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MEDITERRANEAN ACTION PLAN

Consultation Meeting on the Evaluation
of the Croatian Monitoring Programme

Zagreb, 15-17 February 1994

REPORT

OF THE CONSULTATION MEETING ON THE EVALUATION OF THE CROATIAN MONITORING PROGRAMME

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Introduction

1. Within the framework of the monitoring component of the Long-term Programme of Pollution Monitoring and Research in the Mediterranean sea (MED POL Phase II), covering the period 1981-1995, a number of Mediterranean countries have developed national programmes for monitoring marine pollution. These programmes are in various stages of development and organization. In view of the projected completion of MED POL Phase II at the and of 1995 and the commencement of MED POL Phase III in 1996, it was decided to make an evaluation of most developed national monitoring programmes.

2. In keeping with this decision, a Consultation meeting was organized by the Coordinating Unit of the Mediterranean Action Plan, United Nations Environment Programme (UNEP/MEDU) in collaboration with the Ministry of Civil Engineering and Environmental Protection of the Republic of Croatia. The meeting was held in Zagreb from 15 to 17 February 1994 and was attended by 21 Croatian scientists from 8 institutions participating in the national marine pollution monitoring programme, 2 representatives from the Republic of Slovenia, 2 invited experts from other Mediterranean countries, one representative of the Ministry of Environment of Bulgaria, 5 representatives of the Ministry of Civil Engineering and Environmental Protection, one representative from the Ministry of Agriculture and Forestry, one representative from the Ministry of Maritime Affairs, Transportation and Communications, one representative from the Ministry of Health, 5 representatives from the Public Water Management Enterprise and one representative each from the Food and Agriculture Organization of the United Nations (FAO), the World Health Organization (WHO) and the United Nations Environment Programme (UNEP). A complete list of participants is given as Annex I. The list of documents distributed to participants appears in Annex II.

Agenda item 1 - Opening of the meeting

3. The meeting was opened by Mr N. Mikulić, National Co-ordinator for MED POL, who welcomed participants to Zagreb.

4. Mr V. Simončič, Vice Minister in the Ministry of Civil Engineering and Environmental Protection, welcomed all participants on behalf of the Government of the Republic of Croatia. He pointed out that this was the first meeting within the framework of MED POL to be held in Croatia since independence. He thanked UNEP/MEDU for its assistance in the organization of the meeting. He reminded the meeting of the active participation of Croatian scientists in Phases I and II of the MED POL programme. This participation had provided a valuable experience. He also pointed out that in the current phase of MED POL monitoring, there appeared to be a gap between data collection and decision making. The new phase of MED POL would have to cover this gap and ensure that data was collected and processed in such a way as to ensure availability for the end-users, i.e. the decision makers.

5. Mr L. Jeftić, Deputy Coordinator, Mediterranean Action Plan, welcomed the participants on behalf of Ms Elizabeth Dowdeswell, Executive Director of UNEP, as well as on behalf of the Coordinating Unit of the Mediterranean Action Plan. He explained the background to the present meeting and said that two countries had been selected for such meetings at the present stage - Israel and Croatia. He stressed that apart from evaluation of the work performed within the framework of MED POL Phase II which was scheduled to end on 31 December 1995, it was also important to design MED POL Phase III in the light of experience gained.

Agenda item 2 - Election of officers

6. Mr N. Mikulić was elected Chairman. Mr A. Barić, Director of the Institute of Oceanography and Fisheries, Split, was elected Rapporteur, and Ms J. Božičković acted as technical secretary of the meeting.

Agenda item 3 - Adoption of the agenda

7. The Agenda, as shown in Annex III, was adopted unanimously.

Agenda item 4 - Background and scope

8. Mr L. Jeftić gave a concise account of the MED POL programme and its status within the overall framework of the Mediterranean Action Plan as a whole. He first described the main components of the Mediterranean Action Plan (Legal, Environmental assessment, Environmental management and Institutional/Financial), and then provided a more detailed exposé of the MED POL programme. After describing the main components currently constituting Phase II of the programme, he described the overall objectives of the next phase (Phase III), which had been approved by the Eighth ordinary meeting of the Contracting Parties to the Convention for the Protection of the Mediterranean Sea against Pollution and its related Protocols (Antalya, 8-11 October 1993).

9. Mr Jeftić explained the concept of the marine pollution assessment. In the case of monitoring, data quality assurance was essential, as data submitted for management decision had to be completely reliable. Monitoring was now becoming more and more of a managerial tool, rather than a simple data-acquisition exercise (as is the case in many countries), because the objectives of the programme had not been fully taken into account in the design stage. It was therefore essential to define the objectives of the monitoring programme, and to ensure that the end-users of the data were involved as much as possible in the design of the programme.

10. The material in Mr Jeftić's presentation, which was shown in the form of transparencies, is given as Annex IV.

Agenda item 5 - Presentation of the Monitoring Programme of the Eastern Adriatic Coastal area (Report for 1983-1991)

11. Mr D. Degobbis presented a concise overview of the monitoring programme performed between 1983 and 1991, and described the main matrices and parameters. He made a brief analysis of trends, as shown by successive results. The northern part and some semi-enclosed areas of the eastern Adriatic was still subject to eutrophication. In the case of some substances (e.g. DDT) a downward trend in concentrations was evident. In the case of others (such as PCB), no such trend was observed.

12. Ms M. Mastrović gave a brief overview of the situation regarding bathing water quality. She explained the terms of national legislation on the subject, which was based on the guideline values of the relevant EEC Directive. She then described various monitoring stations. In a number of areas, particularly the Istrian peninsula, the establishment of sewage treatment plants had considerably reduced pollution of coastal waters. On the whole, water was of good quality, except in the vicinity of major ports.

13. Mr D. Degobbis presented a brief overview of the Adriatic Scientific Coordinated Programme (ASCOP). He described the organization of the programme and its components. A total of 75 parameters were monitored, including oceanographic and meteorological readings. A number of parameters were monitored in sea water, marine biota and sediments in the Adriatic international waters (northern and middle Adriatic regions). Levels of pollutants recorded were lower than expected.

14. Ms B. Raspor presented a brief overview of quality assurance activities within the framework of the monitoring programme. She described the specific quality control approaches utilized for different components of the programmes: MED POL, ASCOP and Land-based sources. Intercalibration exercises carried out with different materials showed that in some cases, a number of problems occurred which had to be solved at individual laboratory level. In future programmes, it would be necessary to first define the objectives of the programme, so that suitable quality assurance approaches could then be selected and started with the programme.

15. Ms S. Vidič gave a brief presentation of the current monitoring programme regarding pollution reaching the Adriatic Sea through the atmosphere. Measurements were being taken of a number of parameters in air and in precipitation, but so far no heavy metals could be included. It was envisaged that these would be included in future programmes.

16. A number of points were brought up in the ensuing discussion. Some approaches to quality assurance, particularly specific tests, would have to be considered with caution, as not all laboratories were prepared for them. The concept of defining of the objectives of a monitoring programme and then fitting the quality assurance programme to meet these objectives was generally agreed with.

Agenda item 6 - MED POL objectives and achievements: new monitoring strategies

17. Mr G.P. Gabrielides explained that upgrading of the capabilities of Mediterranean laboratories to enable them to perform chemical analyses for determination of pollutant levels in various marine matrices was one of the major achievements of the MED POL programme (Annex V).

18. Monitoring should have defined objectives, either for managerial or research purposes. The actual scope and extent of monitoring would be determined by its specific objectives. Also, this would help overcome one of the main criticisms levelled at some parts of the MED POL programme, i.e. that gathering of data should not be an aim in itself, but should be viewed as a managerial tool.

19. Mr M. Joanny explained the work being done in other, non-Mediterranean areas, where the assessment of available information was being used for the preparation of a quality status report, and link this with the aims of specific conventions. He proposed that a number of issues be looked into within the framework of preparations for the next phase of MED POL. Each issue would, in itself, pose a hypothesis, on the basis of which appropriate monitoring and assessment procedures could be worked out. The number of issues involved were wide-ranging, and were not confined solely to marine contaminants.

20. Mr Joanny also explained the structure and operation of the main marine pollution monitoring networks in France, data from which had recently been put together, amalgamated with relevant data from terrestrial programmes, and presented in such a way as to try to provide a useful management tool (Annex VI).

21. Mr Y. Cohen stressed that monitoring provided an essential tool in management, either to enable decision making or to provide an assessment of the effectiveness of measures already taken. He provided a number of examples to illustrate the necessity of good presentation of data in relation to the objective (Annex VII).

Agenda item 7 - Draft of the new Croatian monitoring programme

22. Mr N. Smodlaka presented a draft of the proposed new Croatian monitoring programme. He explained that monitoring had been performed for the last 20 years. Even though there were no clearly identified objectives and users, data were still useful, as some trends could be seen (Annex VIII).

23. The two main problems were availability of qualified manpower resources and finance. These would affect programme design. In the short term, a number of parameters (to provide the answer to immediate questions) could be done. The Croatian monitoring programme should consist of various subprogrammes each of them with clearly identified objectives and users. Priorities would have to be established. In monitoring marine ecosystems, a knowledge of the systems themselves was required. In the long term, data on a number of eutrophication parameters would have to be collected, even if there appeared to be no immediate need, for the benefit of future generations. Also, one should distinguish between natural problems and problems of anthropogenic origin. In a number of cases, preliminary screening should be performed to establish whether or not there was a need for monitoring.

24. Ms B. Cosović gave a brief presentation on additional requirements for the design of monitoring programmes. She stressed the importance of performing both monitoring and research, to ensure the necessary linkage. As regards the Adriatic Sea proper, there were a number of characteristics which had to be known, in order to have a better idea of its carrying capacity and interchange of water between it and the Mediterranean. Eutrophication studies were also an example of the importance of combining monitoring and research.

25. Mr A. Barić stressed that the primary aim of monitoring was to provide data towards the environmentally sound management of coastal zones. A monitoring system also needed specific components - measurement, quality control, and data reporting - which would have to be carefully designed. Mr Barić listed a number of activities which the new monitoring programme should include. These were sanitary control of beaches, pollutant levels in marine biota, and monitoring of mariculture areas (Annex IX).

26. Ms N. Hak gave a brief presentation of the programme being implemented on the monitoring of land-based sources of pollution, mainly on industrial effluents. She also described the main principles of water protection, and outlined the water quality monitoring programme in terms of national standards. Parameters include physical, chemical and microbiological. To enhance analytical quality, an intercalibration programme leading to certified laboratories has recently commenced.

27. Mr L. Sipos expanded on the theme of measurement of effluents within the framework of the same programme. He described the parameters monitored. Mr S. Tedeschi continued the same overall exposé. In all settlements of more than 10000 inhabitants, the catchment area of the sewage system was established and sewage treatment plants and/or submarine outfall structures planned. In the meantime, measurements were being taken of selected parameters in the sewage effluents to collect data on the basis of which the design of the sewage treatment plants would be effected.

28. Ms B. Raspor outlined the requirements of quality assurance as part of future marine pollution monitoring programme. She explained the elements of quality control and then detailed the specific points to be considered in defining monitoring programmes. One point dealt with certification of laboratories according to defined criteria, including available facilities, laboratory space, qualified personnel, quality control programmes followed, and quality assessment practised. She concluded by proposing that participating laboratories should be selected from among certified laboratories to ensure good results (Annex X).

29. During the ensuing discussion, it became evident that the objectives of the monitoring should be identified. A distinction should be made between compliance monitoring, monitoring of trends and monitoring for undesirable and/or unexpected events (e.g. anoxia, mucilaginous aggregates, oil spills, jellyfish and other organisms invasions). In the case of mariculture, before embarking on any monitoring, the whole matter would have to be studied in depth to assess the possible environmental consequences of maricultural activities. At a very early stage in development of a mariculture industry it would be essential to start monitoring phytoplankton communities, so as to have the baseline data established and to enable early detection of any changes which would eventually result in algal blooms.

30. The use of biomarkers was also mentioned as a component to be included in the monitoring programme.

31. Various opinions were expressed on inclusion or non-inclusion of specific items in the national monitoring programme. It was accepted, however, that no particular item could be omitted if it satisfied the requirements of a recognized objective.

The monitoring programme would have to be dynamic, to enable changes to be made on the basis of experience. Also, there should be a strong connection between compliance monitoring and assessment/trend monitoring.

32. In particular, methodologies used should be the same to enable intercomparisons.

Agenda item 8 - Conclusions

33. It was agreed that the monitoring programme should be as follows:

The national monitoring programme, should be mainly oriented for managerial purposes, while a main objective of a research monitoring is understanding of the complexity of an ecosystem and establishing appropriate and efficient techniques for monitoring. The activities within the national monitoring programme fall into two categories: (a) monitoring for compliance purposes, and (b) monitoring for status and trends. Another suggestion was made that changes in the ecosystem should also be monitored especially in relation to biodiversity.

OVERALL OBJECTIVE

34. The overall objective of the National Monitoring Programme is to provide information necessary for the formulation of measures for marine pollution prevention and control as well as for environmentally-sound management of coastal zones in order to protect the marine ecosystems and human health.

MONITORING FOR COMPLIANCE PURPOSES

35. It was agreed that the following monitoring for compliance purposes would be organized:

- monitoring of land-based sources of pollution;
- monitoring of sanitary quality of beaches;
- monitoring of impacts of fin-fish mariculture on the marine environment; and
- monitoring of shell-fish mariculture sites.

Monitoring of land based sources of pollution

36. The objective is to assess the inputs of contaminants into the marine environment from land based sources. The results of this type of monitoring have to comply with the provisions of the LBS Protocol, the national standards for quality of waste water, and international standards.

Monitoring of sanitary quality of beaches

37. The objective of the monitoring of sanitary quality of beaches is the protection of human health. The results of this type of monitoring have to comply with the national standards for quality of bathing waters.

Monitoring of impacts of fin-fish mariculture on the marine environment

38. The objective is to assess the effects to the marine environment caused by fin-fish mariculture activities. The results of the monitoring of impacts of fin-fish mariculture on the marine environment have to comply with national standards which should be developed.

Monitoring of shell-fish mariculture sites

39. The objective is to protect human health. The results of the monitoring of shell-fish mariculture sites have to comply with the national standards on presence of toxic phytoplankton species, which should be developed in accordance with international criteria, and the national criteria on sanitary quality of coastal waters for shell-fish mariculture.

MONITORING STATUS AND TRENDS

40. The following objectives of monitoring status and trends are identified:

- evaluation of eutrophication trends and effects;
- identification of hot spot areas to be monitored on a long-term basis; and
- monitoring of changes in the ecosystem and biodiversity

41. The following priority areas are identified:

- northern Adriatic;
- semi-enclosed bays;
- river mouths;
- mariculture areas; and
- urban centres;

42. Questions to be answered

a) Eutrophication

- do elevated nutrient inputs into the marine environment cause enhancement of phytoplankton blooms and changes in species composition?
- do changes in phytoplankton blooms result in altered zooplankton and benthos communities?
- does eutrophication reduce temporarily oxygen levels harming marine life?
- is primary production increasing?
- does mariculture play a role?

b) Hot spots

- are the levels of priority pollutants changing?
- is the concentration of any pollutant in commercial marine organisms elevated enough to cause effects?
- are there deleterious biological effects of some pollutants?
- is concentration of mercury in Kastela Bay decreasing?
- others to be defined.

c) Ecosystem and biodiversity

- ecosystem modifications;
- biodiversity trends.

43. There was considerable discussion over these priority areas. One opinion was that in certain aspects of eutrophication, it would be advisable to carry out initial screening prior to embarking on a monitoring programme. The necessity of including all urban centres was also queried. An additional priority area suggested was enclosed bays. It was agreed that within the overall priorities, problem areas would have to be eventually identified.

44. It was also agreed that the Ministry of Civil Engineering and Environmental Protection would establish a Steering Committee (management group) for the monitoring programme which should consist of representatives from governmental bodies (ministries), main institutions participating in the monitoring programme, and end-users of monitoring data. A number of selected international experts could be associated members of the Steering Committee.

The Steering Committee could set up series of working groups on specific topics to implement the monitoring strategy and to co-ordinate all programmes within National monitoring programmes.

This procedure should start by mid 1994 to enable implementation of the programme in 1995.

45. Mr L. Jeftić stated that the meeting had been a very successful one, and that it was now possible to formulate a good programme on the basis of the discussions and conclusions. He gave special thanks to the Croatian authorities both for their work in the organisation of the meeting and the excellent facilities provided, as well as for the generous hospitality accorded to UN staff and foreign experts who attended.

46. The meeting was closed by Mr N. Mikulić after a customary exchange of courtesies on Thursday 17 February 1994 at 12.00 noon.

ANNEX I

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ANNEX II

LIST OF DOCUMENTS

1. Agenda of the meeting, UNEP(OCA)/MED WG.80/1

2. UNEP/FAO/IAEA: Designing of monitoring programmes and management of data concerning *chemical contaminants in marine organisms. MAP Technical Reports Series 77.* UNEP, Athens, 1993

3. UNEP/IOC/IAEA/FAO: Contaminant monitoring programmes using marine organisms: Quality Assurance and Good Laboratory Practice. UNEP Reference Methods for Marine Pollution Studies no. 57

4. UNEP/FAO/IOC/IAEA Guidelines for monitoring chemical contaminants in the sea using marine organisms. UNEP Reference Methods for Marine Pollution Studies no. 6

5. Report of the Consultation Meeting on the Evaluation of the Israeli Monitoring Programme (Haifa, 21-22 December 1992), UNEP(OCA)/MED WG.59/2

6. Bibliography on statistical aspects of trend monitoring

7. Outlines for a proposal of the Croatian Monitoring Programme (CMP)

8. Monitoring programme of the Eastern Adriatic Coastal Area, Report for 1983-1991

ANNEX III

AGENDA

1. Opening of the meeting
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3. Adoption of the agenda
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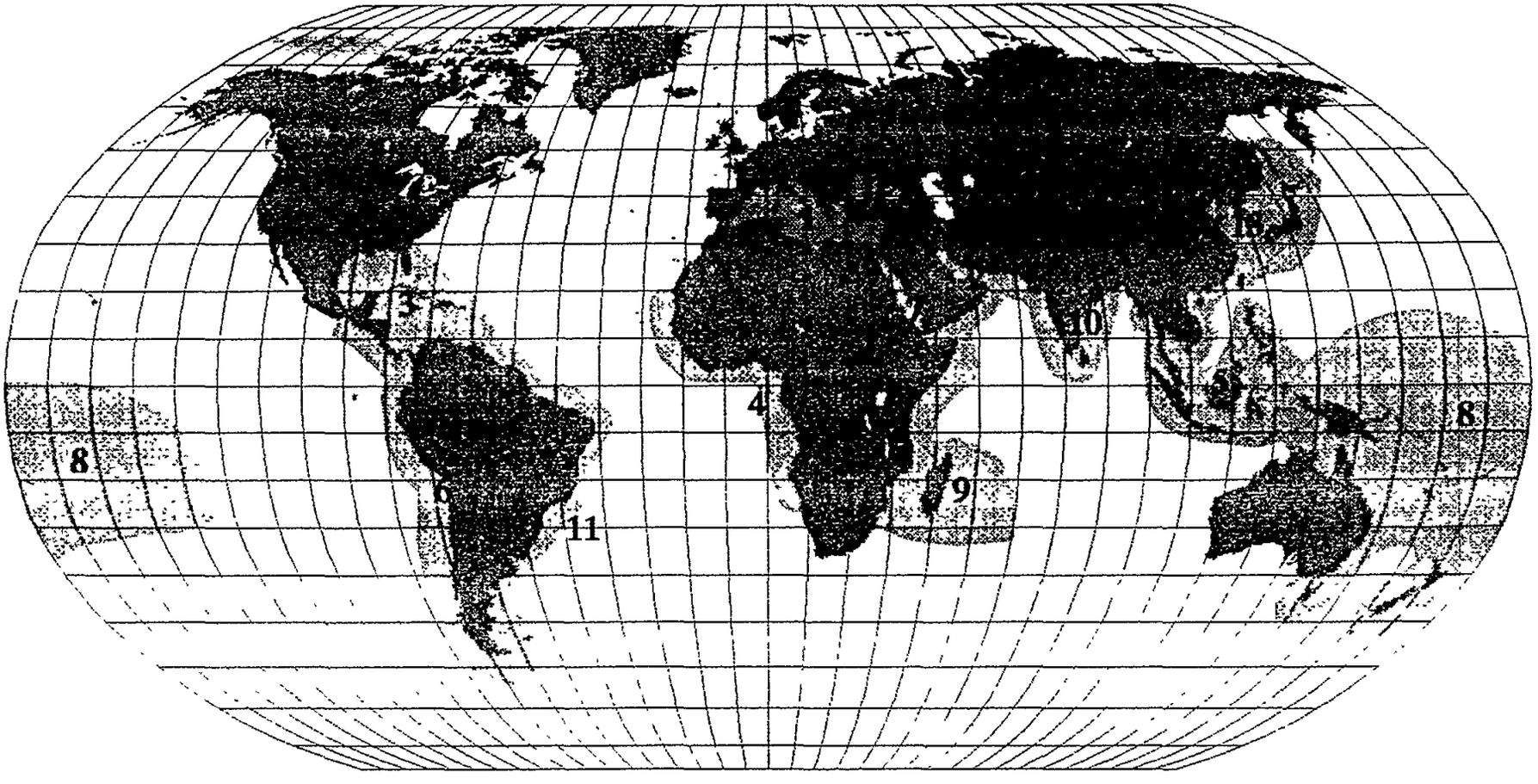
5. Presentation of the Monitoring Programme of the Eastern Adriatic Coastal area (Report for 1983-1991)
6. MED POL objectives and achievements: new monitoring strategies
7. Draft of the new Croatian monitoring programme
8. Conclusions

ANNEX IV

TRANSPARENCIES PRESENTED BY L. JEFTIĆ



1. Mediterranean Region
2. Kuwait Action Plan Region
3. Wider Caribbean Region
4. West and Central African Region
5. East Asian Seas Region
6. South East Pacific Region
7. Red Sea and Gulf of Aden Region
8. South Pacific Region
9. Eastern African Region
10. South Asian Seas Region
11. South West Atlantic Region
12. Black Sea Region
13. North West Pacific Region

UNEP/MEDU
3 September 1993
Internal Code REGSEAS3

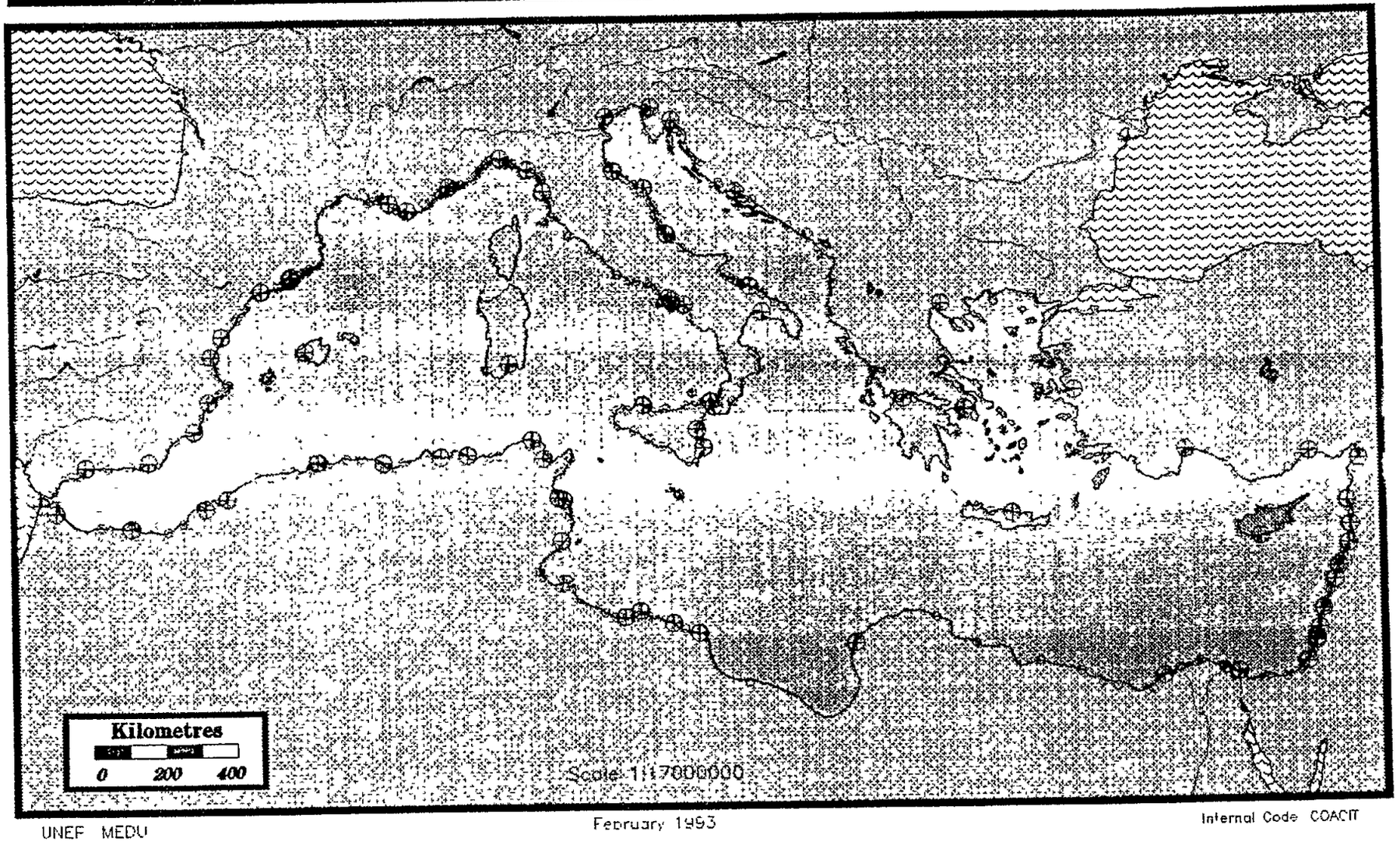
Geographic coverage of UNEP Regional Seas Programme

LENGTH OF MEDITERRANEAN COASTLINE

	CONTINENT	ISLANDS	TOTAL	%
SPAIN	1,679	910	2,589	5.74
FRANCE	901	802	1,703	3.77
MONACO			5	0.01
ITALY	4,184	3,766	7,950	17.61
SLOVENIA			41	0.09
CROATIA	1,745	4,028	5,773	12.79
BOSNIA			24	0.05
MONTE NEGRO			278	0.62
ALBANIA			470	1.04
GREECE	7,300	7,700	15,000	33.23
TURKEY	4,141	499	4,640	10.28
CYPRUS			537	1.20
SYRIA			152	0.34
LEBANON			195	0.43
ISRAEL			222	0.49
EGYPT			996	2.21
TUNISIA			1,028	2.29
LIBYA			1,685	3.73
MALTA			190	0.42
ALGERIA			1,300	2.88
MOROCCO			352	0.78
TOTAL	19,950	17,705	45,130	100.00

Mediterranean Coastal Cities

Population:
- ○ 10,000 to 100,000
- ⊕ Above 100,000



UNEF MEDU

February 1993

Internal Code COACIT

COMPONENTS
OF THE MEDITERRANEAN ACTION PLAN

- INTEGRATED PLANNING OF THE DEVELOPMENT AND MANAGEMENT OF THE RESOURCES OF THE MEDITERRANEAN BASIN (BLUE PLAN AND PRIORITY ACTIONS PROGRAMME);

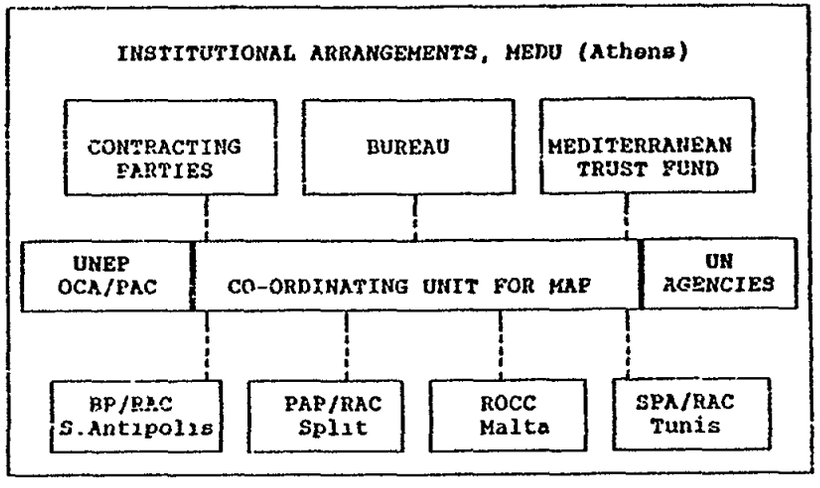
- CO-ORDINATED PROGRAMME FOR RESEARCH, MONITORING AND EXCHANGE OF INFORMATION AND ASSESSMENT OF THE STATE OF POLLUTION AND OF PROTECTION MEASURES (MED POL);

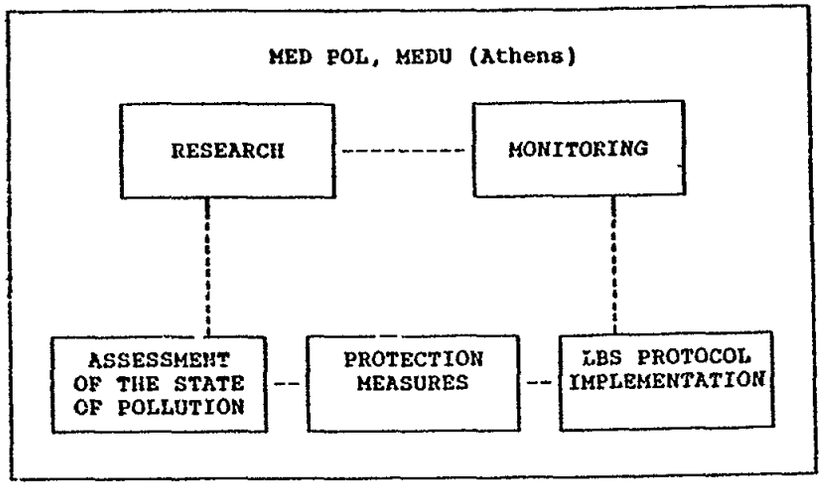
- FRAMEWORK CONVENTION AND RELATED PROTOCOLS WITH THEIR TECHNICAL ANNEXES FOR THE PROTECTION OF THE MEDITERRANEAN ENVIRONMENT;

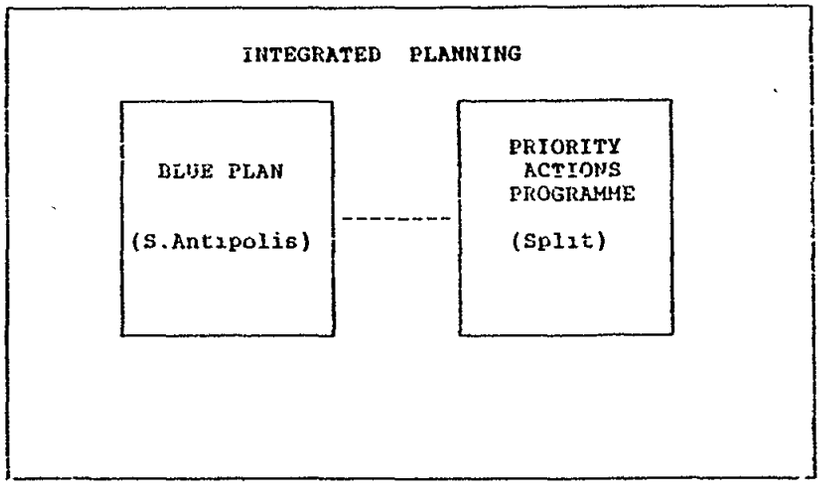
- INSTITUTIONAL AND FINANCIAL ARRANGEMENTS.

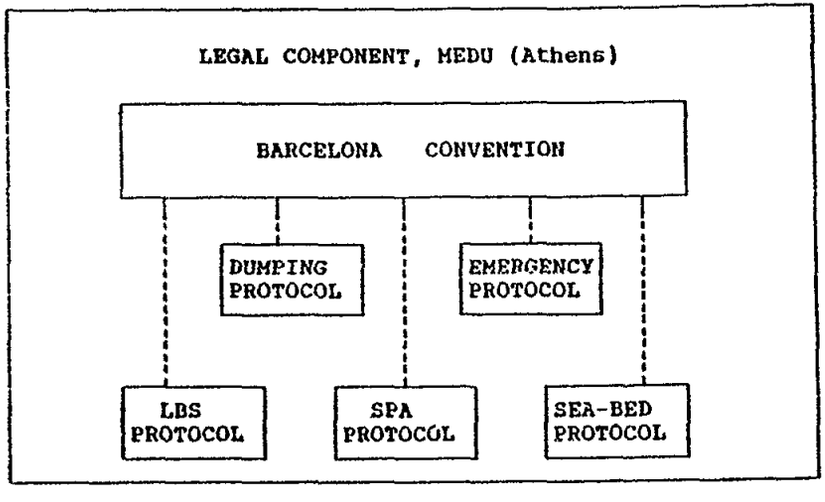
MEDITERRANEAN ACTION PLAN (MAP)

CO-ORDINATION OF ALL FOUR COMPONENTS BY THE CO-ORDINATING UNIT FOR MAP (MEDU), Athens









MEDU = CO-ORDINATING UNIT FOR MAP; OCA/PAC = OCEANS AND COASTAL AREAS PROGRAMME ACTIVITY CENTRE; BP = BLUE PLAN; RAC = REGIONAL ACTIVITY CENTRE; PAP = PRIORITY ACTIONS PROGRAMME; ROCC = REGIONAL OIL COMBATING CENTRE; SPA = SPECIALLY PROTECTED AREAS; MED POL = CO-ORDINATED PROGRAMME FOR RESEARCH, MONITORING, ASSESSMENT OF THE STATE OF POLLUTION AND PROTECTION MEASURES; LBS = LAND-BASED SOURCES; SEA-BED = EXPLORATION AND EXPLOITATION OF SEA-BED.

PROTOCOLS RELATED TO THE BARCELONA CONVENTION

- PROTOCOL FOR THE PREVENTION OF POLLUTION OF THE MEDITERRANEAN SEA BY DUMPING FROM SHIPS AND AIRCRAFT (DUMPING PROTOCOL)
  ADOPTED 18 FEBRUARY 1976 ENTRY INTO FORCE 12 FEBRUARY 1978

- PROTOCOL CONCERNING CO-OPERATION IN COMBATING POLLUTION OF THE MEDITERRANEAN SEA BY OIL AND OTHER HARMFUL SUBSTANCES IN CASES OF EMERGENCY (EMERGENCY PROTOCOL)
  ADOPTED 18 FEBRUARY 1976 ENTRY INTO FORCE 12 FEBRUARY 1978

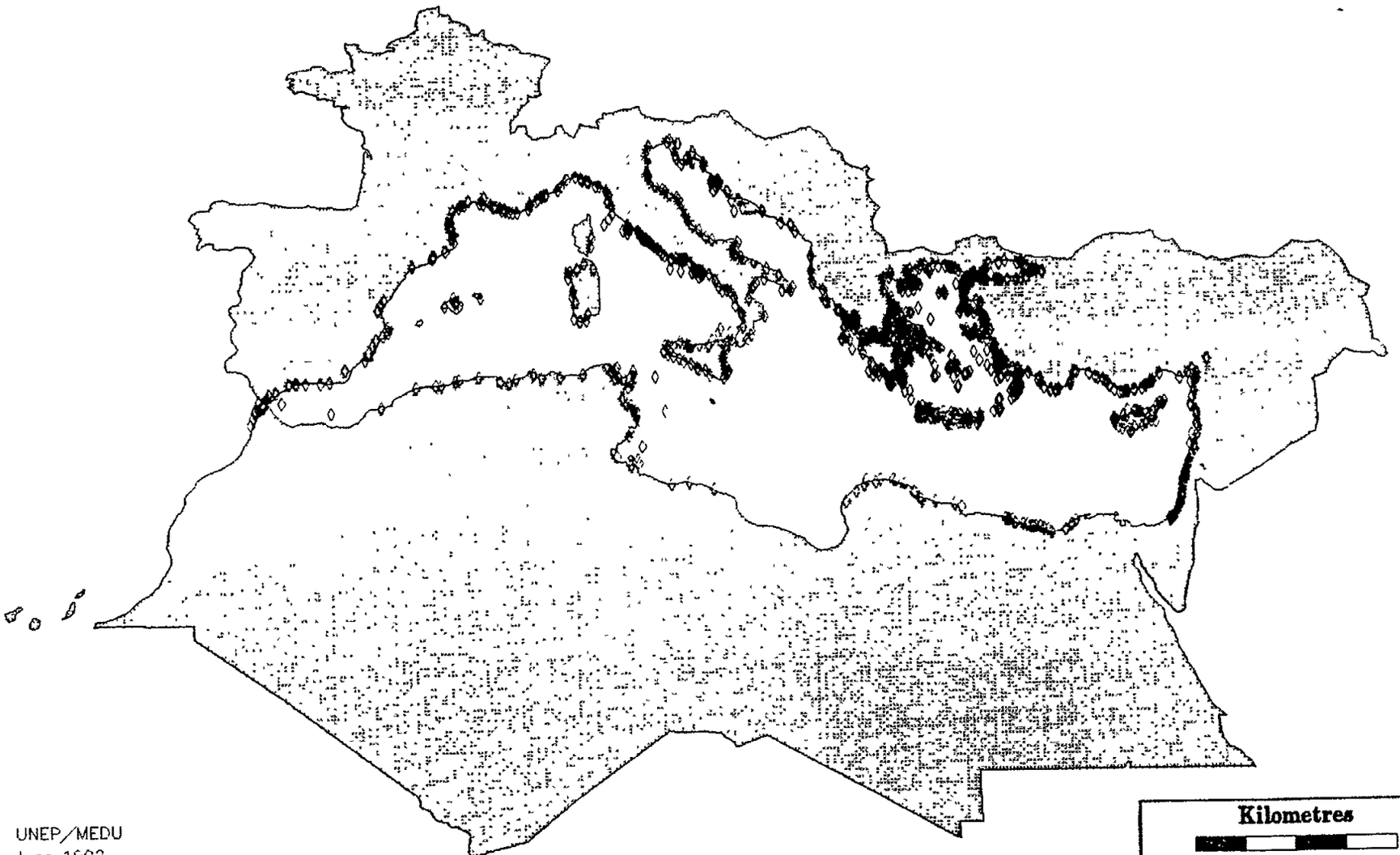
- PROTOCOL FOR THE PROTECTION OF THE MEDITERRANEAN SEA AGAINST POLLUTION FROM LAND-BASED SOURCES (LBS PROTOCOL)
  ADOPTED 17 MAY 1980 ENTRY INTO FORCE 17 JUNE 1983

- PROTOCOL CONCERNING MEDITERRANEAN SPECIALLY PROTECTED AREAS (SPA PROTOCOL)
  ADOPTED 2 APRIL 1982 ENTRY INTO FORCE 23 MARCH 1986

- PROTOCOL CONCERNING THE PROTECTION OF THE MEDITERRANEAN SEA AGAINST POLLUTION RESULTING FROM EXPLORATION AND EXPLOITATION OF THE CONTINENTAL SHELF AND THE SEA-BED AND ITS SUB-SOIL
  (IN PREPARATION)

Mediterranean Underwater Archeological Sites

Compiled by N. C. Flemming and C. O. Webb



UNEP/MEDU
June 1992

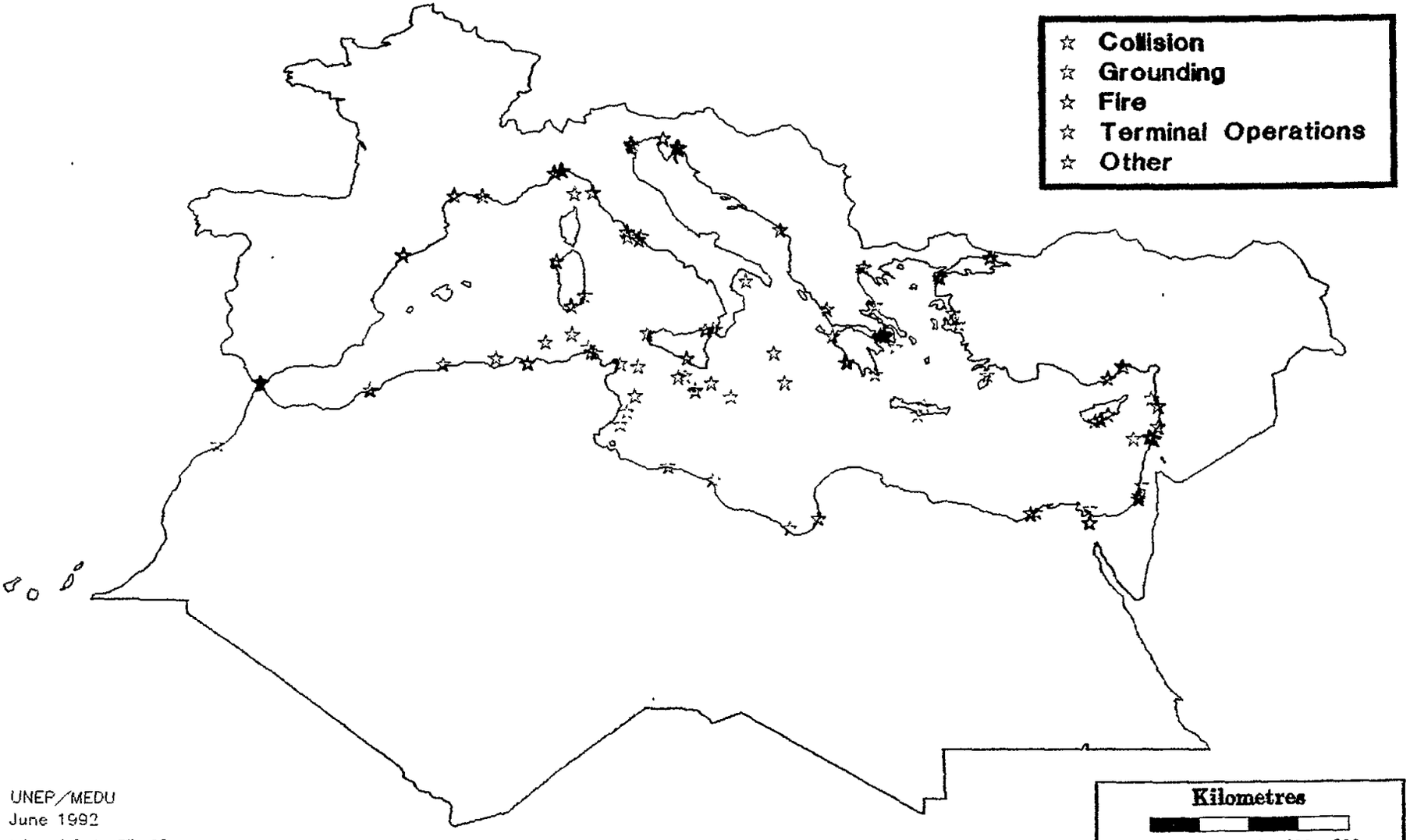
Internal Code UNDSITES

Scale 1.25000000

Kilometres

0 200 400 600 800

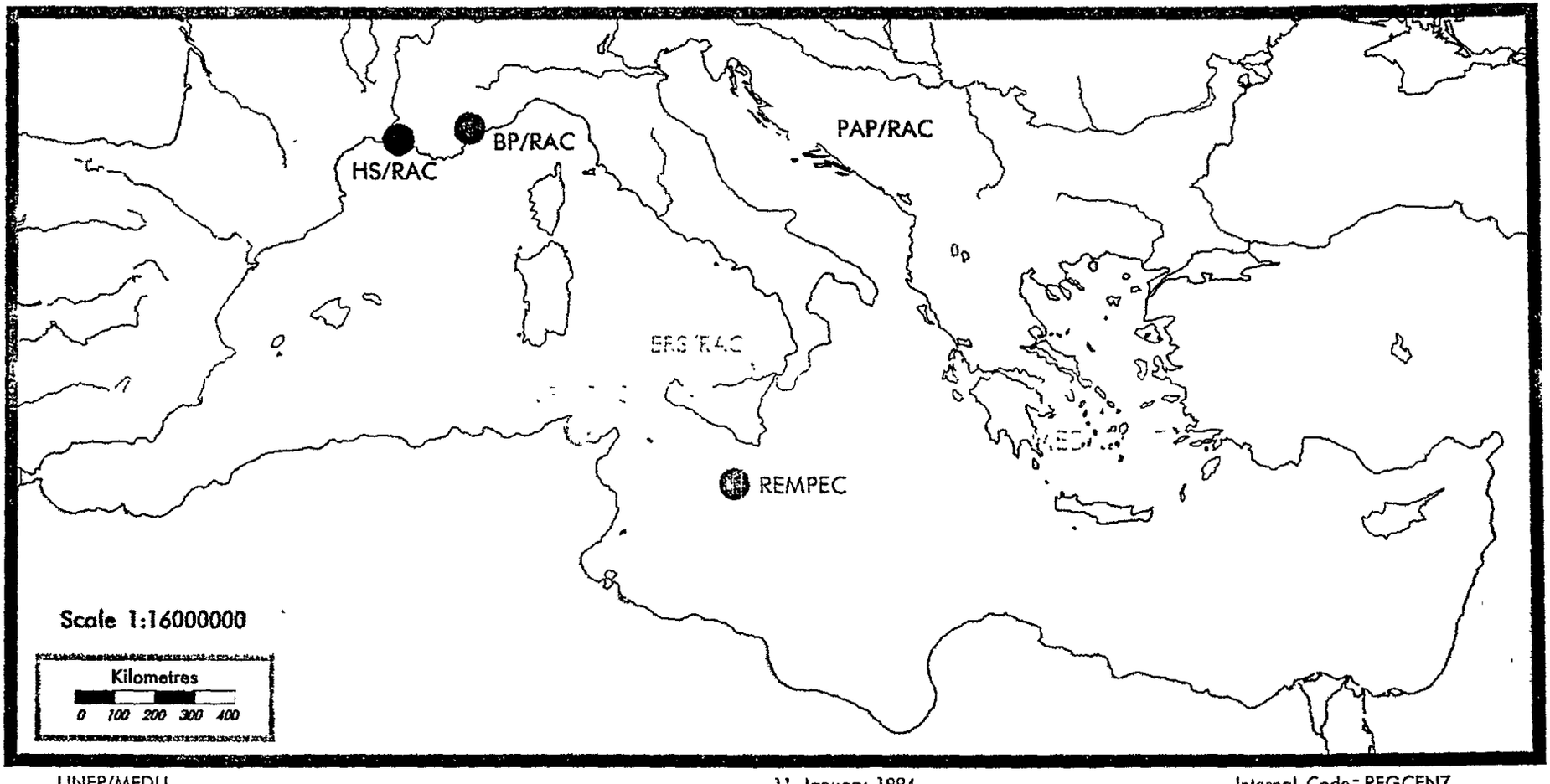
Mediterranean Sea Accidents



UNEP/MEDU
June 1992
Internal Code. SEAACC

Scale 1:25000000

Mediterranean Action Plan



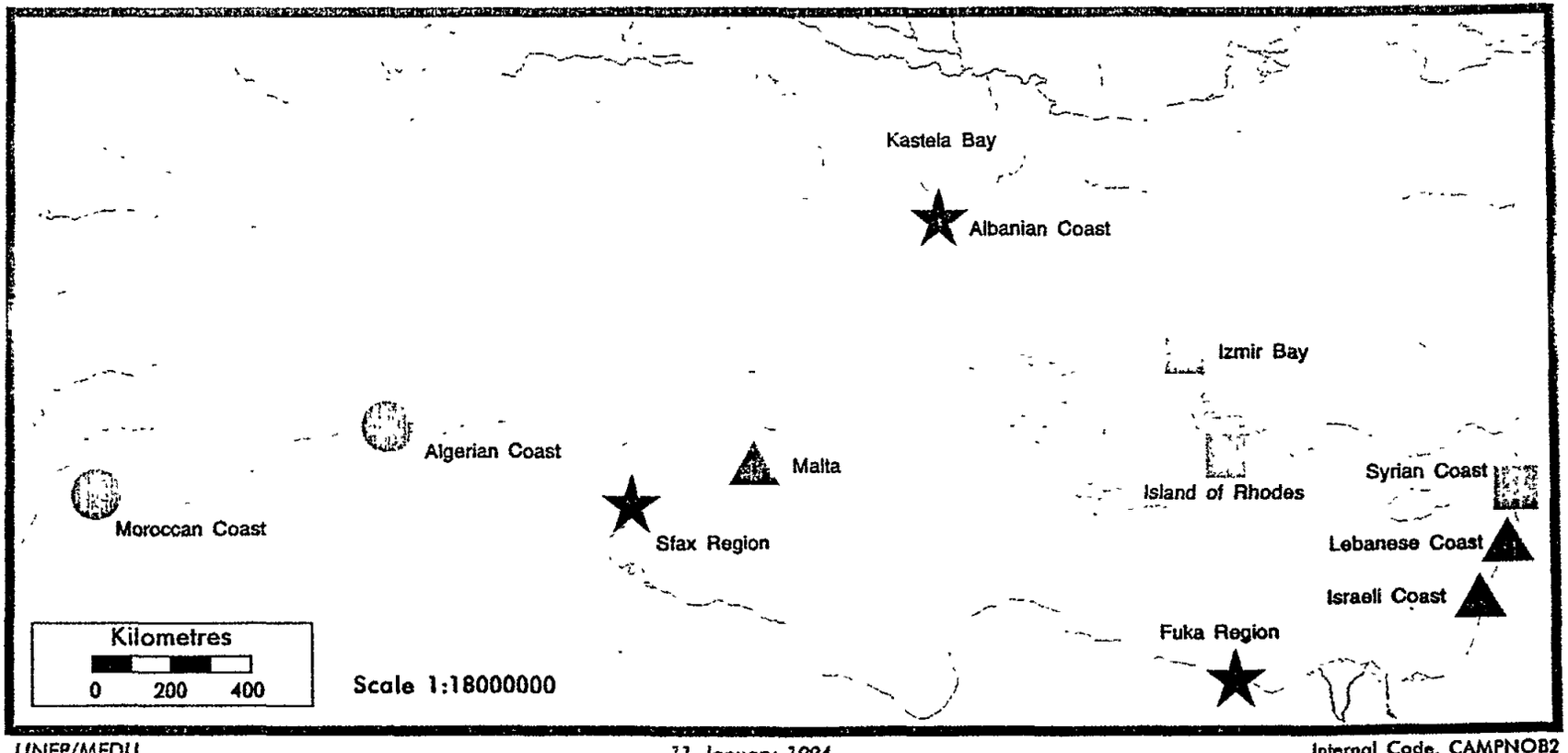
UNEP/MEDU

11 January 1994

Internal Code: REGCEN7

Coastal Area Management Programmes

TO BE FINALIZED (4) | INITIATED (3) | TO BE INITIATED (2) | APPROVED (3)



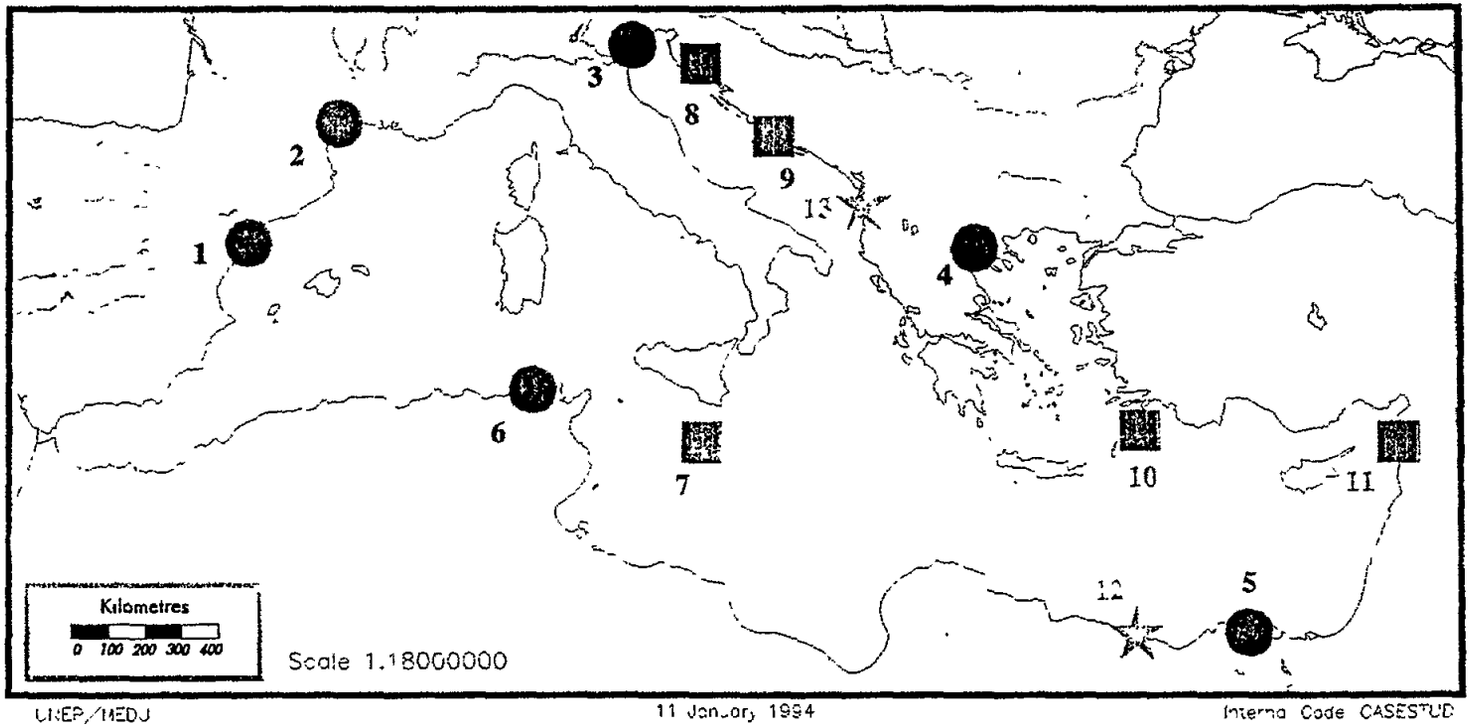
UNEP/MEDU

11 January 1994

Internal Code. CAMPNOB2

THE MEDITERRANEAN REGION

Location of Case Studies on Implications of Climatic Changes



UNEP/MEDU 11 January 1994 Interna Code CASESTUD

1987 - 1989

1. EBRO DELTA
2. GULF OF LION/RHONE DELTA
3. PO DELTA/VENICE LAGOON
4. THERMAIKOS GULF
5. NILE DELTA
6. LAKES ICHKEUL/BIZERTE

1990 - 1992

7. MALTA ISLAND
8. CRES/LOSINJ ISLANDS
9. KASTELA BAY
10. RHODES ISLAND
11. SYRIAN COAST

1993 - 1994

12. FUKA MATROUH
13. ALBANIAN COAST

OBJECTIVES OF MED POL-PHASE I

- TO FORMULATE AND CARRY OUT A CO-ORDINATED POLLUTION MONITORING AND RESEARCH PROGRAMME TAKING INTO ACCOUNT THE GOALS OF THE MEDITERRANEAN ACTION PLAN AND THE CAPABILITIES OF THE MEDITERRANEAN RESEARCH CENTRES;

- TO ASSIST NATIONAL RESEARCH CENTRES IN DEVELOPING THEIR CAPABILITIES TO PARTICIPATE IN THE PROGRAMME;

- TO ANALYZE THE SOURCES, AMOUNTS, LEVELS, PATHWAYS, TRENDS AND EFFECTS OF POLLUTANTS IN THE MEDITERRANEAN SEA;

- TO PROVIDE THE SCIENTIFIC-TECHNICAL INFORMATION NEEDED BY THE MEDITERRANEAN STATES AND THE EEC FOR NEGOTIATION AND IMPLEMENTATION OF THE CONVENTION FOR THE PROTECTION OF THE MEDITERRANEAN SEA AGAINST POLLUTION AND ITS RELATED PROTOCOLS;

- TO BUILD UP CONSISTENT TIME-SERIES ON THE SOURCES, PATHWAYS, LEVELS AND EFFECTS OF POLLUTANTS IN THE MEDITERRANEAN SEA.

MED POL - PHASE I

MED POL I - MED POL VII

MED POL I : BASELINE STUDIES AND MONITORING AND OIL AND PETROLEUM HYDROCARBONS IN MARINE WATERS

MED POL II : BASELINE STUDIES AND MONITORING OF METALS, PARTICULARLY MERCURY AND CADMIUM, IN MARINE ORGANISMS

MED POL III : BASELINE STUDIES AND MONITORING OF DDT, PCBS, AND OTHER CHLORINATED HYDROCARBONS IN MARINE ORGANISMS

MED POL IV : RESEARCH ON THE EFFECTS OF POLLUTANTS ON MARINE ORGANISMS AND THEIR POPULATIONS

MED POL V : RESEARCH ON THE EFFECTS OF POLLUTANTS ON MARINE COMMUNITIES AND ECOSYSTEMS

MED POL VI : PROBLEMS OF COASTAL TRANSPORT OF POLLUTANTS

MED POL VII : COASTAL WATER QUALITY CONTROL

MED POL VIII - MED POL XIII

MED POL VIII : BIOGEOCHEMICAL STUDIES OF SELECTED POLLUTANTS IN THE OPEN WATERS OF THE MEDITERRANEAN

MED POL IX : ROLE OF SEDIMENTATION IN THE POLLUTION OF THE MEDITERRANEAN SEA

MED POL X : POLLUTANTS FROM LAND-BASED SOURCES IN THE MEDITERRANEAN

MED POL XI : INTERCALIBRATION OF ANALYTICAL TECHNIQUES AND COMMON MAINTENANCE SERVICES

MED POL XII : INPUT OF POLLUTANTS INTO THE MEDITERRANEAN SEA VIA THE ATMOSPHERE

MED POL XIII : MODELLING OF MARINE SYSTEMS

OBJECTIVES OF MED POL-PHASE II

- INFORMATION REQUIRED FOR THE IMPLEMENTATION OF THE CONVENTION AND THE PROTOCOLS;

- INDICATORS AND EVALUATION OF THE EFFECTIVENESS OF THE POLLUTION PREVENTION MEASURES TAKEN UNDER THE CONVENTION AND THE PROTOCOLS;

- SCIENTIFIC INFORMATION THAT MAY LEAD TO EVENTUAL REVISIONS AND AMENDMENTS OF THE RELEVANT PROVISIONS OF THE CONVENTION AND THE PROTOCOLS AND FOR THE FORMULATION OF ADDITIONAL PROTOCOLS;

- INFORMATION THAT COULD BE USED TO FORMULATE ENVIRONMENTALLY SOUND NATIONAL, BILATERAL AND MULTILATERAL MANAGEMENT DECISIONS ESSENTIAL FOR THE CONTINUOUS SOCIO-ECONOMIC DEVELOPMENT OF THE MEDITERRANEAN REGION ON A SUSTAINABLE BASIS;

- PERIODIC ASSESSMENT OF THE STATE OF POLLUTION OF THE MEDITERRANEAN SEA.

MED POL - PHASE II

RESEARCH

ACTIVITY 'A' : DEVELOPMENT AND TESTING OF SAMPLING AND ANALYTICAL TECHNIQUES FOR MONITORING OF MARINE POLLUTANTS

ACTIVITY 'B' : DEVELOPMENT OF REPORTING FORMATS REQUIRED ACCORDING TO THE DUMPING, EMERGENCY AND LAND-BASED SOURCES PROTOCOL

ACTIVITY 'C' : FORMULATION OF THE SCIENTIFIC RATIONALE FOR MEDITERRANEAN ENVIRONMENTAL QUALITY CRITERIA

ACTIVITY 'D' : EPIDEMIOLOGICAL STUDIES RELATED TO ENVIRONMENTAL QUALITY CRITERIA

ACTIVITY 'E' : GUIDELINES AND CRITERIA FOR THE APPLICATION OF THE LAND-BASED SOURCES PRCTOCOL

ACTIVITY 'F' : RESEARCH ON OCEANOGRAPHIC PROCESSES

ACTIVITY 'G' : RESEARCH ON THE TOXICITY, PERSISTENCE, BIO-ACCUMULATION, CARCINOGENICITY AND MUTAGENICITY

ACTIVITY 'H' : EUTROPHICATION AND CONCOMMITTANT PLANKTON BLOOMS

ACTIVITY 'I' : POLLUTION-INDUCED ECOSYSTEMS AND MODIFICATIONS

ACTIVITY 'J' : EFFECTS OF THERMAL DISCHARGES ON COASTAL ORGANISMS AND ECOSYSTEMS

ACTIVITY 'K' : BIOGEOCHEMICAL CYCLES OF SPECIFIC POLLUTANTS

ACTIVITY 'L' : POLLUTANT-TRANSFER PROCESSES

MED POL RESEARCH AREAS

(AS FROM 1990)

Research area I - Characterization and measurement

This area will include projects which cover the characterization (identification of chemical or microbiological components) and measurement development and testing of methodologies of specified contaminants.

Research area II - Transport and dispersion

This area will include projects which aim at improving the understanding of the physical, chemical and biological mechanisms that transport potential pollutants from their sources to their ultimate repositories. Typical topics will be atmospheric transport and deposition, water movements and mixing, transport of contaminants by sedimentation and their incorporation in biogeochemical cycles. Priority will be given to the provision of quantitative information ultimately useful for modelling the system and contributing to regional assessments.

Research area III - Effects

This area will include projects relevant to the effects of selected contaminants, listed in annexes I and II of the Land-Based Sources and Dumping Protocols, to marine organisms, communities and ecosystems or man and human populations. Priority will be given to effects and techniques providing information useful for establishing environmental quality criteria.

Research area IV - Fates/Environmental transformation

This area will include projects studying the fate of contaminants (including microorganisms) in the marine environment such as persistence or survival, degradation, transformation, bioaccumulation etc. but excluding transport and dispersion which is dealt in area II.

Research area V - Prevention and control

This area will include projects dealing with the determination of the factors affecting the efficiency of waste treatment and disposal methods under specific local conditions as well as the development of environmental quality criteria and common measures for pollution abatement.

MED POL RESEARCH AREAS

(AS FROM 1992)

Research area VI - Eutrophication and Plankton Blooms

This area will include "case studies" related to eutrophication and plankton blooms. The studies will cover the physical and biological aspects of this phenomenon including modelling and will be concentrated in specific limited areas.

MED POL - PHASE II

MONITORING

1. MONITORING OF SOURCES OF POLLUTION PROVIDING INFORMATION ON THE TYPE AND AMOUNT OF POLLUTANTS RELEASED DIRECTLY INTO THE ENVIRONMENT

2. MONITORING OF NEARSHORE AREAS, INCLUDING ESTUARIES, UNDER THE DIRECT INFLUENCE OF POLLUTANTS FROM IDENTIFIABLE PRIMARY (OUTFALL,S DISCHARGE AND COASTAL DUMPING POINTS) OR SECONDARY (RIVER) SOURCES

3. MONITORING OF OFFSHORE AREAS (REFERENCE AREAS) PROVIDING INFORMATION ON THE GENERAL TRENDS IN THE LEVEL OF POLLUTION IN THE MEDITERRANEAN

4. MONITORING OF THE TRANSPORT OF POLLUTANTS TO THE MEDITERRANEAN THROUGH THE ATMOSPHERE, PROVIDING ADDITIONAL INFORMATION ON THE POLLUTION LOAD REACHING THE MEDITERRANEAN SEA

M E D P O L - P H A S E II

MONITORING PROGRAMME

SELECTED PARAMETERS

THE PARAMETERS TO BE MONITORED WOULD BE DIVIDED INTO TWO CATEGORIES:

CATEGORY I:

- PARAMETERS WHICH SHOULD BE INCLUDED IN NATIONAL MONITORING PROGRAMMES WITHIN THE FRAMEWORK OF MED POL

CATEGORY II:

- PARAMETERS WHICH SHOULD BE INCLUDED IN NATIONAL MONITORING PROGRAMMES WHENEVER NECESSARY AND APPLICABLE

MED POL - PHASE II

MONITORING PROGRAMME

SELECTED PARAMETERS

A. MONITORING OF EFFLUENTS

CATEGORY I PARAMETERS:

VOLUME AND CHARACTERISTICS OF DISCHARGE (E.G. PH, TEMPERATURE, GENERAL COMPOSITION)

- TOTAL MERCURY
- TOTAL CADMIUM
- TOTAL SUSPENDED SOLIDS
- TOTAL PHOSPHORUS
- TOTAL NITROGEN
- FAECAL COLIFORMS
- BOD/COD
- HIGH MOLECULAR WEIGHT HALOGENATED HYDROCARBONS

CATEGORY II PARAMETERS:

- PETROLEUM HYDROCARBONS
- DETERGENTS
- PHENOLS
- TOTAL CHROMIUM
- SELECTED RADIONUCLIDES
- OTHER POLLUTANTS KNOWN TO BE DISCHARGED IN SIGNIFICANT QUANTITIES

NOTE: IN THE SPECIFIC CASE OF MONITORING INDUSTRIAL EFFLUENTS, THE PARAMETERS LISTED ABOVE AND/OR OTHER PARAMETERS SHOULD BE SELECTED IN ACCORDANCE WITH THE SPECIFIC COMPOSITION OF THE WASTEWATER DISCHARGED

MED POL - PHASE II

MONITORING PROGRAMME

SELECTED PARAMETERS

B. MONITORING OF ESTUARIES INCLUDING THE AREAS DEFINED IN ARTICLE 3(B) OF THE LAND-BASED SOURCES PROTOCOL

CATEGORY I PARAMETERS:

- TOTAL MERCURY IN ORGANISMS AND SEDIMENTS
- ORGANIC MERCURY IN ORGANISMS
- TOTAL CADMIUM IN ORGANISMS AND SEDIMENTS
- HIGH MOLECULAR WEIGHT HALOGENATED HYDROCARBONS IN ORGANISMS AND SEDIMENTS
- FAECAL COLIFORMS IN WATER AND BIVALVES
- TOTAL PHOSPHORUS IN WATER AND SUSPENDED MATTER
- TOTAL NITROGEN IN WATER AND SUSPENDED MATTER
- TOTAL SUSPENDED MATTER
- COD
- BASIC OCEANOGRAPHICAL AND METEOROLOGICAL PARAMETERS (SALINITY, OXYGEN, TEMPERATURE, CHLOROPHYLL)

CATEGORY II PARAMETERS:

- RADIONUCLIDES IN ORGANISMS
- POLYNUCLEAR AROMATIC HYDROCARBONS IN ORGANISMS
- PHENOLS IN WATER

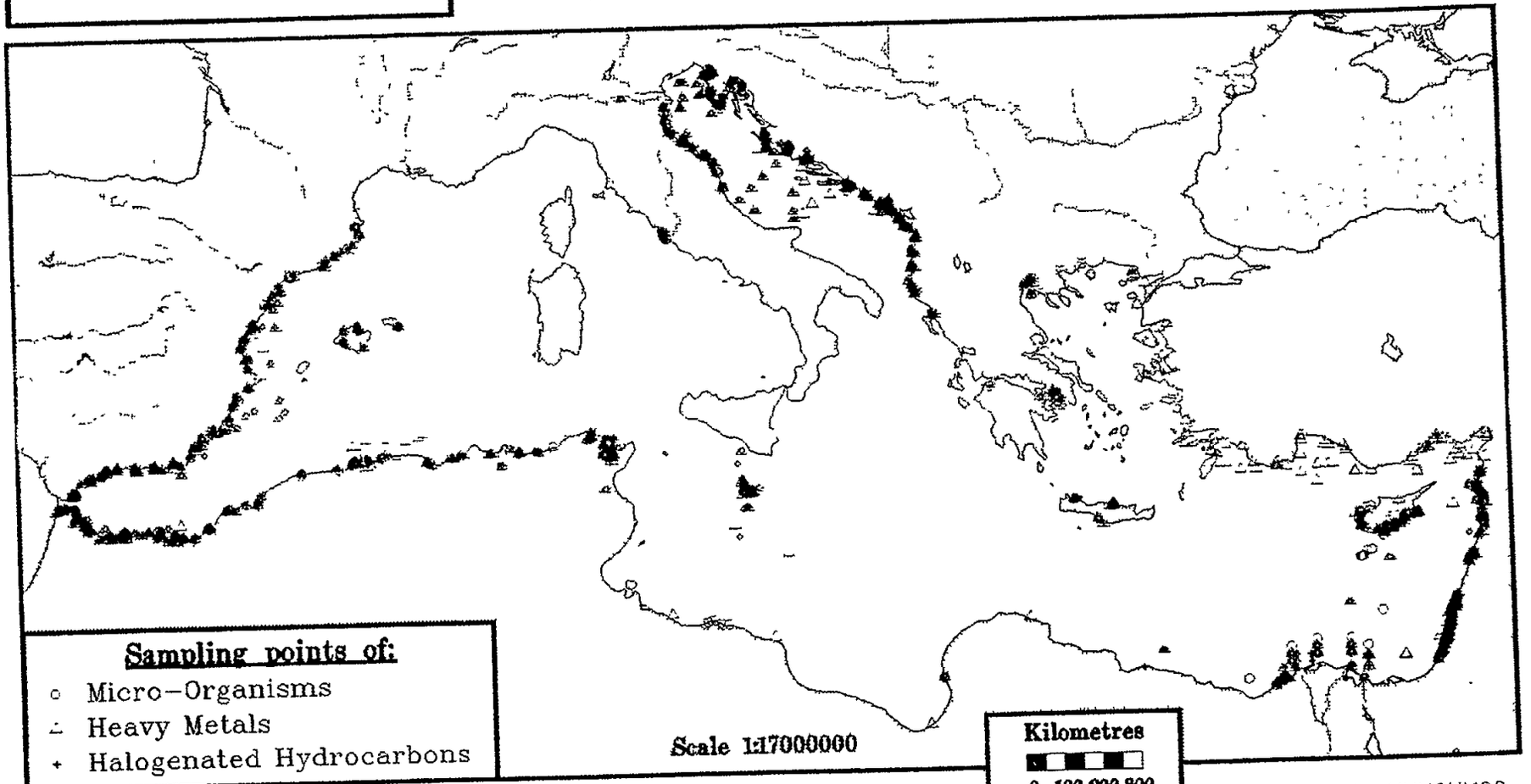
C. MONITORING OF REFERENCE AREAS

THE SAME PARAMETERS (BOTH CATEGORY I AND CATEGORY II) SELECTED FOR COASTAL WATERS

MONITORING STATIONS

Mediterranean Pollution Monitoring

MED POL Phase II - 1983 to 1992



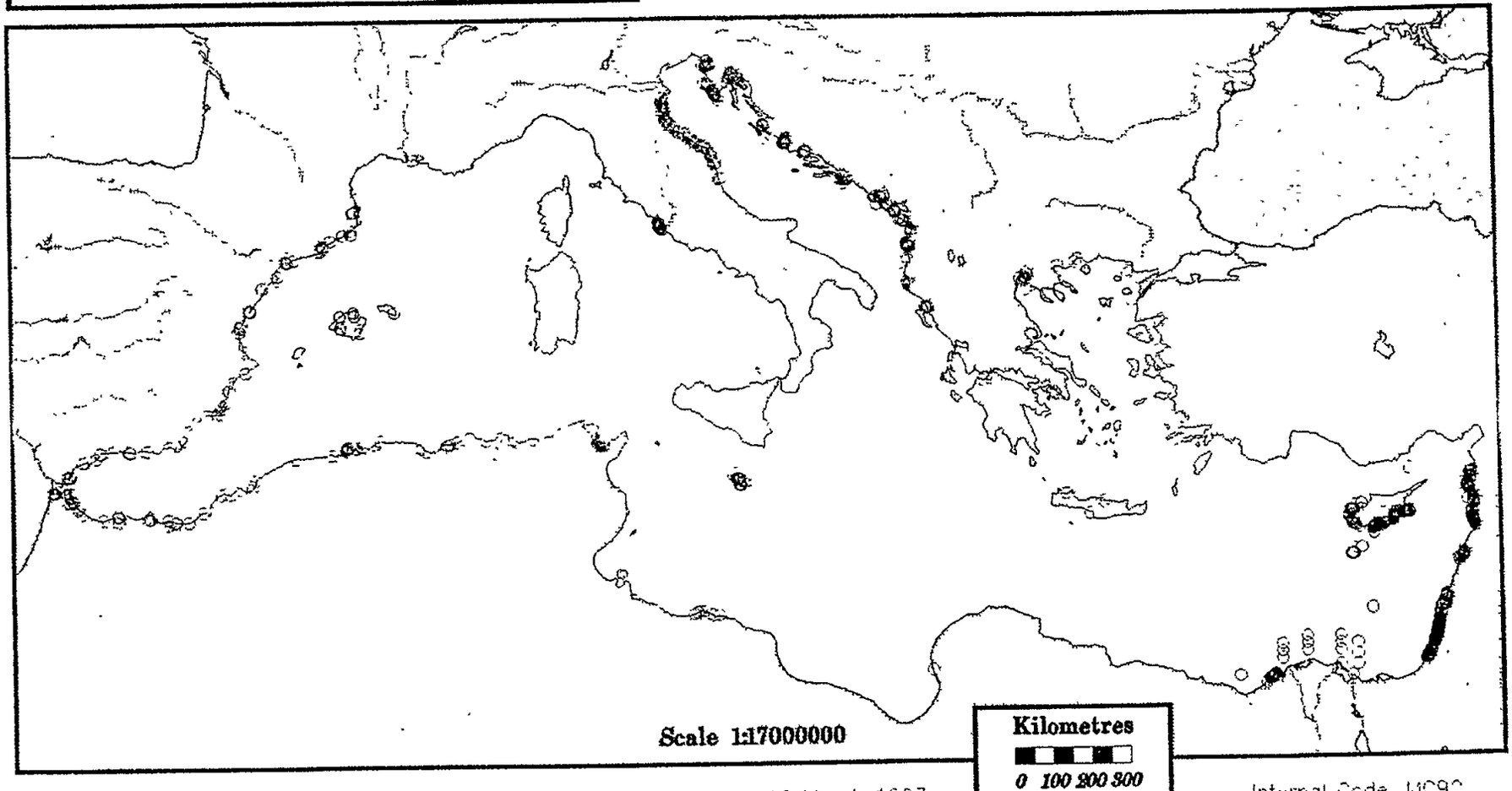
UNEP/MEDU 16 March 1993

Internal Code. HHMCHM92

MICROBIOLOGICAL MONITORING STATIONS

Mediterranean Pollution Monitoring

MED POL Phase II - 1983 to 1992



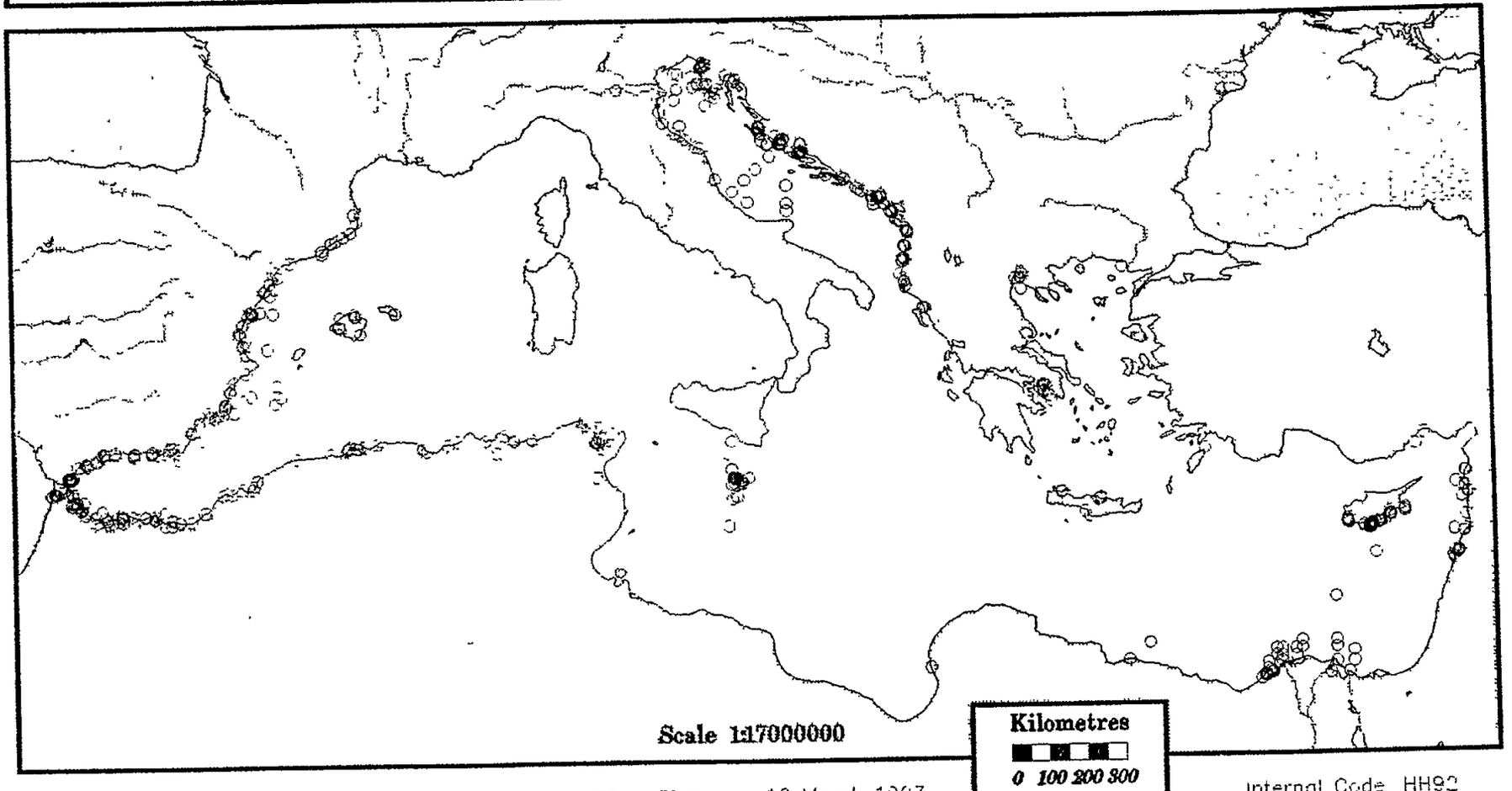
UNEP/MEDU 16 March 1993

Internal Code MC92

HALOGENATED HYDROCARBONS MONITORING STATIONS

Mediterranean Pollution Monitoring

MED POL Phase II - 1983 to 1992



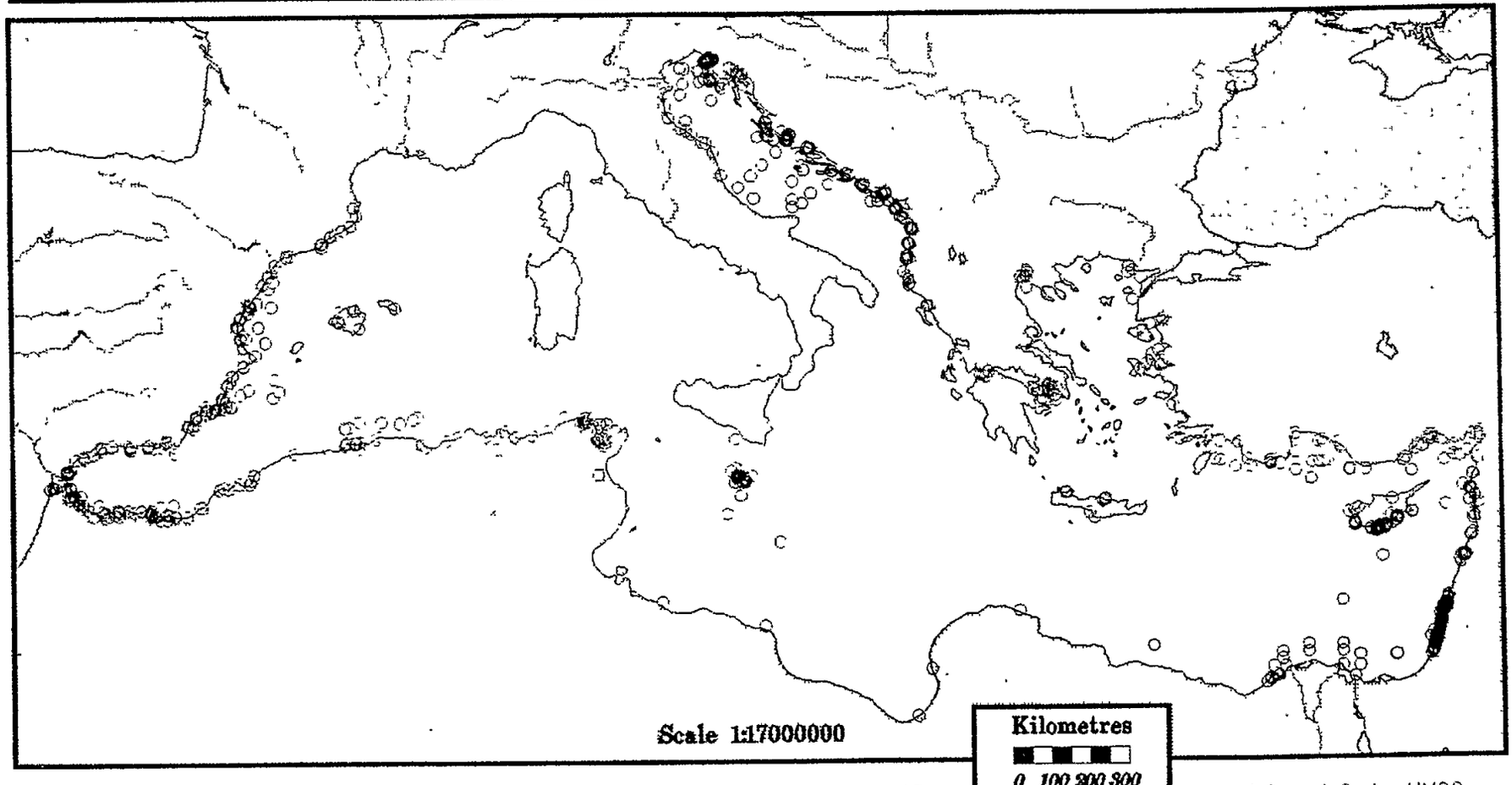
UNEP MEDU 16 March 1993

Internal Code HH92

HEAVY METALS MONITORING STATIONS

Mediterranean Pollution Monitoring

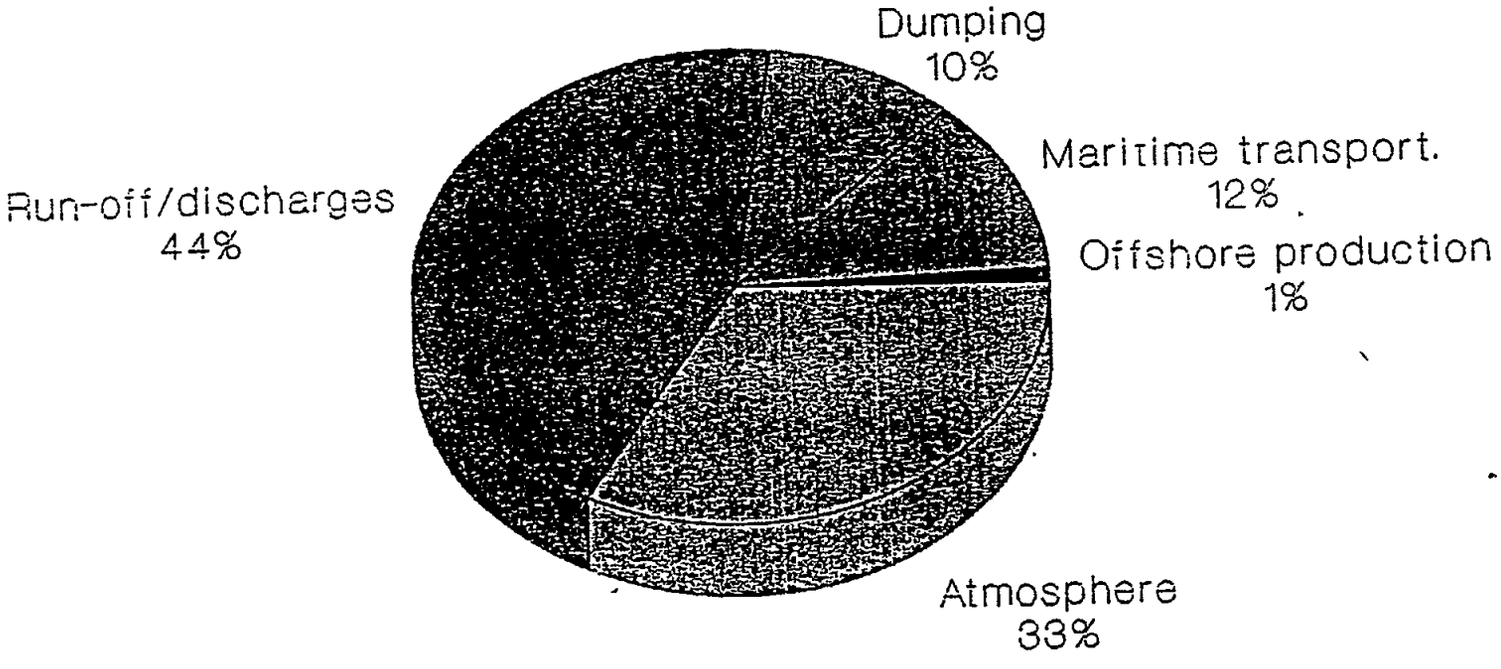
MED POL Phase II - 1983 to 1992



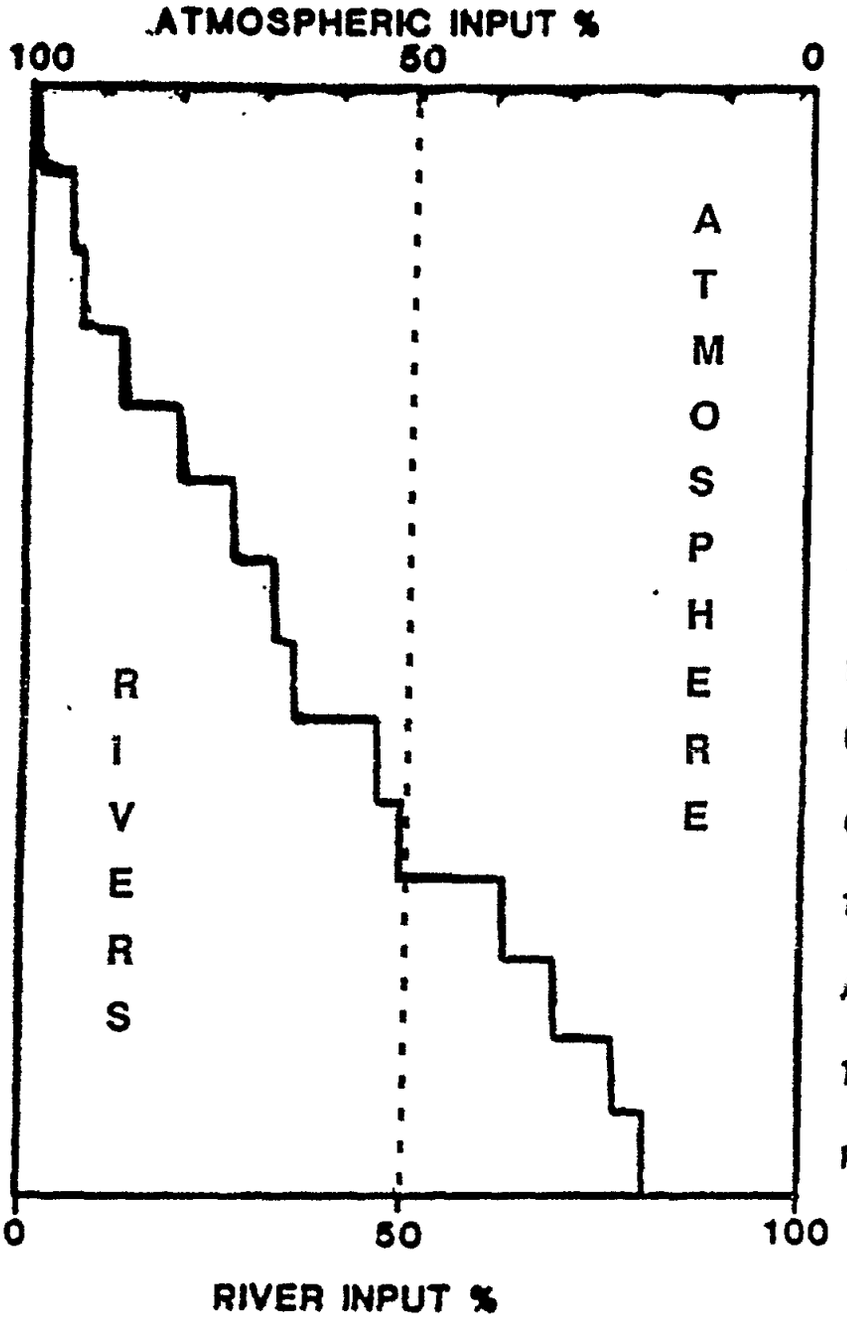
UNEP/MEDU 16 March 1993

Internal Code. HM92

Relative contribution of contaminants to the marine environment



(based on GESAMP 1990)



Dissolved Pb
Particulate Pb
" " Cd
" " Cu
Particles
Dissolved Cu
Pu-239+240
Dissolved Cd
WATER
Cs-137
Total N
Am-241
Total P
Pu-238

NORTH WESTERN MEDITERRANEAN

LAND-BASED SOURCES PROTOCOL

ANNEX I

A

THE FOLLOWING SUBSTANCES, FAMILIES AND GROUPS OF SUBSTANCES ARE LISTED, NOT IN ORDER OF PRIORITY, FOR THE PURPOSES OF ARTICLE 5 OF THIS PROTOCOL. THEY HAVE BEEN SELECTED MAINLY ON THE BASIS OF THEIR

TOXICITY;
PERSISTENCE;
BIOACCUMULATION.

1. ORGANOHALOGEN COMPOUNDS AND SUBSTANCES WHICH MAY FORM SUCH COMPOUNDS IN THE MARINE ENVIRONMENT.[1/]

2. ORGANOSPHOSPHORUS COMPOUNDS AND SUBSTANCES WHICH MAY FORM SUCH COMPOUNDS IN THE MARINE ENVIRONMENT.[1/]

3. ORGANOTIN COMPOUNDS AND SUBSTANCES WHICH MAY FORM SUCH COMPOUNDS IN THE MARINE ENVIRONMENT.[1/]

4. MERCURY AND MERCURY COMPOUNDS.

---

[1] WITH THE EXCEPTION OF THOSE WHICH ARE BIOLOGICALLY HARMLESS OR WHICH ARE RAPIDLY CONVERTED INTO BIOLOGICALLY HARMLESS SUBSTANCES.

LAND-BASED SOURCES PROTOCOL

ANNEX I

A

5. CADMIUM AND CADMIUM COMPOUNDS.

6. USED LUBRICATING OILS.

7. PERSITENT SYNTHETIC MATERIALS WHICH MAY FLOAT, SINK OR REMAIN IN SUSPENSION AND WHICH MAY INTERFERE WITH ANY LEGITIMATE USE OF THE SEA.

8. SUBSTANCES HAVING PROVEN CARCINOGENIC, TERATOGENIC OR MUTAGENIC PROPERTIES IN OR THROUGH THE MARINE ENVIRONMENT.

9. RADIOACTIVE SUBSTANCES, INCLUDING THEIR WASTES, WHEN THEIR DISCHARGES DO NOT COMPLY WITH THE PRINCIPLES OF RADIATION PROTECTION AS DEFINED BY THE COMPETENT INTERNATIONAL ORGANIZATIONS, TAKING INTO ACCOUNT THE PROTECTION OF THE MARINE ENVIRONMENT.

B

THE PRESENT ANNEX DOES NOT APPLY TO DISCHARGES WHICH CONTAIN SUBSTANCES LISTED IN SECTION A THAT ARE BELOW THE LIMITS DEFINED JOINTLY BY THE PARTIES.

LAND-BASED SOURCES PROTOCOL

ANNEX II

A

THE FOLLOWING SUBSTANCES, FAMILIES AND GROUPS OF SUBSTANCES, OR SOURCES OF POLLUTION, LISTED NOT IN ORDER OF PRIORITY FOR THE PURPOSES OF ARTICLE 6 OF THIS PROTOCOL, HAVE BEEN SELECTED MAINLY ON THE BASIS OF CRITERIA USED FOR ANNEX I, WHILE TAKING INTO ACCOUNT THE FACT THAT THEY ARE GENERALLY LESS NOXIOUS OR ARE MORE READILY RENDERED HARMLESS BY NATURAL PROCESSES AND THEREFORE GENERALLY AFFECT MORE LIMITED COASTAL AREAS.

1. THE FOLLOWING ELEMENTS AND THEIR COMPOUNDS:

1. ZINC	8. ANTIMONY	15. URANIUM
2. COPPER	9. MOLYBDENUM	16. VANADIUM
3. NICKEL	10. TITANIUM	17. COBALT
4. CHROMIUM	11. TIN	18. THALLIUM
5. LEAD	12. BARIUM	19. TELLURIUM
6. SELENIUM	13. BERYLLIUM	20. SILVER
7. ARSENIC	14. BORON	

2. BIOCIDES AND THEIR DERIVATIVES NOT COVERED IN ANNEX I.

3. ORGANOSILICON COMPOUNDS AND SUBSTANCES WHICH MAY FORM SUCH COMPOUNDS IN THE MARINE ENVIRONMENT, EXCLUDING THOSE WHICH ARE BIOLOGICALLY HARMLESS OR ARE RAPIDLY CONVERTED INTO BIOLOGICALLY HARMLESS SUBSTANCES.

4. CRUDE OILS AND HYDROCARBONS OF ANY ORIGIN.

LAND-BASED SOURCES PROTOCOL

ANNEX II

A

5. CYANIDES AND FLUORIDES.

6. NON-BIODEGRADABLE DETERGENTS AND OTHER SURFACE-ACTIVE SUBSTANCES.

7. INORGANIC COMPOUNDS OF PHOSPHORUS AND ELEMENTAL PHOSPHORUS.

8. PATHOGENIC MICRO-ORGANISMS.

9. THERMAL DISCHARGES.

10. SUBSTANCES WHICH HAVE A DELETARIOUS EFFECT ON THE TASTE AND/OR SMELL OF PRODUCTS FOR HUMAN CONSUMPTION DERIVED FROM THE AQUATIC ENVIRONMENT, AND COMPOUNDS LIABLE TO GIVE RISE TO SUCH SUBSTANCES IN THE MARINE ENVIRONMENT.

11. SUBSTANCES WHICH HAVE, DIRECTLY OR INDIRECTLY, AN ADVERSE EFFECT ON THE OXYGEN CONTENT OF THE MARINE ENVIRONMENT, ESPECIALLY THOSE WHICH MAY CAUSE EUTROPHICATION.

12. ACID OR ALKALINE COMPOUNDS OF SUCH COMPOSITION AND IN SUCH QUANTITY THAT THEY MAY IMPAIR THE QUALITY OF SEA WATER.

13. SUBSTANCES WHICH, THOUGH OF A NON-TOXIC NATURE, MAY BECOME HARMFUL TO THE MARINE ENVIRONMENT OR MAY INTERFERE WITH ANY LEGITIMATE USE OF THE SEA OWING TO THE QUANTITIES IN WHICH THEY ARE DISCHARGED.

B

THE CONTROL AND STRICT LIMITATION OF THE DISCHARGE OF SUBSTANCES REFERRED TO IN SECTION A ABOVE MUST BE IMPLEMENTED IN ACCORDANCE WITH ANNEX III.

IMPLEMENTATION WORKPLAN FOR LAND-BASED SOURCES PROTOCOL

1.	USED LUBRICATING OILS	1986
2.	SHELL-FISH AND SHELL-FISH GROWING WATERS	1986
3.	CADMIUM AND CADMIUM COMPOUNDS	1987
4.	MERCURY AND MERCURY COMPOUNDS	1987
5.	ORGANOHALOGEN COMPOUNDS	1987
6.	PERSISTENT SYNTHETIC MATERIALS WHICH MAY FLOAT, SINK OR REMAIN IN SUSPENSION	1988
7.	ORGANOPHOSPHOROUS COMPOUNDS	1988
8.	ORGANOTIN COMPOUNDS	1988
9.	RADIOACTIVE SUBSTANCES	1989
10.	CARCINOGENIC, TERATOGENIC OR MUTAGENIC SUBSTANCES	1989
11.	PATHOGENIC MICROORGANISMS	1989
12.	CRUDE OILS AND HYDROCARBONS OF ANY ORIGIN	1990
13.	ZINC, COPPER AND LEAD	1990
14.	NICKEL, CHROMIUM, SELENIUM AND ARSENIC	1990
15.	INORGANIC COMPOUNDS OF PHOSPHOROUS AND ELEMENTAL PHOSPHORUS	1991
16.	NON-BIODEGRADABLE DETERGENTS AND OTHER SURFACE-ACTIVE SUBSTANCES	1991
17.	THERMAL DISCHARGES	1991
18.	ACID OR ALKALINE COMPOUNDS	1992
19.	SUBSTANCES HAVING ADVERSE EFFECT ON THE OXYGEN CONTENT	1992
20.	BARIUM, URANIUM AND COBALT	1992
21.	CYANIDES AND FLUORIDES	1993
22.	SUBSTANCES, OF A NON-TOXIC NATURE, WHICH MAY BECOME HARMFUL OWING TO THE QUANTITIES DISCHARGED	1993
23.	ORGANOSILICON COMPOUNDS	1993
24.	ANTIMONY, TIN AND VANADIUM	1994
25.	SUBSTANCES WHICH HAVE A DELETERIOUS EFFECT ON THE TASTE AND/OR SMELL OF PRODUCTS FOR HUMAN CONSUMPTION	1994
26.	BIOCIDES AND THEIR DERIVATIVES NOT COVERED IN ANNEX I	1994
27.	TITANIUM, BORON AND SILVER	1995
28.	MOLYBDENUM, BERYLLIUM, THALLIUM AND TELLURIUM	1995

COMMON MEASURES ADOPTED BY THE CONTRACTING PARTIES TO THE BARCELONA CONVENTION

INTERIM ENVIRONMENTAL QUALITY CRITERIA CONCERNING MERCURY CONTENT OF SEAFOOD	SEPT. 1985
INTERIM ENVIRONMENTAL QUALITY CRITERIA CONCERNING MICROBIAL CONCENTRATIONS OF BATHING WATERS	SEPT. 1985
MAXIMUM CONCENTRATION OF MERCURY IN EFFLUENT DISCHARGES	SEPT. 1987
ENVIRONMENTAL QUALITY CRITERIA CONCERNING MICROBIAL CONCENTRATIONS OF SHELLFISH WATERS	SEPT. 1987
CONTROL OF POLLUTION BY USED LUBRICATING OILS	OCT. 1989
CONTROL OF POLLUTION BY CADMIUM AND CADMIUM COMPOUNDS	OCT. 1989
CONTROL OF POLLUTION BY ORGANOTIN COMPOUNDS	OCT. 1989
CONTROL OF POLLUTION BY ORGANOHALOGEN COMPOUNDS	OCT. 1989
CONTROL OF POLLUTION BY ORGANOPHOSPHORUS COMPOUNDS	OCT. 1991
CONTROL OF POLLUTION BY PERSISTENT SYNTHETIC MATERIALS	OCT. 1991
CONTROL OF POLLUTION BY RADIOACTIVE SUBSTANCES	OCT. 1991
CONTROL OF POLLUTION BY PATHOGENIC MICROORGANISMS	OCT. 1991
CONTROL OF POLLUTION BY CARCINOGENIC, TERATOGENIC AND MUTAGENIC SUBSTANCES	OCT. 1993

DEVELOPMENT OF MED POL-PHASE III (1996-2005)

- Keeping in mind that, in line with UNCED and Agenda 21, further emphasis is to be given to those MAP activities contributing to the implementation of the sustainable development concept, and

- taking into account that MED POL as the scientific and technical component of MAP, provides the scientific basis for decision making related to marine pollution in the region in the process of achieving sustainable development,

the Meeting approves the development of MED POL-Phase III Programme (1996-2005) with the following overall objectives:

i) organization of a Mediterranean coordinated marine pollution monitoring and research programme, concentrating on contaminants and pollutants affecting the quality of the marine and coastal environment, as well as the health of man and of the living resources in the Mediterranean and interpretation/assessment of the results of the programme as part of the scientific basis for decision making in the region;

ii) generation of information on the sources, levels, amounts, trends (trend monitoring) and effects of marine pollution, develop capabilities for assessing the present and future state of the marine environment within the Mediterranean region as an additional component of the scientific basis upon which the formulation of proposals for preventive and remedial actions can be based;

iii) formulation of proposals for technical, administrative and legal programmes and measures for the prevention and/or reduction of pollution;

iv) strengthening and, when necessary, development of the capabilities of the national institutions, in accordance with the circumstances and the country requesting it, so as to implement monitoring and research on pollution of the marine environment;

v) assistance, as appropriate, to Contracting Parties for the implementation of the recommendations adopted with a view to the assessment of their effectiveness; this assistance will allow the competent authorities to verify the recommendations adopted taking into account data of a satisfactory standard.

In particular, the full implementation of the MED POL Programme will, inter alia, assist the Governments to:

a) further reduce the pollution load reaching the marine environment from land-based sources;

b) safeguard public health by surveillance of the sanitary quality of bathing and shellfish-growing waters and by development of measures which will ensure maintenance of adequate sanitary quality of these waters;

c) assess the damage of pollution on marine and coastal ecosystems with a view to their rehabilitation;

d) assess the effectiveness of measures taken to reduce pollution;

e) establish a set of scientifically-based environmental quality criteria for the coastal environment of the Mediterranean region;

f) assess the present levels, trends and effects of eutrophication and plankton blooms and formulate proposals for prediction and reduction of such phenomena in the Mediterranean region;

g) assess airborne pollution levels and to develop predictive models which can provide basis for remedial actions;

h) enhance the understanding of processes influencing the distribution and dispersion of pollution, and the biogeochemical cycles of specific pollutants;

i) prepare periodically an assessment of the state of pollution of the Mediterranean Sea and assist Contracting Parties to prepare such assessments on a national level;

j) develop and implement national monitoring programmes.

MARINE POLLUTION ASSESSMENTS

I. Are we asking the right questions?

II. Are we getting the right answers?

Selecting contaminants for assessment

- Conduct a land based sources survey in the region
  -Map the sources and coastal-zone (land and marine) useage
  -List major components of discharges and volumes (where known) for point sources (industrial and domestic)
  -List agricultural activities and major products applied in the case of diffuse sources

- For each potential contaminant and residue gather existing information on:
  -Persistence
  -Environmental chemistry (partition, reactivity, fate)
  -Environmental biology (toxicity, biomagnification)

- Based on the above, establish priority ratings for the listed contaminants also considering national development criteria and legislation (pollutants restricted to the coastal zone) or international criteria where contaminant gradients may extend beyond national jurisdiction.

The Pilot Monitoring Programme

- Objective: To evaluate the presence and effects of contamination in an area with quantifiable land-based sources and which is representative of similar areas within the region of interest.

- Inputs required:
  -A land-based source survey of the contaminants studied.
  -Basic studies of the dynamics and biology of the area.
  -Information on land and sea use, sensitive ecosystems, etc.
  -Background info. on the contaminants and their effects.

- Studies made:
  -Presence and spatial and temporal distribution of target contaminants in appropriate phases in order to establish contamination gradients from the source to "background" levels.
  -Biological effects studies along the observed gradient(s)

The Pilot Monitoring Programme

- Results expected: With careful site selection, contaminant gradients can be measured relating to identified principal sources (domestic, single industrial activity, major agricultural practice etc.). These can then be related to biological effects, though considerable care is required in data interpretation.

- The assessment: Careful analysis of the data should reveal:
  -The presence or absence of marine pollution associated with specific coastal-zone activities.
  -The potential impact of the marine pollution on marine resources, sensitive ecosystems, etc.

- Application: Decision of whether or not to start a wider monitoring programme in areas similar to that of the pilot study. Decision whether to take remedial/preventative measures. Evidence for requesting support for follow-up.

FULL SCALE MONITORING

-Repeated measurements in time and/or space-

- OBJECTIVE: To provide data upon which to base objective decisions for environmental management.

- AIMS: Four main reasons for monitoring:
  (i) Contaminant levels in edible marine organisms for the protection of public health.
  (ii) Identification of heavily contaminated areas of the marine environment ("hot spots") where adverse biological effects are evident or the integrity of sensitive communities is threatened.
  (iii) The establishment of present levels of contamination (a "baseline").
  (iv) Assessment of concentration changes of contaminants in time ("trends").

FULL-SCALE MONITORING (2)
Basic Requirements

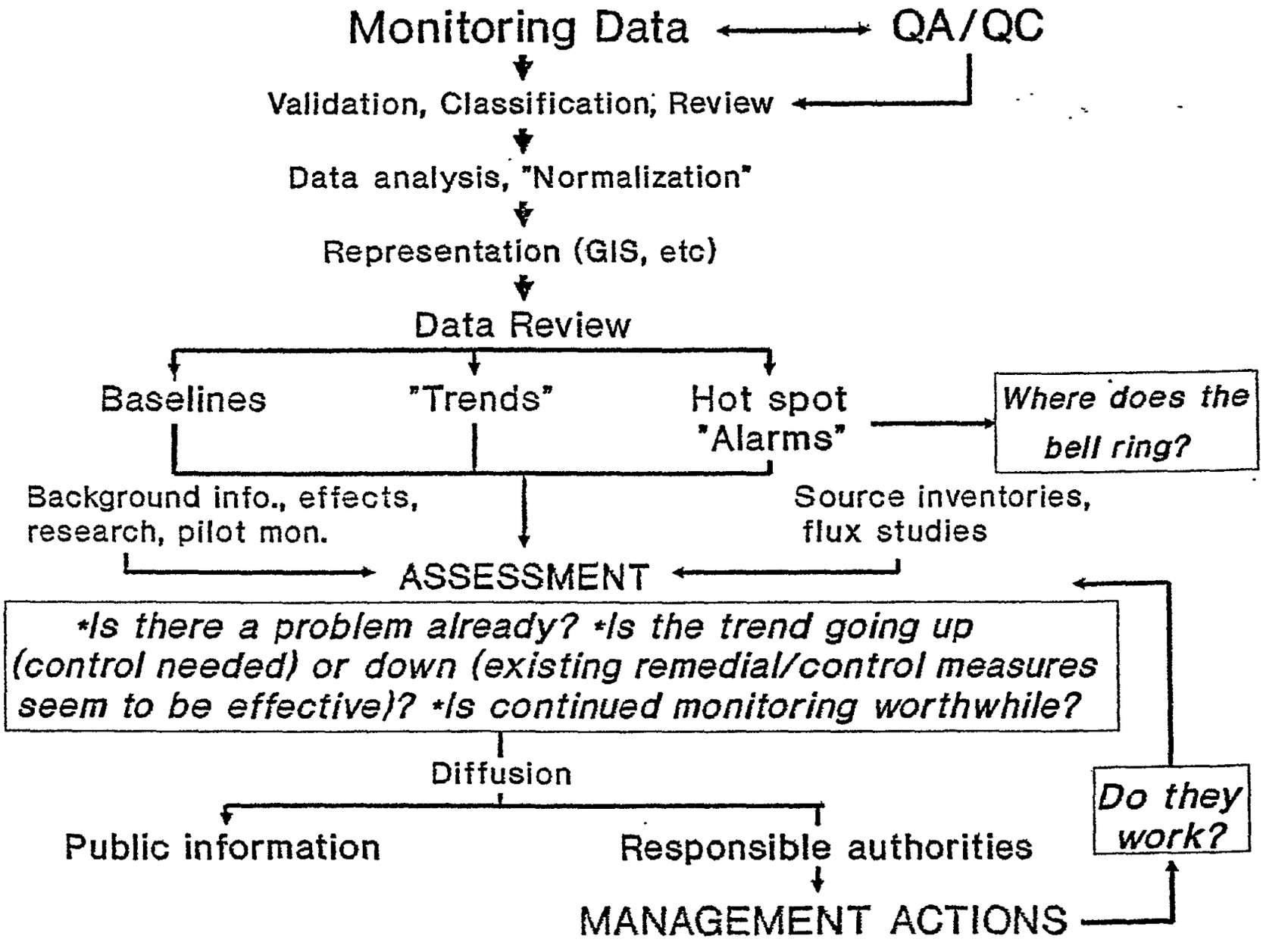
- Antecedents
  -Previous studies including research, background information on sampling sites and target contaminants, and a survey of sources, land-based, atmospheric and marine
  - A Pilot monitoring study
- A viable network of committed laboratories with suitable instrumentation and qualified personnel.
- Widely applicable methodology with suitable precision and accuracy.
- A strong quality assurance programme which includes intercomparison exercises, continuous quality control using reference materials, training and equipment maintenance.
- Good planning and sufficient funds

QUALITY ASSURANCE

Making sure the data is precise and accurate enough for a given purpose

QUALITY CONTROL

Keeping the data precise and accurate enough!


Monitoring Data
QA/QC
Validation, Classification, Review
Data analysis, "Normalization"
Representation (GIS, etc)
Data Review
Baselines
"Trends"
Hot spot "Alarms"
Where does the bell ring?
Background info., effects, research, pilot mon.
Source inventories, flux studies
ASSESSMENT
*Is there a problem already? *Is the trend going up (control needed) or down (existing remedial/control measures seem to be effective)? *Is continued monitoring worthwhile?
Diffusion
Public information
Responsible authorities
MANAGEMENT ACTIONS
Do they work?

ANNEX V

TRANSPARENCIES PRESENTED BY G.P. GABRIELIDES

BROAD CATEGORIES OF MONITORING
ICES(ACMP), 1988)

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1. MONITORING FOR COMPLIANCE PURPOSES

2. MONITORING PATTERNS AND TRENDS

3. MONITORING FOR RESEARCH PURPOSES

SPECIFIC MONITORING OBJECTIVES

A) TO PROTECT HUMAN HEALTH

B) TO PROTECT MARINE LIFE

C) TO ASSESS THE EFFECTIVENESS OF MEASURES TAKEN

D) TO ASSESS EXISTING LEVELS OF POLLUTION AS A TIMELY WARNING SYSTEM

E) TO ASSESS INPUTS

OSPARCOM MONITORING OBJECTIVES

- to assess possible hazards to human health
- to assess harm to living resources and marine life
- to assess the existing level of marine pollution
- to assess the effectiveness of measures taken for the reduction of marine pollution

COMPARE DATA

A) WITH CERTAIN STANDARDS OR CRITERIA (eg. for health safety reasons)

B) COLLECTED FROM ONE AREA WITH DATA FROM ANOTHER AREA (SPATIAL TRENDS)

C) FROM THE SAME AREA BUT COLLECTED IN DIFFERENT YEARS (TEMPORAL TRENDS)

REAL DIFFERENCES ARE MASKED BY

A) NATURAL VARIATIONS

B) ANTHROPOGENIC VARIATIONS

MINIMIZE VARIATIONS BY

A) PROPER PROGRAM DESIGNING

B) GOOD DATA QUALITY ASSURANCE PROGRAM

Decide on

1) Area / Location

2) stations (sampling points)

3) matrix (water, sediment, biota) ——

4) frequency (how often)

5) when (dates)

6) no. of replicate samples

7) contaminant

---

8) sampling technique

9) preservation method

10) analytical method

11) data quality control

BIOTA

1) species
2) tissue
3) size/age
4) individual/ composite
5) no. of individuals per composite sample

ELEMENTS OF GOOD QUALITY PRACTICE

1) Good sampling techniques to avoid contamination

2) Selection of appropriate preservation, transport and storage procedures to maintain integrity of samples

3) Properly equipped and well-maintained laboratory facilities

4) Regular maintenance of all analytical equipment and use of appropriate quality labware and reagents

5) Maintenance of skilled analytical staff with proper training programmes for new or inexperienced analysts

ELEMENTS OF GOOD QUALITY PRACTICE (Cont.)

6) Use of analytical procedures with the required accuracy and precision

7) Regular in-house checks on the accuracy and precision of methods using appropriate reference materials

8) Participation in inter-laboratory comparisons and intercalibration exercises

9) Proper documentation of data and use of control charts to check on the quality of data

IN CHARGE OF MONITORING?
REMEMBER

---

1) To ensure that the data collected are really useful for the defined objectives of the monitoring programme

2) To review the programme and the results at intervals and, if necessary, modify the programme (by addition or deletion) to redirect it to the specific objectives

3) Not to continue measurements simply for the sake of continuing or because it is easy to do so (established procedures) and difficult to change

4) To measure contaminants only in the matrix or substrate necessary to meet the defined objectives

5) To adjust the sampling frequency according to real needs

6) To ensure that data quality is adequate for the purpose in question

ANNEX VI

TRANSPARENCIES PRESENTED BY M. JOANNY

REVISING MONITORING PROGRAMME

1) STARTING FROM PRESENT
(Ex: National Level France)

OR

2) PREPARING FUTURE
(Ex: International OSPAR)

1.1 MONITORING IN FRANCE (IFREMER)

. RNO - CONTAMINANTS
- BIOLOGICAL EFFECTS

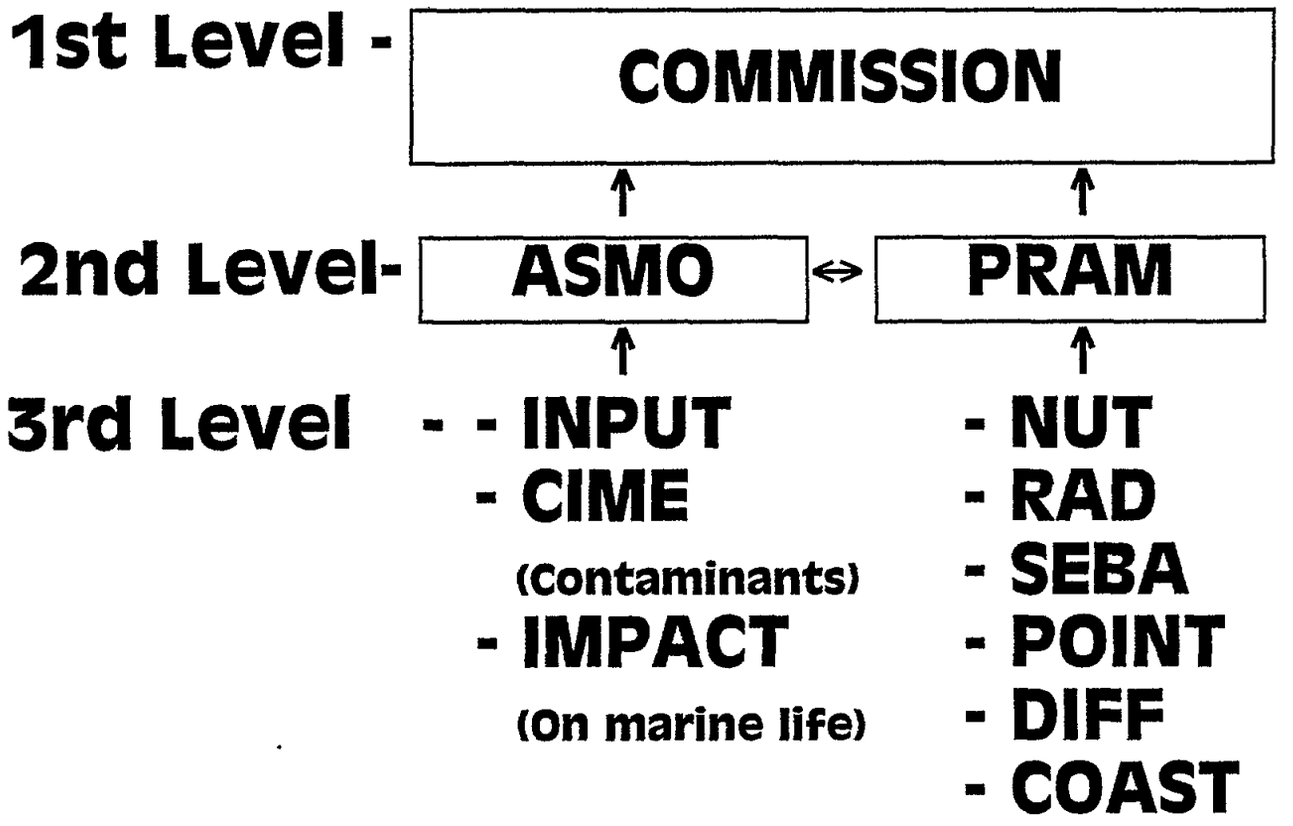
. REPHY - PHYTOPLANKTON

. REMI - MICROBIOLOGY

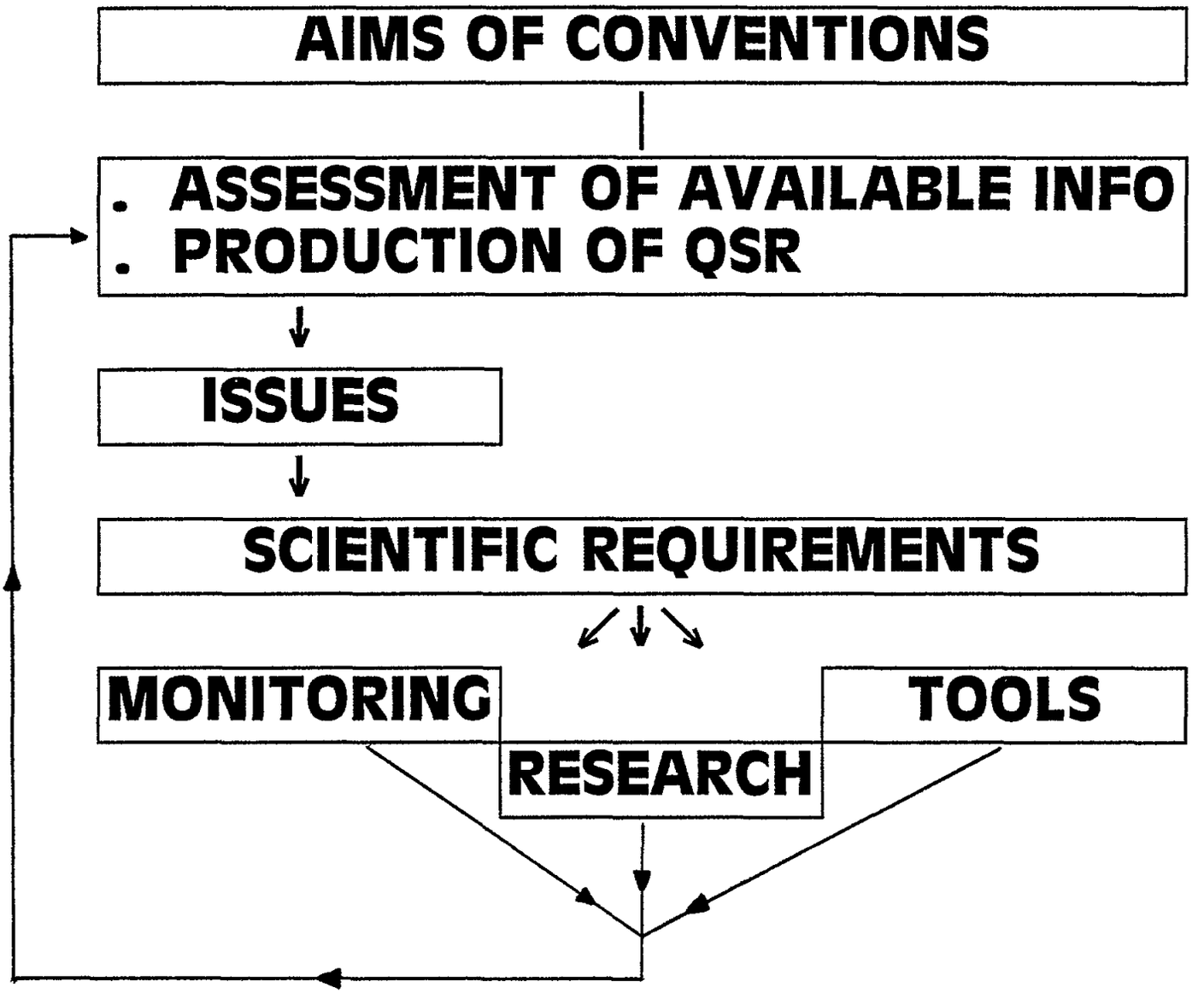
1.2 - ASSESSMENT OF DATA, PRESENTATION IN A CONVENIENT WAY FOR END USERS (ESPECIALLY THE MINISTRY)

- MERGING ALTOGETHER THE THREE NETWORKS TO GET BETTER DEFINED OBJECTIVES, MORE EFFICIENT SAMPLING AND RETRIEVAL OF DATA

NEW 2.1 PARIS CONVENTION (OSPAR)



PRODUCT: 2000 QSR.
(Quality Status Report)



(MONITORING AS A PART OF ASSESSMENT OF THE QUALITY OF MARINE ENVIRONMENT)

2.3 PROCEDURE FOR ESTABLISHING MONITORING

1. Selected:
   * ISSUES (OF CONCERN)

2. Translated in:
   * TESTABLE HYPOTHESIS (OR QUESTIONS)

3. Defined
   * CRITERIA
     . BACKGROUND VALUES
     . ECOTOXICOLOGICAL C.

(before starting monitoring)

ANNEX VII

USE OF MONITORING AS A BASIS FOR MANAGEMENT DECISIONS AND FOR EVALUATION OF THEIR EFFECTIVENESS - THE EXAMPLE OF HAIFA BAY, ISRAEL

BY YUVAL COHEN

Properly designed and applied monitoring can be a powerful tool for marine environmental management. Monitoring should be used as a basis for management decisions as well as for evaluation of their effectiveness. The Israeli experience of monitoring Haifa Bay provides an example:

A chlor-alkali plant has been discharging mercury into the Bay since the mid-50's. The plant introduced waste treatment facilities in the mid-70's and mercury discharge was drastically reduced. Monitoring of mercury levels in the Bay's sediments and biota started in the late 70's. The monitoring results demonstrated significant mercury pollution in the Bay including elevated mercury levels in edible fish. This led to pressure on the chlor-alkali plant to improve its waste treatment facilities in order to reduce further mercury discharge. This was done in 1980/81. Continued monitoring in the Bay showed that since the mid-80's the level of mercury pollution was gradually decreased. The drop of mercury levels was observed in sediments, benthic fauna and edible fish. Thus overall, the long-term monitoring of Haifa Bay contributed to decision making in pollution prevention measures and demonstrated that these measures were indeed effective.

ANNEX VIII

PRESENTATION BY N. SMODLAKA

"RUĐER BOŠKOVIĆ" INSTITUTE
CENTER FOR MARINE RESEARCH
ROVINJ, CROATIA

OUTLINES FOR A PROPOSAL OF THE CROATIAN MONITORING PROGRAM (CMP)

BACKGROUND OF THE PROPOSAL

Coordinated and complex monitoring activities have been started in the eastern Adriatic Sea in 1973 in the framework of the UNDP project. These activities were continued through various national environmental studies and international projects, primarily the UNEP MED POL phase I and II. To understand some phenomena observed in coastal areas, the need of a open water monitoring became soon evident. Thus, a comprehensive research and monitoring program started in 1979 in the framework of a bilateral collaboration with Italy (ASCOP).

From the data collected during the past two decades and their analysis two general conclusions may be drawn:

A) Eutrophication and pollutant levels and trends are not yet quantitatively known with a sufficient accuracy, due to the following reasons:

   1) some complex processes (e.g. eutrophicatin, periodical mucilage phenomenon, population explosions and single species invasions) occurred on a larger temporal scale, compared to the investigated period (two decades);

   2) a number of data, related to pollutant levels, are not reliable and/or comparable, due to different and, sometimes, inadequate sampling technique and analytical methods applied, lacking coordination of the measurements, often performed with an insufficient frequency, due to (but not only) missing financial support.

B) In spite of these limitations, the achieved results allowed the identification and description of the most important environmental problems in the open and eastern coastal Adriatic. However, it should be outlined that some areas were not adequately monitored, at least not recently (e.g. Rijeka Bay, some mariculture and estuarine areas).

AIMS AND MANAGEMENT OF THE FUTURE ACTIVITIES

Based on the past experience, the environmental problems and areas, which should be further investigated and/or monitored, can be ranked. The first priority activities should be continuously supported. The lower priority activities would be performed depending on financial possibilities, and possibly alternated in different periods.

Each of these activities (subprojects) should be designed with a defined strategy and clear goals to maximally improve the management of the monitored area and the control of pollution processes, to provide fast and objective information to authorities and public opinion on the observed events, and, when possible, to provide useful data to design protection and restoration measures.
Consequently, the responsibility for the realization of the program and the reliability of the results, including the duty to interact as much as possible with other subprojects, should be fixed for each subproject.

A minimal number of stations and parameters, and an adequate sampling frequency must be defined, below which the measurements should not be performed at all, as they might not give significant results. Only previously intercalibrated sampling and analytical procedures, sufficiently sensitive for the Adriatic samples should be accepted.

To make operative the future activities and achieve the fixed goals, an organization structure (e.g. the Coordination Board of the CMP) should be established, competent to use results and data collected in the framework of the CMP, and also of relevant national and international projects. According to the obtained results, the Board should be also competent to restructure ongoing and design additional activities (environmental studies, specific measurements in case of unexpected events, improvements of the methodologies, etc.). Moreover this Board should assure the necessary flexibility of the program, related both to the measurement strategies and financial support, as well as the collaboration or participation in any relevant scientific and monitoring national and international initiative undertaken in the Adriatic.

A priority list of the environmental problems relevant to the eastern Adriatic is proposed in the following text.

PRIORITY AREAS AND ENVIRONMENTAL PROBLEMS

First priority

1) Eutrophication and unexpected phenomena

Eutrophication at a regional level occurs in the northern Adriatic, and at a local level in several coastal areas, with periodic extremely negative consequences for the ecosystem and various human activities. Furthermore, a series of undesirable events occurred in the past decades: invasions of jellyfishes and other species, hypertrophic formation of mucilaginous aggregates, and more recently an increased frequency of toxic (DSP) dynoflagellate appearance.

A long-term monitoring of eutrophycation and unexpected events (natural or due to accidents, oil spills, tar balls) should be continued, with more intensity in the northern Adriatic. Measurements should be performed on a number of stations (not less than 20 in total) in the northern, central and southern Adriatic, selected to monitor basic oceanographic and biological processes (e.g. water exchange and plankton transport, organic production and composition changes of plankton communities, consumption and production of relevant chemical substances), which are expected to have a significant influence on the eutrophycation and unexpected events. Stations should be selected among those studied in the past. Special parameters and observations (SCUBA diving, current measurement, and similar) should be perform with adequate frequencies.

In the case of unexpected events the monitoring should be integrated with additional measurements and/or special studies designed accordingly.

In the framework of this activity (subproject) the participation in international studies of interest should be particularly encouraged (e.g. collaboration with Alpe-Adria Project, Italian CNR Project "Adriatic", etc.).

Efforts should be also supported to develop and apply new monitoring techniques (remote sensing, moored automatic sensors).

2) Eutrophication of the Kaštela Bay

Anthropogenic eutrophication processes have been well documented for the Kaštela Bay. The continuation of monitoring at least on the central oceanographic station in the bay will be also useful for a rational

planning of the restoration measures and a proper interpretation of the effect of these measures. Thus, such a scientifically supported restoration activities in the Kaštela Bay may become a model for other Mediterranean coastal areas with similar problems.

Additional studies on the "red tide" phenomena that seem to occur with increasing frequency and intensity in the Vranjic area (eastern Kaštela Bay) should be also supported.

3) Monitoring of larger mariculture areas

Mariculture has a significant development in Croatia and relatively large installations are operating at several locations along the coast. Recently, almost no attention was paid to environmental problems, which can be expected at these locations. The monitoring of the areas should be designed taking into account at least two different types of interaction between human activities and the environment.

1) Mariculture activities can negatively influence the ecosystem equilibria. The environmental capacity of the area is a crucial problem to design a profitable mariculture production and protect the ecosystem.

2) The quality of mariculture products can be affected by an increased concentration of naturally present toxic phytoplankton species above a "critical" level. Studies on the ecology of these species should be also performed in relation to their monitoring.

Monitoring is particularly needed in areas that are in same time used for other economic activities (tourism, port activities), in contrast with mariculture (e.g. Limski kanal, Raša Bay, Maloston Bay).

4) Radioactivity monitoring

Radioactivity monitoring in sediment and biota in the Rovinj area (started in the sixties) should be continued, as an early warning of possible accidents. In the case of accidents the measurements should be enlarged and intensified accordingly.

Second priority

5) Mercury monitoring in the Kaštela Bay

The most marked heavy metal pollution was documented for the Kaštela Bay, compared with other investigated areas. Since 1990, after a chloro-alkali plant was closed, a significant decrease of the mercury level in the Kaštela Bay mussels, but not in sediment, has been noticed. Thus, the sediment represents a serious potential mercury source to biota. For these reason, a periodical control of sediment (and mussel) mercury levels should be imposed.

6) Eutrophication of the Krka Estuary

Anthropogenic eutrophication is also significant in the Šibenik Bay. Eutrophication monitoring should be started again before and after restoration measures will be undertaken, to estimate their efficiency. Monitoring activities should be extended to the Prokljansko Jezero, where near-anoxia conditions were already observed.

7) TBT in harbour and marina areas

To verify a possible tributyl-tin (TBT) contamination, a "screening" for this pollutant should be performed in the major harbour and marina areas.

8) Biomonitoring

The evaluation of the stressing effects of pollutants on populations and communities in "critical" areas, using various physiological, biochemical and genotoxic parameters, should be supported.

Third priority

9) Pollutant level control

Periodic controls of the PCB and petroleum hydrocarbons levels should be performed in previously investigate areas of interest (e.g. open northern Adriatic, Rijeka and Kaštela bays, Zadar and Dubrovnik areas) to verify possible trends.

10) Environmental study of estuarine and urbanized areas

The results of LBS program should indicate possible anthropogenic influences in areas that were not monitored (at least not recently). As an example, a study of industrial pollution in the Rijeka Bay will be probably requested with priority.
Furthermore, some other localized urban and estuarine areas will also be of interest (e.g. Zadar and Ploče areas, Neretva estuary, Gruž harbour, and others).

These studies should be performed for 2-3 years with at least seasonal frequency. The need of successive monitoring activities will be pointed out from the results of these studies.

On the other hand, environmental studies related to the application of restoration measures will be necessary. Kaštela Bay can be, for instance, a useful model for other Mediterranean industrialized areas.

11) Studies on "new" synthetic organic compounds

The use of "new" synthetic organic compounds in the agriculture and industry (LBS program) will suggest the need for development and successive application of analytical methods in some areas, in which their presence can be expected (e.g. Mirna, Raša, Neretva estuaries, Rijeka, Zadar, and Šibenik areas, Kaštela Bay).

MONITORING FREQUENCIES

To monitor eutrophication, unexpected events, mariculture areas and radioactivity (activities 1, 2, 3, 4 and 6) at least monthly coordinated measurements should be performed, more frequently in the expected bloom periods.

Mercury, PCBs and petroleum hydrocarbons (activities 5 and 9) should be monitored at least seasonally during periods of 2-3 years per decade.

OUTPUTS

One of the principal aims of the CMP should be a maximal efficiency in the information transfer. This transfer should be realized through:

1) immediate information resulting from a preliminary interpretation of the data, particularly in the cases of unexpected events and accidents;

2) periodical (yearly) subproject progress reports; and

3) syntheses and documents useful for the competent authorities and the public opinion, prepared by the Coordination Board using CMP reports, as well as information and data from other relevant projects.

A computerized information system and organization of data exchange that will enable the creation of a data base structured for fast and useful responses are obviously needed to satisfy the new proposed strategy.

Rovinj, 5 February 1994
Prepared by: D. Degobbis, R. Precali, B. Ozretić, and N. Smodlaka

ANNEX IX

TRANSPARENCIES PRESENTED BY A. BARIĆ

NATIONAL MONITORING PROGRAMME

DEFINITION

MONITORING IS THE REPEATED MEASUREMENT OF AN ACTIVITY OR OF A CONTAMINANT OR OF ITS EFFECTS, WHETHER DIRECT OR INDIRECT, IN THE MARINE ENVIRONMENT

OBJECTIVE

THE ULTIMATE OBJECTIVE IS TO PROVIDE INFORMATION FOR ENVIRONMENTALY - SOUND MANAGEMENT OF COASTAL ZONES

COMPONENTS OF A NATIONAL MONITORING PROGRAMME

A. SAMPLING PLAN AND MEASUREMENT PROCEDURES

- LOCATION
- PARAMETERS (WATER, BIOTA, SEDIMENTS)
- FREQUENCY OF SAMPLING
- SAMPLE PREPARATION AND TREATMENT
- MEASUREMENT PROCEDURE
- CALIBRATION AND INTERCALIBRATION

B. QUALITY CONTROL, PROCESSING, STORAGE AND RETRIEVAL OF DATA

- QUALITY ASSURANCE
- QUALITY CONTROL
- QUALITY ASSESSMENT
- PROCESSING OF DATA
- STORAGE AND RETRIEVAL

C. REPORTING OF DATA

ACTIVITIES WITHIN THE NATIONAL MONITORING PROGRAMME

A. SANITARY CONTROL OF BEACHES

PURPOSE: TO ASSESS POSSIBLE HAZARDS TO HUMAN HEALTH

B. MARINE ENVIRONMENTAL QUALITY SURVEILLANCE

PURPOSE:

- TO ASSESS THE EXISTING LEVEL OF MARINE POLLUTION
- TO ASSESS POSSIBLE HARM TO MARINE ECOSYSTEMS
- TO ASSESS THE EFFECTIVENESS OF MEASURES APPLIED TO REDUCE POLLUTION

C. MONITORING OF MARICULTURE SITES

(TOXIC PHYTOPLANKTON SPECIES AND SANITARY CONTROL)

PURPOSE: TO ASSESS POSSIBLE HAZARDS TO HUMAN HEALTH

A. SANITARY CONTROL OF BEACHES

- SITES: PUBLIC BEACHES
- PARAMETERS: CONCN. OF INDICATORS OF FAECAL POLLUTION
- FREQUENCY: AT FORTNIGHT INTERVALS DURING THE SUMMER SEASONS

B. MARINE ENVIRONMENTAL QUALITY SURVEILLANCE

- SITES: 9 ZONES (NOTHERN ADRIATIC, RIJEKA BAY, ZADAR CHANNEL, KRKA ESTUARY AND SIBENIK CHANNEL, KASTELA BAY AND SPLIT AND BRAC CHANNEL (CETINA ESTUARY), NERETVA ESTUARY THE MIDDLE ADRIATIC PROFILE, RIJEKA DUBROVACKA

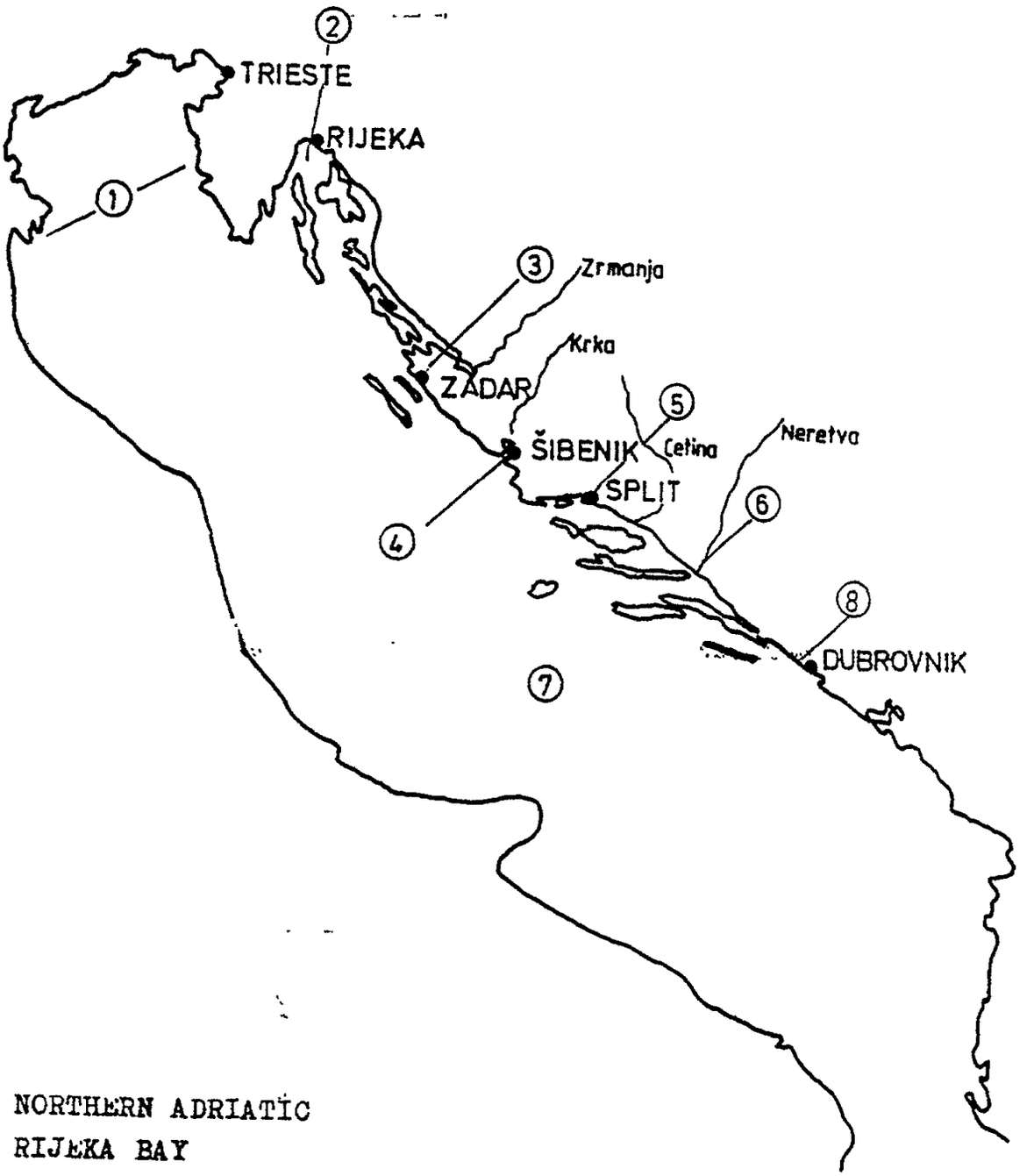
- PARAMETERS: a) SEA WATER-T, S, NUTRIENTS, O_2, CHLOROPHYL,TSS

(PRIMARY PRODUCTION, PHYTOPLANKTON BIOMASS AND COMMUNITY COMPOSITION, ZOOPLANKTON BIOMASS AND COMPOSITION, BACTERIOPLANKTON BIOMASS)

b) SEDIMENTS-HEAVY METALS (Hg, Cd, Pb)

c) BIOTA (*MULLUS BARBATUS, MYTILUS GALLOPROVINCIALIS*)-
HEAVY METALS (Hg, Cd, As)
CHLORINATED HYDROCARBONS
PAH

- FREQUENCY: a) SEAWATER - 4-5 TIMES A YEAR (SUMMER, WINTER)
b) SEDIMENTS - EVERY 3-5 YEARS
c) BIOTA - SEASONALLY



1. NORTHERN ADRIATIC
2. RIJEKA BAY
3. ZADAR CHANNEL
4. KRKA ESTUARY
5. KAŠTELA BAY AND SPLIT AND BRAČ CHANNELS
6. NERETVA ESTUARY
7. MIDDLE ADRIATIC PROFILE
8. RIJEKA DUBROVAČKA BAY

C. MONITORING OF MARICULTURE SITES

SITES: 10 ZONES (BAY OF MALI STON, NERETVA ESTUARY, KASTELA BAY, MARINA BAY, KRKA ESTUARY, LAMJANA BAY, NOVIGRAD BAY, KLENOVICA BAY, POMER BAY, LIM CHANNEL

MONITORING STATIONS

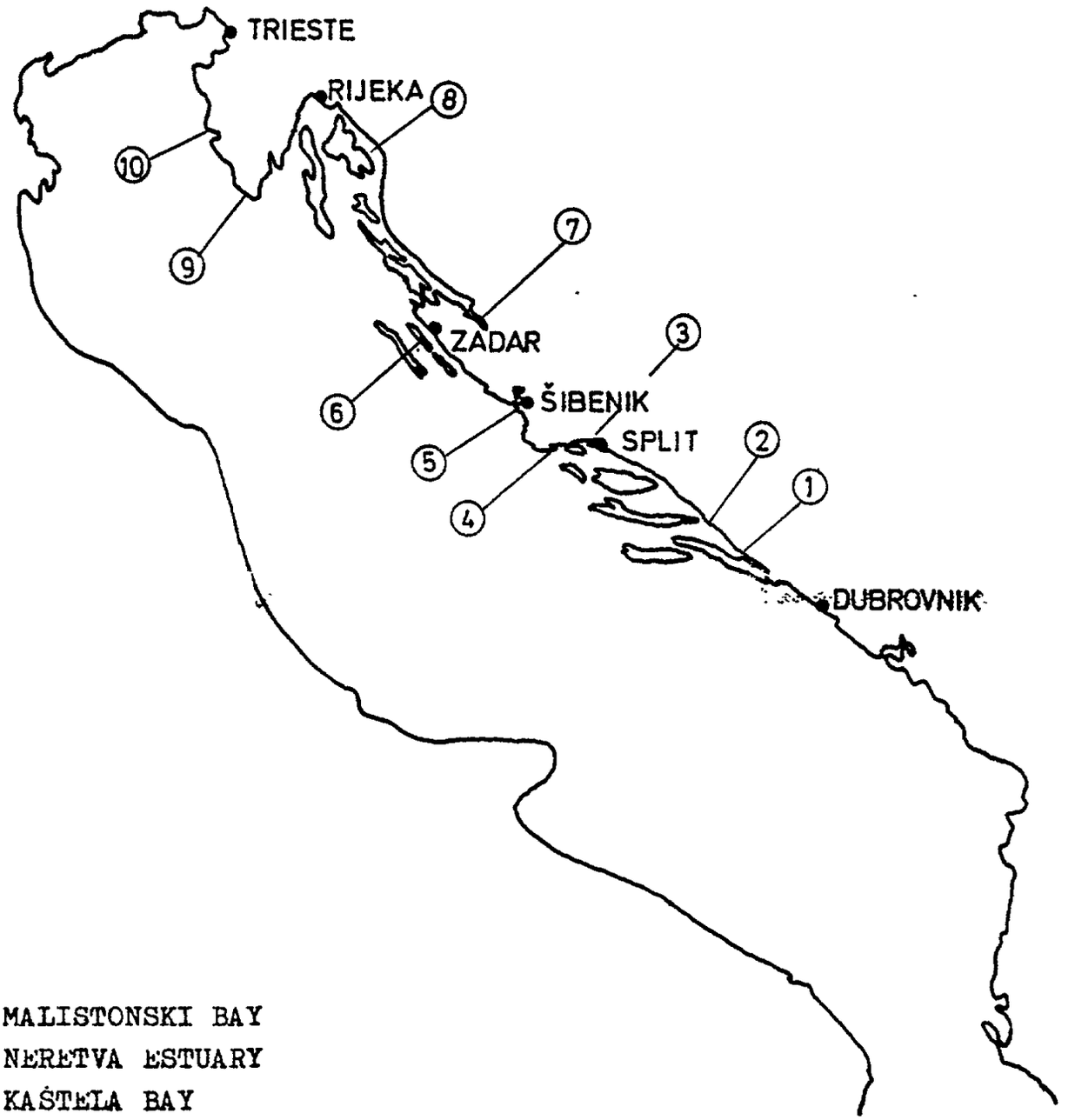
PARAMETERS: - COMPOSITION OF PHYTOPLANKTON COMMUNITY
- INDICATORS OF FAECAL POLLUTION IN SEA WATER SAMPLE

FREQUENCY: - WINTER (IX - IV) TWICE A MONTH
- SUMMER (V - VIII) WEEKLY

WARNING STATIONS FOR TOXIC PHYTOPLANKTON SPECIES ONLY

PARAMETERS: - DETERMINATION AND COUNTING OF TOXIC SPECIES IN SEA WATER SAMPLE
- MOUSE TEST ON A SHELLFISH HEPATOPANCREAS

FREQUENCY : WEEKLY



1.MALISTONSKI BAY
2.NERETVA ESTUARY
3.KAŠTELA BAY
4.MARINA BAY
5.KRKA ESTUARY
6.LAMJANA
7.NOVIGRAD BAY
8.KLENOVICA
9.POMER BAY
10.LIM BAY

MARICULTURE AREAS

ANNEX X

PRESENTATION BY B. RASPOR

QUALITY ASSURANCE AS PART OF THE FUTURE NATIONAL MONITORING PROGRAMME(S)

The objective of quality assurance programs for analytical measurements is to reduce measurement errors to tolerable limits and to provide a means of ensuring that the measurements generated have a high probability of being of acceptable quality (1). Quality assurance involves those steps which are required to guarantee the generation of data of suitable quality to address the defined aims of a monitoring programme. Starting point is a clear definition of the aim which should be achieved with the monitoring programme. Considering monitoring as the repeated measurement of a contaminant or an activity (2), up to now in the Eastern part of the Adriatic Sea monitoring objectives have been mainly:

I to establish baseline levels of selected harmful and toxic substances in the marine environment
II to identify the sources of contamination and the "hot spots"
III to establish spatial and seasonal changes of selected harmful and toxic substances (trends).

Depending on the objective, monitoring programme places a different demand on the participating laboratories with respect to the collection, storage, pretreatment of samples and the measurement process. Before embarking any monitoring programme (3) a clear and unambiguous statement on the objectives of the work have to be defined, followed up by the means necessary to achieve the defined goals. Quality Assurance is an essential part of any monitoring programme. Quality Assurance involves all those steps required to guarantee the generation of data of suitable quality to address the defined aims of monitoring programme. In quality assurance two concepts are involved:
- quality control (the mechanism of minimizing errors) and
- quality assessment (the mechanism of verifying that the errors are within acceptable limits, i.e. that the results are in the state of statistical control).

The elements of quality control are as follows (1,3):
-well-maintained and calibrated instrumentation
-appropriate calibration of the instrumental response
-use of written and validated methods (Standard Operating Procedures (SOPs) established for sampling, sample storage and pretreatment, measurement, calibration and data handling)
-reliable and qualified personnel
-close supervision of all operations by senior personnel
-use of certified reference materials (CRMs) for evaluation methodology
-use of reference material on a regular basis throughout the monitoring programme to check that analytical performance is maintained

-participation, encouraged by senior management, in interlaboratory checks of analytical performance (this is the only independent method available to check on a laboratory's analytical capability).
-certification of laboratories.

A system of control charts is the main element of the quality assessment technique. Control charts are plots of the results of analyses of the same sample over a period of time. They allow analysts to check whether the results are in the state of statistical control.

Certification of a laboratory is one form of quality assurance. Certification is based on the criteria that are considered essential to generate valid data and is a formal recognition that the laboratory is competent to carry out a specific test or specific type of test.

Points to be considered in defining future National Monitoring Programme(s):

a) monitoring objectives clearly defined

b) selected parameters necessary to achieve the defined goals

c) for selected parameters the Quality Assurance Program established in order to generate the data of suitable quality

d) certification of laboratories according to the defined criteria as follows:

-available facilities for the accomplishment of the monitoring programme (samplers, apparatus, vessel)
-laboratory space, storage rooms, offices, clean rooms, cold rooms etc.
-qualified personnel (technical and senior)
-quality control programme which consists of:
calibration of the instruments
calibration of the instrumental response with the Certified Reference Materials (CRMs);
participation in national and international intercomparison runs
-quality assessment programme:
the use of control charts
-at the national level the SOPs for the relevant parameters should be defined and should be obligatory for the duration of the monitoring programme.

e) laboratories, participating in the defined monitoring programme should be selected among the certified laboratories. Special recommendation for the selection of the laboratory should be the achievement of the acceptable results during the intercomparison runs organized at the international level.

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3) Contaminant monitoring programmes using marine organisms: Quality Assurance and Good Laboratory Practice. Reference Methods for Marine Pollution Studies No. 57, UNEP November 1990.

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