The Institute of Hygiene has been working on problems of marine pollution for about 10 years, co-ordinated within the framework of the National Research Council.

The first part of the study was aimed at obtaining a pollution map of the North Adriatic from Trieste to Ravenna.

Further research on a sampling zone including the Marano lagoon, which is highly polluted, and its sea front was directed toward the study and comparison of microbiological parameters (E. coli, total bacterial load at 34°), physical parameters, biochemical, temperature, OD, BOD, detergents, chlorides, orthophosphates, polyphosphates, ammonia, etc.) to try to define the validity of their utilization in marine pollution research and in the study of the diffusion of pollutants.

Methodological research is under way for the detection of enteric pathogens such as salmonella and viruses.

The Institute of Hygiene of Trieste is prepared to collaborate in the MED VII project in the following research:

- 1) Methodological evaluation of microbiological, chemical and biochemical tests;
- 2) Determination of polluted areas by microbiological tests (E. coli, streptococci faecalis, enteropathogens (bacteria and viruses)).

Collaboration between the various groups working in the North Adriatic is to be hoped for. For example, some agreements have already been reached with the Marine Biological Station in Portoroz, Yugoslavia.

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J. NAGGEAR (President)
 Marine Research Centre of Jounieh
 National Council for Scientific Research
 P.O. Box 11-8281
 BEIRUT
 Lebanon

It was not possible to accomplish much actual research throughout last year (1975-76) for obvious political reasons. However, presently action is under way for upgrading the Centre's capability and reassessing the intention for full participation.

In Lebanon, there are a number of institutions undertaking studies along the lines of MED VII project. One of these institutions is the newly established Marine Research Centre of Jounieh. Currently, different institutes use different methodologies, and not all collected data is readily available or published. Parameters routinely measured include counts for E. coli, streptococcus faecalis, BOD, O₂, S^o/_{oo}

The participation of the Centre aims at adopting common and accepted methodology within the Mediterranean, and advising relevant authorities on bacteriological standards.

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L. J. SPITERI
 Public Health Laboratory
 Health Department
 Ministry of Health and Environment
 VALLETTA
 Malta

Samples of sea water are analysed bacteriologically by the multiple tube dilution method and the results are expressed as MPN per 100 ml samples. These samples are submitted routinely by the health inspectors for examination. When the level of E. coli exceeds 1000 per 100 ml or coliforms are in excess of 1800 per 100 ml bathing is prohibited.

Three main areas will be monitored within the framework of project MED VII, Mellena Bay, San Luciano and Renella. The monitoring will be carried out according to the mandatory part of the operational document using the membrane filtrations method.

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C. C. SOLAMITO (President)
 Centre Scientifique de Monaco
 MONTE CARLO
 Principauté de Monaco

The Laboratory of Microbiology and Studies of Marine Pollution, department of the "Centre Scientifique de Monaco" has been working since November 1966 on coastal water quality control.

Samples of sea water are collected along the coast (3 km long) at 10 stations, once a week, at the surface and at three meters depth, for examination for coliform, E. coli, streptococcus faecalis, and Salmonella by the method of membrane filtration.

During the "swimming season" from May to October, water is collected in the beach area at 20 supplementary points.

Studies on currents and winds, factors of dispersion and diffusion of pollution have also been carried out.

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S. E. ULUG
 Environmental Engineering Department
 Middle East Technical University
 ANKARA
 Turkey

The selected Pilot Project area on Coastal Water Quality Control "Antalya Konya Alti Beach" is one of the places where the highest tourism potential is expected. The project is supported by the Turkish Scientific and Technical Research Council, the Ministry of Tourism, the Ministry of Health and Social Welfare, the Ministry of Agriculture and the General Directorate of Water-derived Resources.

The checklist of Pilot Project Activity (ICP/CEP 209) is signed by the collaborating centre (METU, Environmental Engineering Department) as the co-ordinating institute for the above interested public services.

Monitoring will include the water phase, sediments, plankton and shellfish.

Meteorological and hydrographic conditions of the area will be available from other studies carried out in the selected Pilot Project areas.

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M. LENARCIC
Marine Biological Station
University of Ljubljana
PORTOROZ
Yugoslavia

Regular monitoring was carried out along the 17 km length of coastal area at the densely populated and touristically developed Slovenian littoral of the Gulf of Trieste. The effects of pollution and its extent were assessed by monitoring complex parameters (Physico-chemical), bioproductivity, biocoenotic, bioassay, sedimentological etc) including bacterial parameters. During 1971-75 sampling took place at thirty-four (34) stations covering the above coastal area for bacteriological examinations, mostly at monthly intervals. Obligatory total heterotrophs grown on nutrient agar at 37°C and faecal coliforms on "Teagitol 7" medium at 44.5°C, obtained by membrane filtration, were counted. Indicatively, at selected stations and seasons, faecal streptococci and clostridium perfringes were examined. The data obtained during the period of five years were evaluated statistically and the following sanitary standards were recommended to the responsible authorities for application in an up-dating of the legislation.

- shellfish culture waters: max 10 faecal coliforms/100 ml
- highly satisfactory bathing waters: max 50 faecal coliforms/100 ml
- tolerable bathing waters: max 800 faecal coliforms/100 ml

Beginning in 1975, regular bacteriological examinations have been made of the mussels (Mytilus galloprovincialis) from the polluted Port of Piran, of natural populations in clean waters of Savudrija, and in cultivation plants in Strurijan for comparison purposes. The parameters are faecal coliforms (by the multitube method) and pathogens, (Salmonella, Vibrio, Proteus, Shigella etc.) (by relevant methods).

For the purpose of the Pilot Project MED VII, it is planned to undertake the following studies:

- 1) Monitoring of the whole coastal sea as described above, including the obligatory part of the MED VII programme. The above study is to be co-ordinated with the investigations proposed by the Institute of Hygiene, Trieste, in order to include the whole area of the Gulf of Trieste.
- 2) Advanced and enlarged examinations of mussels as described above.
- 3) Research on the fate, behaviour, accumulation and disappearance of symbiotic and pathogenic enteric micro-organisms in experimental lagoons which will be artificially polluted by a typical domestic sewage.

In addition, in-job training facilities will be provided.



Programme
des Nations Unies
pour l'environnement

United Nations
Environment
Programme



in co-operation with FAO(GFCM), UNESCO, IOC, WHO, WMO, IAEA

Mid-term Review Meeting on the
Progress of the Co-ordinated
Mediterranean Pollution Monitoring
and Research Programme (MED POL)
and Related Projects of the
Mediterranean Action Plan

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DRAFT PROGRESS REPORT

ON THE IMPLEMENTATION OF THE

CO-ORDINATED MEDITERRANEAN POLLUTION MONITORING AND RESEARCH PROGRAMME (MED POL)

AND RELATED PROJECTS OF THE MEDITERRANEAN ACTION PLAN

ANNEX V: MAPS

ANNEX VI: LIST OF ACRONYMS

M A P S

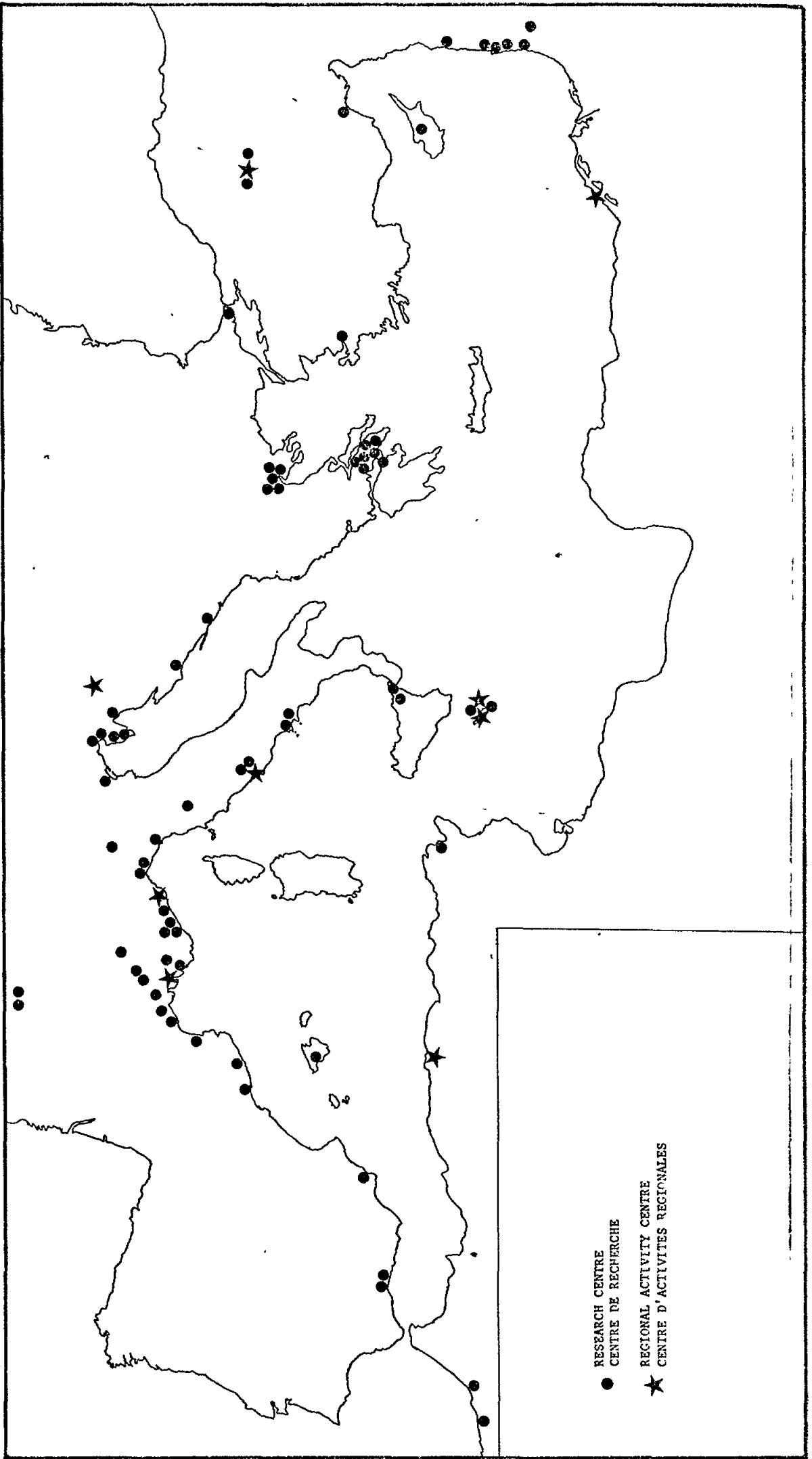
This set of maps illustrates the geographical distribution of the research centres participating in various pilot projects of the Co-ordinated Mediterranean Pollution Monitoring and Research Programm (MED POL), of the Regional Activity Centres relevant to MED POL projects and the areas where monitoring or research activities are carried out in the framework of MED POL pilot projects.

FIG 1

RESEARCH CENTRES NOMINATED AS PARTICIPANTS IN MED POL AND REGIONAL ACTIVITY CENTRES RELEVANT TO MED POL

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CENTRES DE RECHERCHE DESIGNES COMME PARTICIPANT AU MED POL ET CENTRES D'ACTIVITES REGIONALES SE RAPPORTANT AU MED POL



●
RESEARCH CENTRE
CENTRE DE RECHERCHE

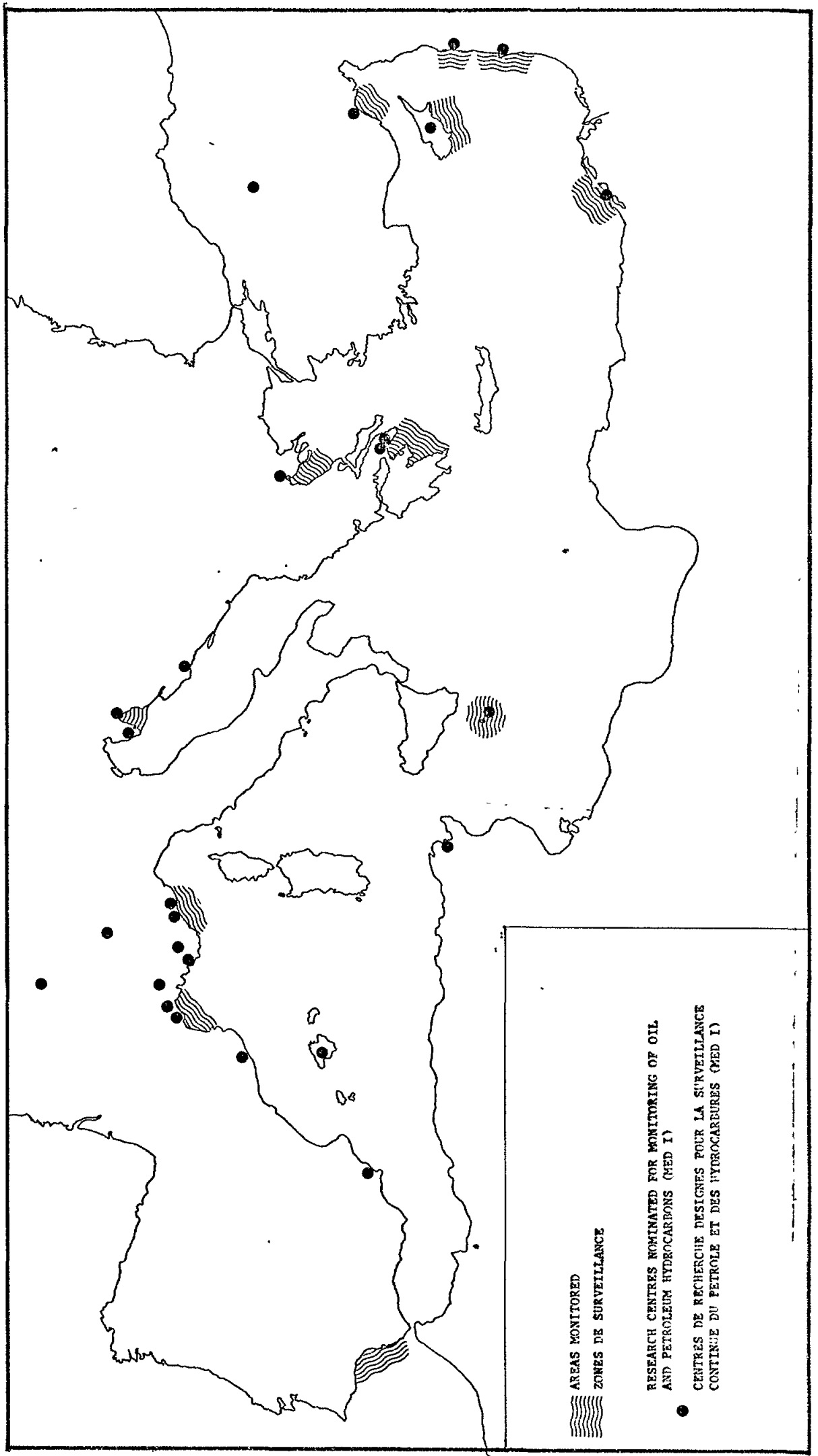
★
REGIONAL ACTIVITY CENTRE
CENTRE D'ACTIVITES REGIONALES

FIG 2

AREAS MONITORED FOR OIL AND PETROLEUM HYDROCARBONS AS PART OF MED POL

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ZONES DE SURVEILLANCE CONTINUEE DU PETROLE ET DES HYDROCARBURES COMME FAISANT PARTIE DU MED POL



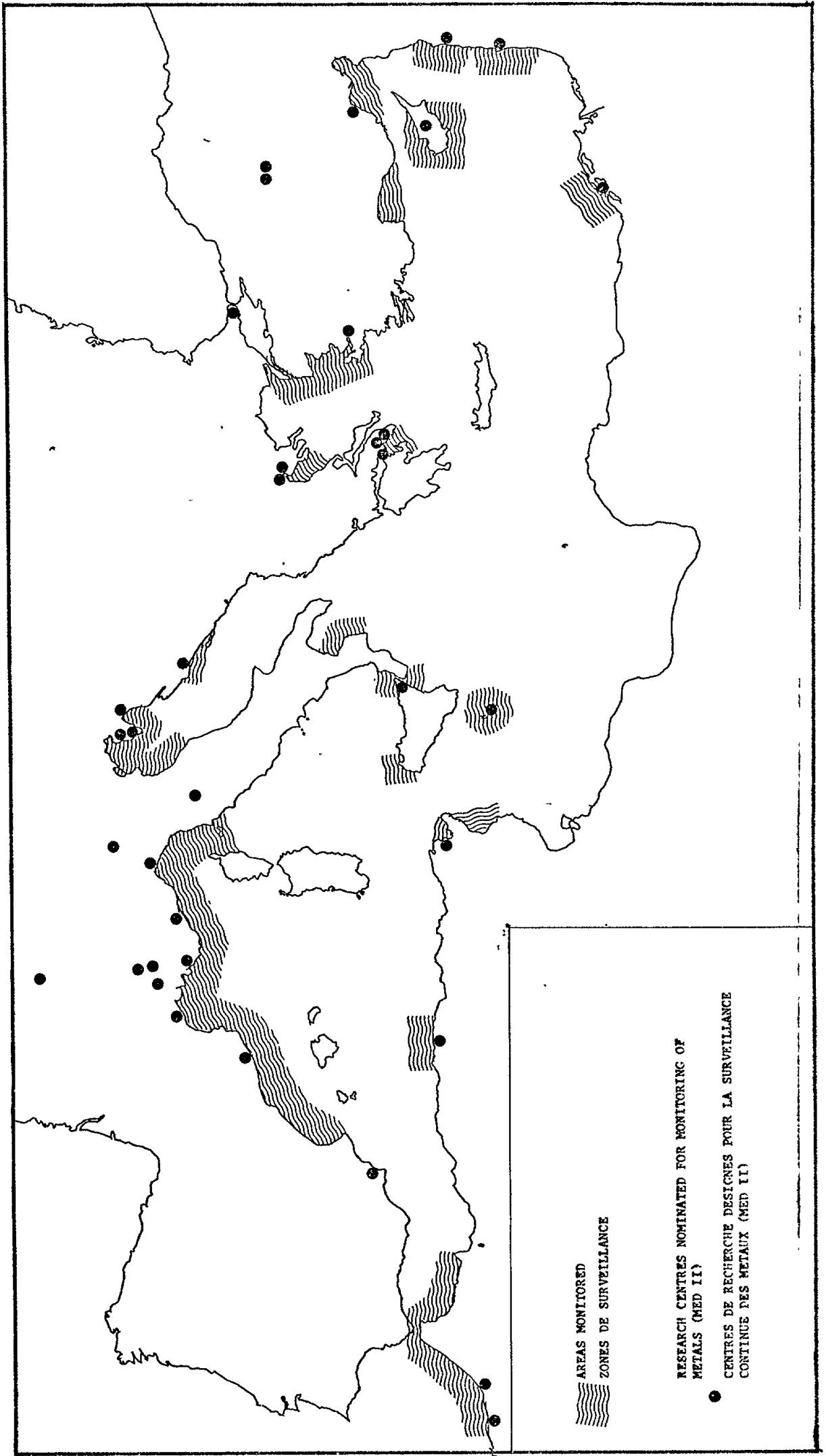


FIG 4

AREAS MONITORED FOR CHLORINATED HYDROCARBONS AS PART OF MED POL

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1 July 1977

ZONES DE SURVEILLANCE CONTINUE POUR LES HYDROCARBURES CHLORES COMME FAISANT PARTIE DU MED POL

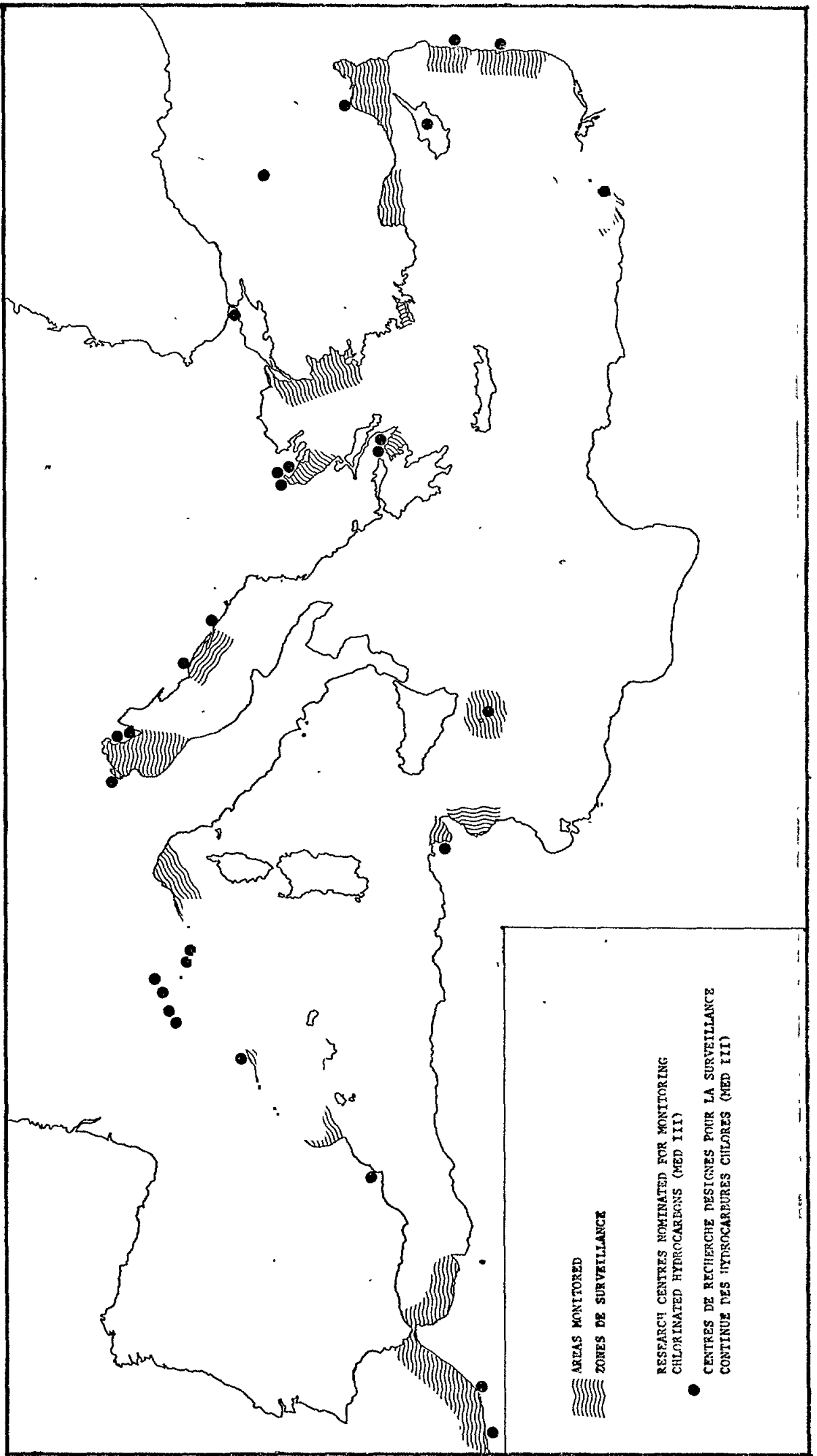
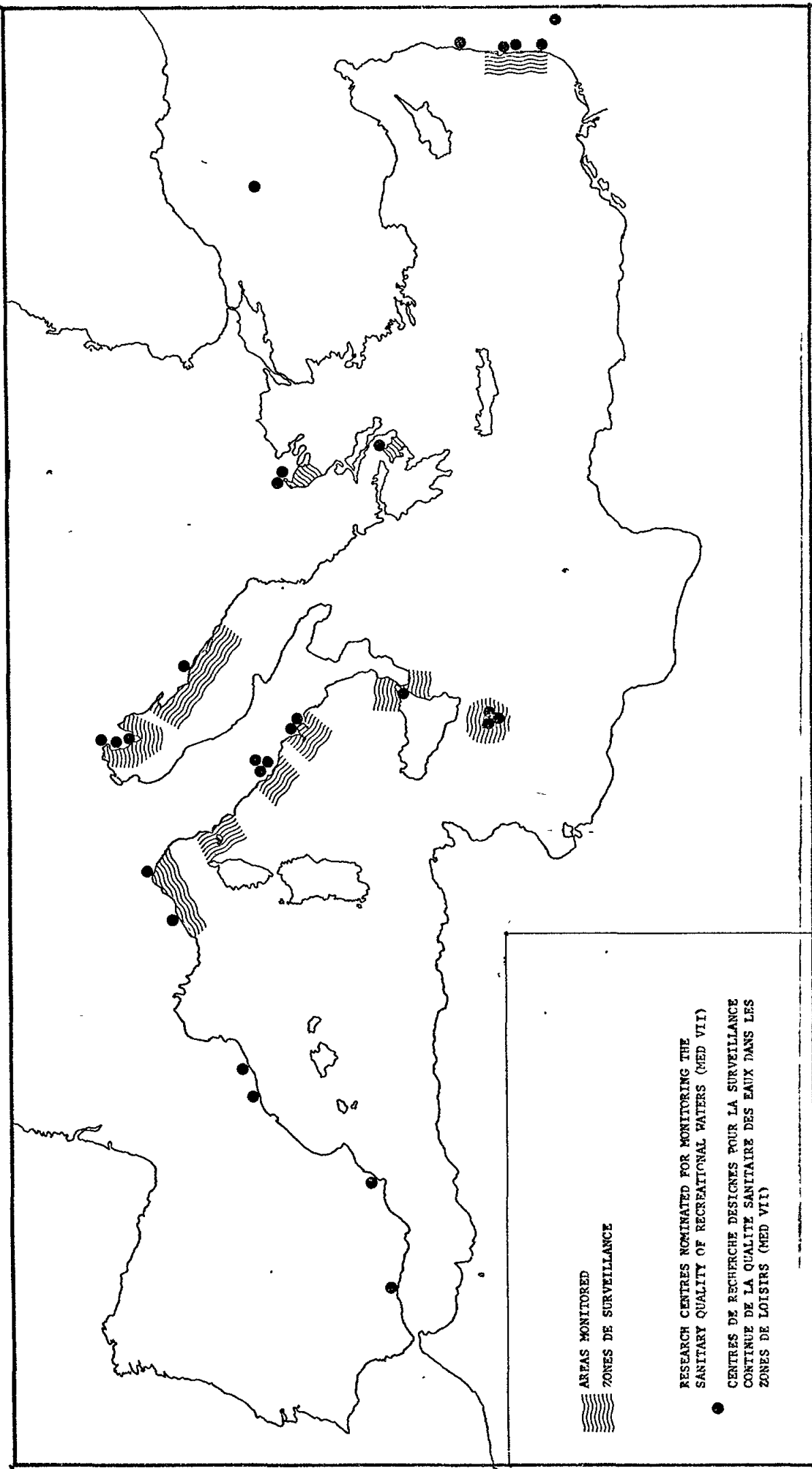


FIG 5

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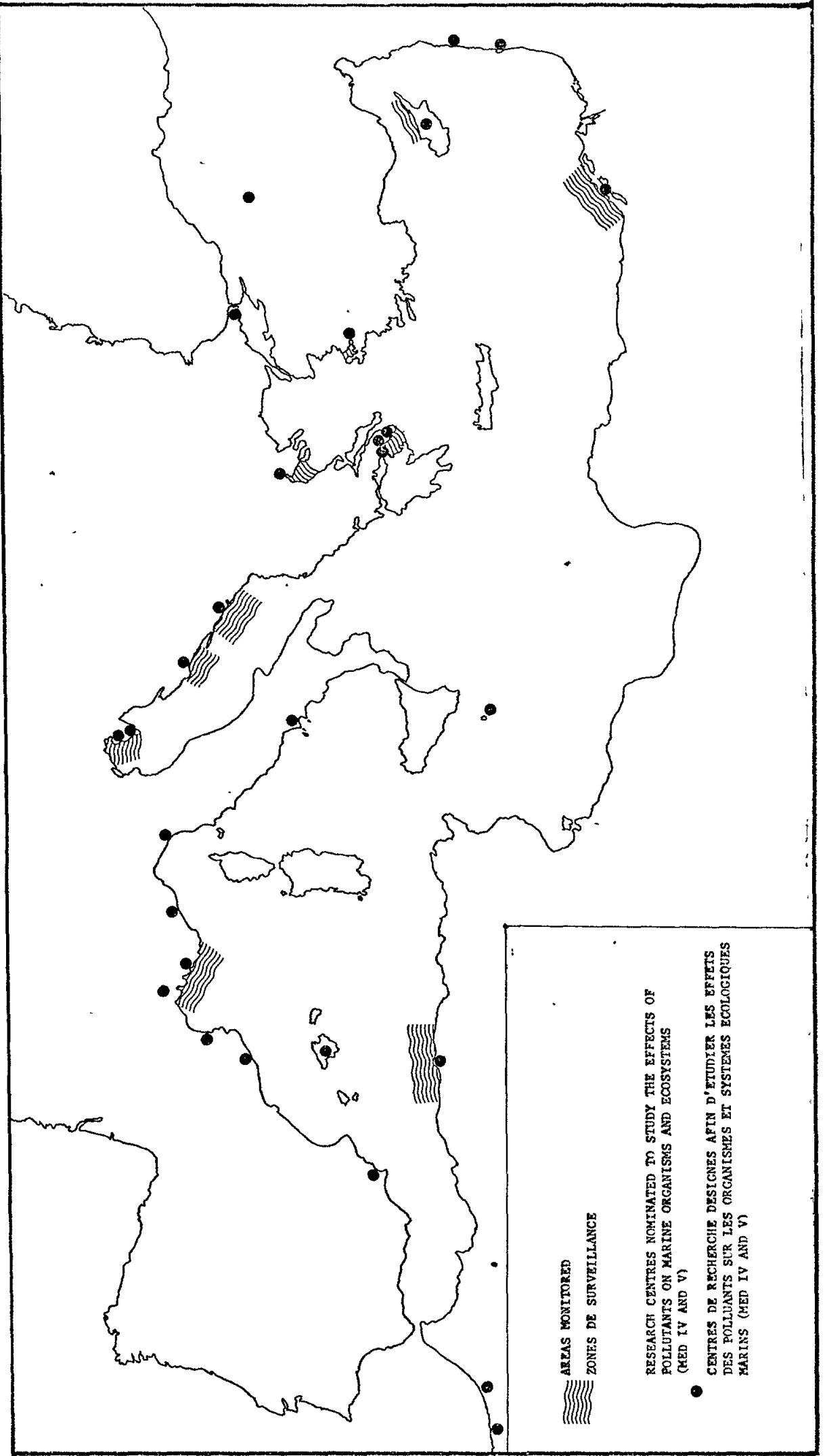
AREAS MONITORED FOR THE SANITARY QUALITY OF COASTAL WATERS AS PART OF MED POL

ZONES DE SURVEILLANCE CONTINUE POUR LA QUALITE SANITAIRE DES EAUX COTIERES COMME FAISANT PARTIE DU MED POL



AREAS WHERE THE EFFECTS OF POLLUTANTS ON MARINE POPULATIONS AND ECOSYSTEMS ARE STUDIED AS PART OF MED POL

ZONES OU LES EFFETS DES POLLUANTS SUR LES PEUPLLEMENTS ET LES SYSTEMES ECOLOGIQUES MARINES SONT ETUDIES COMME FAISANT PARTIE DU MED POL



AREAS MONITORED
ZONES DE SURVEILLANCE

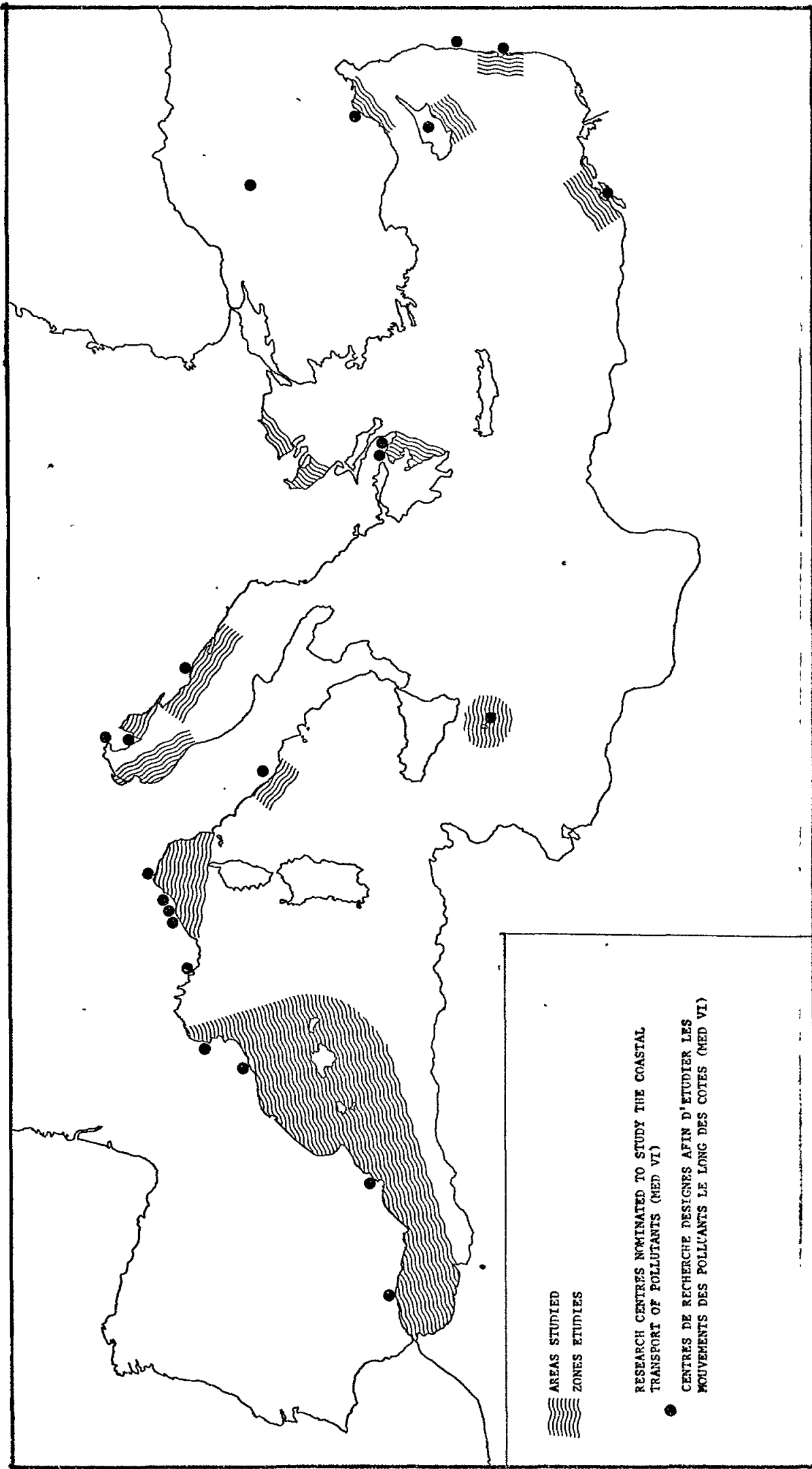
RESEARCH CENTRES NOMINATED TO STUDY THE EFFECTS OF
POLLUTANTS ON MARINE ORGANISMS AND ECOSYSTEMS
(MED IV AND V)

CENTRES DE RECHERCHE DESIGNES AFIN D'ETUDIER LES EFFETS
DES POLLUANTS SUR LES ORGANISMES ET SYSTEMES ECOLOGIQUES
MARINS (MED IV AND V)

AREAS WHERE THE COASTAL TRANSPORT OF POLLUTANTS ARE STUDIED AS PART OF MED POL

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ZONES OU LES MOUVEMENTS DES POLLUANTS LE LONG DES COTES SONT ETUDIES COMME FAISANT PARTIE DU MED POL



LIST OF ACRONYMS

ASFIS	:	Aquatic Sciences and Fisheries Information System
CIM	:	Co-operative Investigations in the Mediterranean
ECE	:	Economic Commission for Europe
FAO	:	Food and Agriculture Organization of the United Nations
GFCM	:	General Fisheries Council for the Mediterranean
IAEA	:	International Atomic Energy Agency
ICSEM	:	International Commission for the Scientific Exploration of the Mediterranean
IGOSS	:	Integrated Global Ocean Station System
IMCO	:	Intergovernmental Maritime Consultative Organization
IOC	:	Intergovernmental Oceanographic Commission
IRS	:	International Referral System
IUCN	:	International Union for the Conservation of Nature and Natural Resources
MED POL	:	Co-ordinated Mediterranean Pollution Monitoring and Research Programme (Part of the Mediterranean Action Plan)
NBS	:	US National Bureau of Standards
UNEP	:	United Nations Environment Programme
UNESCO	:	United Nations Educational, Scientific and Cultural Organization
UNIDO	:	United Nations Industrial Development Organization
WHO	:	World Health Organization
WMO	:	World Meteorological Organization