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Review Meeting of MED POL – Phase III Monitoring Activities

Saronida (Attica, Greece), 9-11 December 2003

REPORT OF THE REVIEW MEETING OF MED POL-PHASE III MONITORING ACTIVITIES

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Introduction

1. Within the framework of the implementation of the MED POL-Phase III programme (1996-2005) and pursuant to the recommendations of the Eleventh Meeting of the Contracting Parties to the Barcelona Convention (Malta, 27-30 October 1999), a first review meeting of monitoring activities was held in Rome from 5-7 December 2001. It dealt in particular with five aspects of this component- trend monitoring; the gradual introduction of biomonitoring; development of compliance monitoring; the eutrophication monitoring strategy and the setting up of a MED POL database.
2. In accordance with the recommendations of the Twelfth Ordinary meeting of the Contracting Parties (Monaco, 14-17 November 2001), a second meeting to review MED POL- Phase III monitoring activities was held in Saronida (Attica, Greece) from 9-11 December 2003, at the National Centre for Marine Research.

Attendance

3. Representatives of the following Contracting Parties attended the meeting: Albania, Bosnia and Herzegovina, Croatia, Cyprus, Egypt, European Commission, European Union, France, Greece, Israel, Italy, Morocco, Slovenia, Spain, Syria, Tunisia, and Turkey.
4. The United Nations organisations were also present as observers, as were the following international, intergovernmental and non-governmental organisations: International Atomic Energy Agency (IAEA), World Health Organisation (WHO), International Marine Centre (IMC), and MedGOOS (UNESCO-IOC).
5. Finally, the meeting was attended by twelve guest experts.

Agenda item 1: Opening of the Meeting

6. Mr. Evangelos Papathanassiou, Director of the Oceanographic Institute and member of the Board of Administration of the Hellenic Centre for Marine Research (NCMR), welcomed participants and made a brief presentation about the structure of the Centre. It comprised two other institutes apart from this one in Saronida- one in Crete and the other in Rhodes- with a total staff of 400. He had leapt at MED POL's proposal that he should host the meeting, as cooperation with the other Mediterranean and the Black Sea countries was one of the NCMR's priorities. In the course of the meeting he himself and experts from the Centre would be given the opportunity of making presentations, which would give participants an idea of the thematic areas in which cooperation with the Centre could be set up in the future to the mutual benefit of everyone.
7. Mr. Francesco-Saverio Civili, MED POL Coordinator, thanked Mr. Papathanassiou and the NCMR scientists for their hospitality, thanks to which the meeting could take place in a context and climate of research with which all participants were familiar. He then recalled the aim of the meeting on monitoring activities which was now convened on a two-yearly basis. Historically, this had been MED POL's first activity, which had then expanded over the years throughout Phase I, and again during Phase II when national monitoring programmes were launched. It had long since become the most important component in the entire Mediterranean Action Plan. Focusing initially on the marine environment, monitoring had been extended to the coasts and drainage basins under the new field of activity established by the revised 1996 "LBS"

Protocol. MED POL had also had a “research” element which had played an important role, not so much in terms of its budgetary means as for the fact that it had acted as a catalyst in the region for numerous projects, which had thus drummed up further funding. Finally, with the Rio Summit which had brought the concept of sustainable development into its own, MED POL had gradually shifted its focus from pollution assessment to pollution control as it moved into Phase III. This was related in particular to the adoption of the revised “LBS” Protocol and the Strategic Action Programme (SAP), which targeted groups of pollutants and sectors of activity, and set a specific timetable. This did not mean, of course, that monitoring activities were to be abandoned. Rather, it used them to serve specific ends, in three very different forms: trend monitoring, biological effects monitoring, and compliance monitoring. These three types of monitoring were consequently going to account for a large part of the work over the three days of the meeting.

8. Having painted this positive picture, the MED POL Secretariat could not avoid expressing its concern at certain shortcomings in monitoring at its current stage, particularly the slow rate at which national monitoring programmes were being set up in the countries, many of which did not as yet appear to have grasped the full potential of this instrument for backing up coastal management and the sustainable development process. The tables drawn up by the Secretariat on the state of play with monitoring agreements and the levels of country participation clearly enough reflected these shortcomings. Moreover, three major European countries and members of MAP- Spain, France and Italy- had excellent programmes but did not officially take part in MED POL monitoring. This was a serious shortcoming, which deprived the programme of experience and a mass of data which could well be a determining factor in its future development. It did look as though things were about to move on this front, and it was to be hoped that the meeting would confirm this favourable slant. Finally, on the trend monitoring issue, few and far between were the countries which applied it in strict observance of the stringent criteria which it imposed in order to produce valid results. It was the Secretariat’s expectation that the meeting would discuss these various flaws in the programme in depth, including all the technical aspects they implied.

Agenda item 2: Election of Officers

At the Secretariat’s proposal following informal consultation with the participants, the meeting elected its officers as follows:

Chairman:	Mr. Louis Alexandre Romana (France)
Vice-chairman:	Mr. Sabir Kaabi (Tunisia)
Rapporteur:	Mrs. Nada Krstulovic (Croatia)

Agenda item 3: Adoption of the agenda and organisation of work

9. Regarding the organisation of work over the three days, the MED POL Coordinator proposed that the meeting should work in plenary session on the major points included on the draft agenda and that on the afternoon of the third and final day it should then split into two parallel ad hoc groups, dealing respectively with eutrophication and data flows, before reconvening in plenary to adopt its conclusions. The meeting report would not be adopted at the close of proceedings. It would be drawn up by the Secretariat and sent out to all participants for any comments or changes to be included in the final version. Mrs. Colpan Polat Beken, MED POL programme officer, had carefully prepared all the technical side of the meeting, and would be responsible for all discussions and questions pertaining thereto.

10. The meeting adopted its agenda as circulated under reference UNEP(DEC)/MED WG.243/1 and amended, which is to be found in **Annex II** to this report.

Agenda item 4. Review and analysis of MED POL monitoring activities

11. Mrs. Colpan Polat Beken, MAP/MED POL programme officer, introduced the structure of the meeting's working document (UNEP(DEC)/MED WG.243/3), which along with the experts' presentations would provide the basis for discussion of the various types of monitoring, compliance monitoring having been postponed until the following day. She then provided further details as to how the two parallel sessions would be organised on the final day, the one on data flow which would involve a presentation by an expert from the European Environment Agency being mainly of concern to current and future members of the European Union. At the request of one representative, it was agreed that the two sessions would be staggered to allow any participants who so wished to follow part of both discussions. Mrs. Beken subsequently gave a general introductory presentation on monitoring activities: the legal basis, the general and specific aims of trend monitoring, of biological effects monitoring and of compliance monitoring, the state of play regarding monitoring agreements, and inadequate geographical coverage. She stressed once more the crucial importance of setting up a temporal trends monitoring programme to follow up the effectiveness of managerial actions and policy measures taken. At the end of the presentation the Secretariat invited the representatives of those countries which had not as yet prepared or signed a monitoring agreement to sum up their respective positions.
12. The representative of Morocco stated that since 1995 MED POL had been a means for the scientists and technicians in charge of monitoring in his country to build up expertise and to learn "hands on" how to organise their activities at national level, and to be receptive to the results from other countries. But as far as the table showing participation was concerned, which indicated that Morocco had prepared but not yet finalised its programme, he wanted to know whether all that remained for his country to do before submitting the results was to draw up a straightforward administrative agreement, or whether there was some shortcoming concerning actual transmission of the results. The representative of Egypt pointed out that since 1998 his country had had a national coastal waters monitoring programme, the results of which were posted on the Ministry website. It was, however, in need of some revision to bring it into line with MED POL requirements, even though the gaps to be bridged were not major. According to the representative of Spain, coastal water monitoring in his country was incumbent upon the regions. At least two of them had complete programmes, and it was worth taking a look to see how MED POL could be provided with the data.
13. The MED POL Coordinator explained that there were various steps leading up to the signing of a national programme with MED POL: firstly, the country in question had to show that it intended to set up the programme; negotiations were then got underway during visits between the Secretariat and the country on the technical aspects of the programme (frequency of sampling, parameters to be monitored, etc.); thereafter the country prepared a draft programme to check that the monitoring criteria (for trends monitoring, for example) were properly met. Finally, the programme was finalised and included in the formal agreement signed between MAP and the country. At the request of the country assistance could be provided, giving rise to a memorandum of understanding laying down the details. One of the sine qua non conditions for any national MED POL programme was obviously that MED POL should receive data on the approved data reporting formats, which could be downloaded from the MAP website. Obviously Spain, France and Italy were capable of having highly advanced

monitoring programmes requiring no assistance whatsoever, but in failing to submit their results they were depriving the MED POL database of major input. It would be useful if the specific criteria applied to the other national programmes could be met so that the data was comparable. For her part, Mrs. Beken gave an answer to the representative of Morocco, saying that the draft agreement with his country could be signed very quickly, but that the country still needed to appoint the institutes which would collaborate with MED POL.

14. The Chairman, speaking as the representative of France, one of the countries flagged up by the Secretariat along with Spain and Italy, admitted that data for its Mediterranean coastline was indeed not sent to MED POL, but that his country was also required to submit data concerning its North Sea coast to OSPAR. The matter of the submission form then arose- it would need to be identical given the huge volume of data produced, otherwise it would become far too complicated. The speaker did however detect “rumblings” in the French authorities’ willingness to communicate their data to MED POL as well as OSPAR, a willingness which would become even clearer in the future, and should lead to negotiations getting underway with the Secretariat on the details of notification.
15. Ms. Gianna Casazza (APAT, Italy) stated that in her country the data produced by coastal water monitoring met practically all MED POL requirements, although they are organized in a different format, frequency and distribution, as they respond to national law on water quality protection. She also underlined that hopefully, in the near future, an agreement between the “representative” authority of MED POL for Italy and the Italian competent authority for coastal water monitoring and data collection could be reached on submitting this data to the Secretariat. An intercalibration programme among the 15 Italian coastal regions, on their 2001-2003 data, was underway and a new monitoring programme was expected to be launched in June 2004, pursuant to the EU Water Framework Directive. The regions would be responsible for this monitoring as it is already the case for the present monitoring programme.

Trend monitoring: achievements, problems, and statistical analysis

16. Mr. Robert Precali, UNEP/MAP consultant and guest expert, introduced section 2.2 of document UNEP(DEC)/MED WG. 243/3 on trend monitoring: definition of this type of monitoring, consistency of national programmes, extent to which signed programmes had actually been implemented and a country by country assessment of data produced, showing the main errors identified during data transfer, lacking or disparate data, and incorrect use of units of measurement. He then gave a detailed statistical analysis of the data available, along with a study on the intra and inter-annual variance of measurements taken in the biota (mainly the mussel *Mytilus galloprovincialis* and the fish *Mullus barbatus*), once again country by country. Finally, he ran through the main conclusions MED POL drew from this analysis- the need to encourage more specific objectives in the future, new precise stipulations on the number of samples to be taken and of specimens to be pooled for each sample depending on the size of the organisms, the adoption of the International System (SI) of units of measurement for notifying results, encouraging participants in the programme to draft a practical manual on the objectives and methodological approach of trend monitoring.
17. Several participants felt that for the sampling strategy it was not enough simply to refer to the “pre-spawning period”, since the time of spawning could vary within the year, particularly for *Mytilus galloprovincialis*. It could even span the whole year. Following a brief discussion during which the expert pointed out that this was simply a recommendation, it was agreed that the important point was that sampling should

take place within optimal conditions of physiological stability, in other words outside the spawning period, which of necessity produced physiological changes both at the beginning and at the end. Also, the samplers should endeavour to establish what was the best period in relation to the chosen sampling sites, and study the behaviour of the organisms and the influence of abiotic factors such as temperature or water salinity which were likely to induce an additional stress.

18. One participant commented that sometimes in his country some species were not available, or at least there were disparities in the presence of a species such as *Mytilus galloprovincialis*. The expert pointed out that this situation could be rectified by placing the organisms in cages, which also meant that other indexes such as the rate of mortality could be checked, and stable hydrological and hydrodynamic conditions achieved, resulting in a more constant response than when studying organisms sampled in wild state.
19. Picking up on the comment from one participant that switching from a technique of sampling in the natural state to one using cages would introduce a further variance and that as such it would be better to opt all-out for one or other of the two methods. Mrs. Beken pointed out that the issue of the natural versus the cage approach had triggered some thought in MED POL when the proposal was made to have a national laboratory combining the two. Under the MED POL sampling strategy it had been decided that the mandatory species would be *Mytilus galloprovincialis* for the molluscs and *Mullus barbatus* for the fish, sampled in natural state, and that if these two species were not present, or were too rarely and randomly distributed, then other species such as *Perna perna* or *Upeneus moluccensis* could be substituted. In any case, the choice between taking samples of natural or caged organisms needed to be made before any trend monitoring programme was launched, subsequently sticking to the same natural or caged organism throughout the entire programme, MED POL's strategy giving priority to natural populations. Two participants made the point that using different species as well as other factors such as size and gender made it more complicated to compare results. A further two participants questioned the reliability of studying caged organisms as this was affected by other variables such as the depth at which the cage was positioned, the type of under-lying substrate, etc., to the extent that, depending on the parameters in question, the values could turn out much higher or lower than those obtained with organisms sampled in the wild state.
20. In contrast, and in the belief that the issue consisted of identifying trends in the various countries rather than comparing them from one country to another, one participant noted that since large sections of his country's Mediterranean coastline were devoid of any natural populations, the decision had been taken to position cages of mussels at several points, with a 97% recuperation rate. This had allowed comparisons to be made with natural mussel populations (usually in the vicinity of "hot spots", and more highly contaminated), and data to be collected on the growth of these organisms. Studying caged organisms could therefore prove very useful and complementary to the study of organisms in natural state. Echoing this opinion, another national delegate advocated setting up a network of cages throughout the entire Mediterranean Basin for the same size-standardised species. He added that these cages should only be used with non-mobile species such as molluscs, since they brought about radical changes in mobile species such as fish, and consequently also changed the stress responses. Reference software could be developed for processing the data collected using the cage system.
21. Finally Mr. Precali, the expert, introduced trend monitoring in sediment, emphasising how important the granulometric factor was in pollutant concentration, and the corresponding need to standardise its effects in order to obtain valid comparisons. He

also specified the methods for such sampling for MED POL trend monitoring purposes. In this respect, he concluded that the annual sampling frequency currently applied in all countries of one sample per station was not enough to establish trends and that a new strategy taking the granulometric factor into account would need to be adopted to meet the statistical requirements of this type of monitoring. For his part, the IAEA/MESL expert felt that the mineralogy of the sample should also be taken into account in sediment analysis, particularly its total organic carbon content.

Data quality assurance

22. Mr. Stephen J. de Mora, Head of the Monaco-based Marine Environment Laboratory (IAEA/MESL), introduced section 2.2.7 of document UNEP(DEC)/MED WG. 243/3. He briefly recalled the history of IAEA/MESL support for the MED POL programme, initially within the framework of maintenance services provided for the laboratory instruments, then through the organisation of inter-laboratory exercises to ensure the quality of their data. He recalled the definition of pollution adopted by most of the UNEP regional seas programmes, laid out the basic principles behind any programme of data quality assurance, and recalled the main activities conducted within this context since 1998, particularly inter-comparison and inter-calibration exercises, the production of new reference material, the organisation of training sessions, as well as technical assistance on request for the national laboratories during field visits.
23. Assessing this component of MED POL and the performances achieved, Mr. de Mora pointed out that laboratory participation in the inter-comparison exercises was not entirely satisfactory. Moreover, this activity should be backed up by a regular analysis of certified reference material, and by the preparation of analytical quality control diagrams. He concluded that a data review report for MED POL-Phase III was required, and that this issue should be rapidly settled so that a report spanning 1996 through to 2003 could be published in 2004, giving a very thorough assessment of the MED POL laboratories' analytical performances. Finally, MED POL should consider extending the parameters requirements (for metals, for example, only mercury and cadmium were currently analysed), and the laboratories should optimise the precision of their results for trend monitoring.
24. Since clarification had been requested about the policy of IAEA/MESL conducting checks on MED POL laboratories, Mr. de Mora ran through the various stages of the procedure: inter-comparison and then, where performance was bad, information exchange through various channels, which often allowed errors to be corrected in a simple, direct manner. If the laboratory continued to under-perform, it took samples and sent them to Monaco for analysis by the MESL, whilst conducting the same analysis itself so that errors could be identified through a comparison of the results. Finally, if at the end of this third stage the errors persisted, the MESL sent a mission to the laboratory or, as a last resort, it was the laboratory which sent one of its analysts for a training course at the MESL. Finally, the IAEA/MESL expert detailed the criteria which were applied in consultation with MED POL national coordinators to the selection of candidates for training courses at the Monaco-based laboratory.
25. In response to the issue raised concerning the maintenance of laboratory equipment in each country, the MED POL Coordinator explained that, for many years, as part of the MED POL assistance programme, this had been efficiently dealt with by the IAEA which rapidly dispatched an engineer to the various MED POL laboratories who was responsible for the repair and maintenance of the equipment provided by the programme- such as gas chromatographs and atomic absorption spectrophotometers. Unfortunately this service had been terminated due to budgetary

cutbacks over recent years, but at the same time countries had been prepared to take over at least part of it themselves, using local technicians, and spare parts were more readily available. In any case, if a problem concerning the installation or maintenance of instruments persisted, MED POL could always intervene. This would, however, be on a one-off basis and within the framework of global assistance to the countries as stipulated in the monitoring agreements, and no longer using a specific budget line with a permanent engineer. The IAEA/MESL expert stated for his part that there was a demand for training in equipment maintenance, and that it was up to the MED POL Secretariat to see whether it could consider this for the future. Finally, one national representative proposed the organisation of regional training courses on maintenance. The MED POL Coordinator pointed out that this type of meeting had already taken place in certain national laboratories, providing the opportunity to work hands on, and without too obvious a disparity in working conditions as was the case between the Monaco laboratory and some less-equipped national ones. Any country or laboratory interested in organising similar meetings would be favourably received by MED POL.

Biological effects monitoring: achievements and problems.

26. Mr. Aldo Viarengo, MED POL Consultant and professor at Genova University's Instituto di Fisiologia Generale, introduced section 2.3 of document UNEP(DEC)/MED WG. 243/3 on biological effects monitoring, the only monitoring activity to provide information on the direct impact of pollutants on marine flora and fauna. He presented a table showing the extent to which Mediterranean countries had participated in the pilot activities launched under this component, which revealed that four countries (Croatia, Greece, Slovenia and Tunisia) had sent in data, the 2001-2003 activity report indicating, moreover, that other laboratories were ready to launch bio-monitoring thanks to the training provided under the MED POL programme, and that a "twinning" system between institutes could encourage the development of this programme. MED POL-Phase III bio-monitoring had been launched with three main elements being taken into account: the choice of sentinel organisms, the use of a battery of biomarkers (for stress and exposure), and the development of a quality assurance programme involving in particular the distribution of a UNEP/MAP manual for biomarker utilisation, the circulation of a video produced by RAMOGE, the organisation of inter-calibration activities at the University of Alessandria's Di.S.T.A. laboratory, and a training course at the Centre for Interuniversity Research's laboratory at Genova University, which had attracted researchers from 16 Mediterranean countries. The 2001-2003 report indicated that several other laboratories were ready to launch bio-monitoring. The results of the 2001 inter-calibration exercise bore witness to the high quality and comparability of data obtained by the laboratories participating in the bio-monitoring programme for three bio-markers: lysosomal membrane stability, metallothionein content and EROD activity. Finally, Professor Viarengo stressed the new perspectives which were opening up in this field, particularly for MED POL: the setting up of an "expert system" which made it possible to include data from different biomarkers and thereby to rank the level of stress syndrome affecting organisms living in polluted waters, the growth of proteomics and the study of the effects of pollutants at genomic level using DNA micro-mechanisms to assess the stress syndrome.
27. In answer to one participant who raised the possibility of setting up a network of bio-monitoring laboratories by including exchanges between universities, the MED POL Coordinator stated that Professor Viarengo was already contemplating this when he advocated twinning between laboratories in the North and South, and that the inter-calibration programme developed by the University of Alessandria provided a good example of what could be achieved by combining local and MED POL efforts.

28. At the request of the Secretariat, Professor Viarengo gave further details about the “expert system” model and software developed by the University of Alessandria. He explained that with biomarkers such as EROD activity or lysosomal membrane stability, biological effects increased depending on water pollution until the stress syndrome appeared, but that beyond a certain stress level these effects started to decrease and could even fall below the control level, through enzymatic inhibition of protein synthesis and catabolism acceleration. Hence the biological response could only be traced up to a given level of stress with these biomarkers. However, if they were combined with other biomarkers which gave a constantly increasing response depending on the stress- such as lipofuscin accumulation or micronuclei frequency- using software it was then possible to obtain a simple index taking account of these various biological reactions, and then, using the values obtained from a dozen biomarkers, to classify the physiological state of the organisms on five levels from A to E, and consequently to obtain a picture of pollution in the surrounding environment. In the future a consistent and clear classification index of this type could be used to back-up decision-taking, and tests were to be run using data from the European bio-monitoring programme or BEEP to establish whether the “expert system” was able to “recognise” pollution gradients. If so, it could then be used as a support in environmental decision-taking, and would be included in the MED POL bio-monitoring programme.
29. The representative of Slovenia expressed the view that these developments, and particularly the introduction of new bio-markers, could create problems for EU Member States insofar as, under the Water Framework Directive, they were moving in a different and easier direction using simple eco-toxicological tests. The MED POL Coordinator assured participants in this respect that one of the programme’s main concerns was to avoid this type of difficulty for the EU Member States, and that one of the reasons behind Professor Viarengo’s invitation was that he was involved in the European monitoring programmes, and as such was extremely careful about convergence between the EU and MED POL. For his part, Professor Viarengo pointed out that the aim at European level was to detect the ecological risk and that, within the MED POL context, the idea was to establish within a short period of time whether rehabilitation projects were effective, without waiting to monitor the results over a two year period. With an instrument like the “expert system” it should in theory become possible to establish this within a matter of weeks.
30. At the close of this discussion the MED POL Coordinator wanted to share some of the Secretariat’s concerns with participants, and to hear their views on the matter. The programme was nearing the end of Phase III, and would need to tackle the preparation of Phase IV. It was therefore an opportunity to do some thinking and to make an honest appraisal of monitoring as a whole, in particular the most demanding aspect, i.e. “trend monitoring”. Without underestimating the programme’s successes, such as the quality assurance activities, training or the launch of bio-monitoring, an honest look at reality needed to be taken. Nine national MED POL monitoring programmes were operational for a total of 21 riparian states, not many of which had reached a good level, covering the three main types of monitoring. There were several possible reasons for this general situation: administrative or managerial slowness, lack of technical capacity, inadequate funding and deficient political backing. In addition to that, were the scientific objectives of the programme realistic? Did the programme need to be revised? Should it be simplified at the risk of compromising certain objectives? Should its activities be better adapted to the prevailing situations? Did the programme exceed the capacities of the Mediterranean region? At the same time, if the SAP were to be seriously implemented by the countries over the next few years, the entire region would need to be covered by

reliable data. As far as the European countries were concerned, the fact was that they often put their EU (national) commitments before their international commitments under the Barcelona Convention. Relations with the Commission were improving, however, MAP had been recognised by the Euro-Med partnership as the body responsible for promoting sustainable development in the region, and this development as well as the preparation of the European Marine Strategy, should have a favourable impact on EU-MED POL cooperation.

31. All those participants who took the floor praised the MED POL Coordinator for the frankness and clarity with which he had raised the issues. Responses varied. Some speakers (Morocco, Egypt) felt that capacity had increased thanks to MED POL, knowledge had been built up, and even if it was not exhaustive it did at least clearly show that the Mediterranean Basin was being undermined by the impact of human activity. It was therefore high time that something was done, that combating pollution at source, monitoring and coastal management were reconciled and, for this purpose, that the upgrading of developing countries was encouraged and a means found to assist their leaders to institutionalise their monitoring networks using national budget lines rather than always having to rely on international sponsors. Others (Italy, EC) believed that as far as the European countries were concerned, scientists should lobby their political leaders; but for these leaders to give their backing they would need to be presented with a sound, clear and convincing technical dossier establishing the reliability of monitoring (France, EC). A further delegate (Tunisia) felt that it was difficult for a scientist from a developing country to convince his superiors of the need to respect MED POL provisions when the three developed countries to the North did not transmit any data. A change of behaviour on their part would undoubtedly act as a stimulant for the countries on the Southern and Eastern shores. The IMC representative proposed that a well-argued brochure on the health risks and economic incidence of pollution in the Mediterranean should be published for all decision-takers. Finally, Professor Viarengo and the IAEA expert both pointed out that it was acknowledged that MED POL served as a reference for other countries outside the Mediterranean, and according to the representatives of Slovenia and Cyprus it should continue along a path which was beginning to bear fruit and to be understood by political leaders, strengthening its assistance component if needs be.

Compliance monitoring

32. Mrs. Colpan Polat Beken, MED POL programme officer, introduced section 2.1 of document UNEP(DEC)/MED WG. 243/3 on compliance monitoring. She recalled that this type of monitoring covered the health-related conditions of bathing water and shellfish/fish farming waters, effluent and "hot spots". The activities involved came under the pollution prevention and control strategies applicable under the Strategic Actions Programme (SAP). Apart from assessing compliance with criteria and standards, they also aimed at creating and updating an inventory of land-based sources of marine pollution, at determining the quantities and types of pollution released into the sea, and at assessing the effectiveness of the anti-pollution measures adopted. Finally the countries were required to submit their compliance reports on an annual basis, irrespective of whether they had signed national monitoring agreements, and this was a major contribution to monitoring SAP implementation.
33. Mr. Kamizoulis, WHO/MED POL Senior Scientist, presented an appraisal of country participation in the components of compliance monitoring for 2001-2003, from which it transpired that only nine riparian states had implemented this part of the programme, several other countries were lacking the capacity and means to draw up their compliance reports. This was a shortcoming which needed to be addressed, since

over the coming years this type of report was set to become essential in terms of SAP implementation. Moreover, Mr. Kamizoulis stressed the importance to tourism of monitoring bathing waters. He pointed out that the following week a meeting was to be held within the MED POL/WHO framework on revising the Mediterranean standards and criteria for recreational coastal waters, and that this work could be carried out on a consistent basis since the recently published WHO criteria and those in the draft EC Directive on bathing water had a lot in common. The methods of analysis were also to be reviewed, with the more difficult and expensive Most Probable Number method (MPN) mentioned in the EC Directive to be scrapped in favour of the membrane filtration method recommended by the WHO.

Eutrophication monitoring and implementation strategy

34. Mrs. Beken introduced section 2.4 of document UNEP(DEC)/MED WG. 243/3, running through the chain of events which had led up to the preparation of a project on eutrophication monitoring strategy, starting with a recommendation from the meeting of MED POL coordinators in Venice in May 2001, its examination, its submission to the Rome meeting in December 2001 and the 36th CIESM Congress, and its subsequent approval at the MED POL national coordinators meeting in Sangemini in May 2003. The strategy was comprised of two parts: 1) short term, with the identification of eutrophic sites depending on several criteria and based on three different typologies (affected marine site, fish-farm and coastal lagoon), setting up of the stations, monitoring of parameters according to a very specific sampling strategy; 2) medium and long term with the introduction of biological parameters and supported by remote sensing and operational oceanography techniques. A data quality assurance programme had been organised for the mandatory chemical parameters (basically the nutrients), and the biological ones (chlorophyll-a and phytoplankton). The IAEA/MESL had prepared a reference handbook on analytical reference methods, and a training course had been organised in Cesenatico in June 2003 by three Italian institutes coordinated by ICRAM, which was attended by scientists from eight Mediterranean countries. Finally, Mrs. Beken announced that MED POL intended to begin the short-term strategy in 2004 with the launch of pilot projects in the countries aimed at gradually integrating the eutrophication "hot spots".
35. Mr. Franco Giovanardi, expert (ICRAM, Italy), presented and explained the TRIX index which assigned a numerical value to the trophic levels of coastal waters, with four variables: chlorophyll-a, dissolved oxygen, dissolved inorganic nitrogen, total phosphorus- the first two of which provided information on effective productivity in terms of phytoplankton biomass produced and the dynamics of this production, and the other two on potential productivity, the two remaining parameters in the formula (k and m) being the coefficients of scale needed to set the index's lower limit value and the scope of the corresponding trophic scale, in other words from 0 to 10 units. After log-processing of the original four variables, annual TRIX distribution along homogeneous coastal areas was usually normal, and variance was reasonably stable. To interpret the TRIX values, those exceeding 6 TRIX units were generally linked to highly productive coastal waters where eutrophication effects were comprised of frequent anoxia episodes in the water at the bottom. Values below 4 TRIX units were characteristic of waters with low productivity, and those below 2 generally applied to the high seas. Mr. Giovanardi gave some examples of TRIX index value mapping in the Italian waters, particularly the Po delta, and the preliminary trophic ranking of these waters.
36. Several participants asked questions about the legitimacy of variables in the TRIX formula, and the difficulties they could cause (total phosphorus instead of orthophosphate, dissolved nitrogen, and the uncertainty produced by its

measurement, etc.), as well as the depth at which the measurements were taken, particularly in cases where eutrophication affected the lower part of the water column, and where chlorophyll and dissolved oxygen values were equal to zero. Mr. Giovanardi replied that the TRIX index was no panacea, that it was a combination of parameters commonly measured by all laboratories, essentially in surface water, and that it could obviously not reflect highly specific situations. The representative of France noted for his part that during studies conducted in Catalonia, by measuring parameters such as nitrate which showed the influence of riverine loads, and ammonium which reflected the impact of domestic waste, the TRIX index had been usefully completed by providing information as to nutrient origin even if, generally speaking, there had been good correlation between these complementary results and those from the TRIX index. Finally, the representative of Slovenia stressed how important it was to avoid mixing up data from the bottom of the sea with data from the surface, to take account of seasonality in interpreting the index and, prior to the launch of any eutrophication monitoring activities, to set up a data quality assurance programme. Moreover, the discussions focused on the interest of including other aquaculture installations (mussel farms, in particular) and not just fish farms amongst the sites to be monitored in the programme.

37. In response to the representative of Israel who had drawn attention to the importance of nutrient input from the atmosphere, Mrs. Beken pointed out that the monitoring programme covered land-based elements, but that in the long term it would need to take account of all nutrient sources. As far as nutrients from the atmosphere were concerned, there was no doubt that there were some major gaps in the region, which was why MED POL had planned to earmark funding for the issue of atmospheric load and the transfer of nutrients through this channel from drainage basins, but that these projects were part of the programme's "research" component.

Agenda item 5: Research activities and emerging issues

38. The MED POL Coordinator introduced section 3.1 of document UNEP(DEC)/MED WG. 243/3, recalling that during MED POL Phases I and II over 200 research projects had enjoyed partial funding and this had acted as a catalyst. Under Phase III, with the programme being refocused on pollution control, the Contracting Parties had decided to cut back on appropriations for research, and to largely use them for emerging issues and those of importance for the future. Over the last biennium, eutrophication had benefited in particular, support having been granted to two projects and the organisation of a workshop. The people who had headed up these activities were invited to present the results to the meeting.
39. Mrs. Alenka Malej from the Marine Biological Station (National Institute of Biology, Piran, Slovenia), presented the results of a project entitled "Influence of fish farming on coastal marine sediment in Slovenia". This project, which had been conducted in May 2003, had involved sampling sediment points below the cages of a fish farm, and comparing the values of the parameters with values from a control site 200 metres away. For the sampling points under the cages the results had shown an increase in dissolved nutrients in the sediment, a change in the structure of the meiofauna, increased rates of matter sedimentation, the maximum of which, measured at a depth of 5m, coincided with the concentration of organic matter at cage level, and higher levels of organic carbon and total nitrogen in the matter.
40. Mrs. Malej then presented a summary of the workshop on the "Environmental Impact of Mariculture and Mitigation Strategies", which had been held in Eilat (Israel), from 3-11 October 2002, based on the hypothesis that nutrients released from the cages of fish farms stimulate primary and secondary production, exceeding the production

levels of “clean” reference sites. The results of the measurements taken to check the hypothesis showed very significant differences when compared with the reference sites for phosphates, nitrates and ammonium, but non-significant differences for phytoplankton populations and bacterial biomass, whilst generally speaking bacterial production remained the same. In response to comments on the different interpretations which could be given to these two presentations, Mrs. Malej pointed out that they both came from remote areas of the Mediterranean, one of which (in the Eastern basin) was characterised by oligotrophic waters, and the other (in the Northern Adriatic) by mesotrophic water.

41. Mrs. Argyro Zenetos, NCMR (Greece), presented the project entitled “*Pinctada radiata*: an invasive bioindicator in the Mediterranean”, in which Greece, Syria and Tunisia were participating. She explained that for biologists the term “globalisation”, synonymous with the transfer at global level of goods, manpower, services and capital, also meant the growing introduction of non-indigenous or exogenous species. The bi-valve mollusc *Pinctada radiata*, which in the past had been cultivated as a food and for decorative purposes (pearls), and which had appeared in the Mediterranean in 1899, was highly invasive and was very widespread in the region today. According to various hypotheses, none of which had as yet been confirmed, it had been introduced into the Mediterranean either through the Suez Canal (lessepsian species), or in ballast water, or deliberately by a shellfish farm. It was useful as a bioindicator due to its tolerance of metals (indicator of chemical contamination), and its thermal tolerance (indicator of climate change). In the three participating countries the project consisted of endeavouring to confirm how it had been introduced into the Mediterranean, conducting genetic, molecular biological, and toxicological and morphometric (differences between populations) analyses. The project would be rounded off by a workshop at which the results would be presented and discussed.
42. One participant had expressed his surprise that other molluscs (such as the *Donax*, *Mactra*, etc. species) had not been included in the study to try to determine which would make the best sentinel species for indicating pollution. Mrs. Zenetos responded that *Pinctada* was already very widespread and used as a bio-indicator in other regions of the world such as the Persian Gulf, and that it was abundant in the Mediterranean, particularly in highly polluted areas such as ports. The representative of Egypt pointed out that in his country *Pinctada* was studied as an oil indicator, and that before it was used the mollusc’s spawning period should be established.
43. Two participants expressed the view that this new area of investigation could be of great interest for MED POL. Mr. Civili added that generally speaking MAP had in the past already done a lot of work on invasive species in the Mediterranean. Indeed, since the new SPA and biodiversity Protocol had come into force with a related provision, this was an issue which came within the ambit of the SPA/RAC in Tunis. The Centre did not have a research budget for this purpose, but in the future MED POL could involve it in work undertaken in this field.
44. The Secretariat pointed out that the next two projects to be presented were not MED POL ones as such, but that MED POL was involved.
45. Mr. Evangelos Papathanassiou, Director of the Hellenic Oceanographic Institute, presented an international action project on the sustainability of the Mediterranean and Black Sea environment, a European initiative which had come into being and been spurred on by the Greek presidency of the EU, and which involved the EU Member States and all the other riparian states of the two seas. Its aim was to build research capacity in the two basins through joint action in a whole series of areas: collection of information, organisation of a database on connections between the

Mediterranean and the Black Sea, which for the first time were treated as a single entity, the effects of climate change, and revision of the monitoring system to make it compatible between the two regions. Coordination was to be organised in order to establish a work plan and a conference. "Sets of tasks" would need to be defined, which would bring together scientists from different disciplines on a whole series of themes: paleo-oceanography and climate variability, operation of eco-systems, state and trends of fish stocks and resources in the high seas, biotechnological applications, coastal management, modelling, risks and threats, etc. So far 42 institutes had joined the project, which would have quite a large budget and which, having been submitted for approval in October 2003, should theoretically get off the ground in April or May 2004 and run for 18 months.

46. Mrs. Beken drew the meeting's attention to Annex IV of document UNEP(DEC)/MED WG. 243/3 which contained the report from the UNESCO-IOC/UNEP working party on the Mediterranean chapter of the Global NEWS Project (Global Nutrient Export from Watersheds). An international task force comprising scientists from 15 institutions in 8 countries had begun the project in spring 2002, and had already notched up several activities: two workshops, the building up of a database, a model in its initial stages, and the development of a partnership with other institutions. The Mediterranean sub-project (Global NEWS-Med), with MAP backing, was intended to help better understand and predict N and P inputs into the coastal waters of the various regions of the Basin, using existing data bases, and preparing relevant preliminary models for these two elements.
47. Mr. Louis Alexandre Romana of the IFREMER Centre (France) presented the MEDICIS programme on the fate of chemical contaminants in the Western Mediterranean, certain parts of which were already well underway. The basic idea was to study all inputs of these contaminants and their behaviour and, on this basis, to identify the current state of chemical contamination. The assessment would be made for a certain number of well-chosen chemical contaminants in water, suspended matter and live matter- for the latter case it would specifically be hake. This would be done on several spatio-temporal levels, and would look at the processes which manage the passage of contaminants from the coastal area out to sea. The expert gave an overview of the mass of knowledge built up in the Mediterranean on this type of contamination, stating that it mainly involved three main groups of contaminants: PCBs, DDTs and PAHs. Given the large number of contaminants produced by man- some 120,000- it had been necessary to draw up lists of priorities, like the EC's, although there were others. They included some contaminants which until then had been completely ignored, such as pharmaceutical products not metabolised by man (anti-depressants, antibiotics, beta blockers, etc.) which were starting to be found in sewage works and the marine environment, and were a constant cause for concern regarding human health and that of the environment. MEDICIS was organised around eight projects: three on inputs (including atmospheric inputs and the inputs from a large city- Marseilles), two on the state of contamination (one of them, MYTILOS, was a study of caged mussels in collaboration with all the countries bordering on the Western Mediterranean, and the other was a major oceanographic campaign planned for 2006 on the state of chemical contamination in the high seas and in the deep benthos), and three on the processes of exchange between the coastal environment and the high seas. The expected benefits would be in mass appraisals, coastal and deep-water contamination, assistance to decision-makers, responding to international conventions and the North-South sharing of knowledge.
48. Mr. Alon Zask from the Ministry of the Environment in Israel, presented the SISCAL project (Satellite-based Information System on Coastal Areas and Lakes,

<http://www.siscal.net>), involving Germany, Denmark, Norway, Italy and Israel, and intended to provide end users with accessible, customized Earth Observation (EO) data for monitoring of coastal areas, lakes and oceans. The main task was to create a software processor which could use satellite data to provide near-real-time information on aquatic ecosystems for users with no specialised EO knowledge, in other words to bridge the gap between research, satellite data providers and end users. Mr. Zask gave some examples of EO products likely to become commonly accessible such as chlorophyll-a levels, Sea Surface Temperature, Top of Atmosphere images as prices could be brought down considerably by clustering end users in the area covered by one satellite, whilst distributing products via the Internet would make the process faster and less expensive. Planned activities included transforming the format of various EO sources into a common format to be used for the SISCAL processor, developing the GIS processor so that in addition to satellite images it could also provide ancillary digital information on bathymetric data, specific coastline data, the location of sampling sites, etc., as well as the establishment of an Internet server to present the SISCAL project to the public. SISCAL would then become a decision-making tool for managers.

Agenda item 6: MED POL/MedGOOS cooperation

49. Mrs. Beken presented section 3.2 of document UNEP(DEC)/MED WG. 243/3 on cooperation with MedGOOS, first of all placing it within the overall GOOS (Global Ocean Observing System) set-up under the auspices of UNESCO-IOC. She highlighted the 3-year EU-funded MAMA project (Mediterranean network to assess and upgrade monitoring and forecasting activity), with a partnership made up of all the riparian countries and qualified international organisations, which intended to set up a multinational network and a regional platform for regular monitoring in the Mediterranean. For the time being, MAP/MED POL cooperation with MAMA revolved around the work package aimed at increasing awareness of the benefits of ocean forecasting in the Mediterranean. Mrs. Beken then reviewed the possible areas of future cooperation regarding the water quality monitoring of coastal waters with the tools of operational oceanography, particularly the study of eutrophication through operational monitoring at certain occasions which take place in short time scales that was not possible to detect with on site monitoring programmes planned for certain dates with pre-defined sampling frequency.
50. Mr. Constantinos Knitis, NMCR (Greece) added some technical details to Mrs. Beken's general presentation of MedGOOS and MAMA, particularly regarding the applications of operational monitoring to water quality, the interest of operational oceanography in terms of safety at sea, coastal management, the study of climate variability, and the use of marine resources. He gave details of the various tested or operational buoy systems in various parts of the Mediterranean, such as the Poseidon system, which consisted of a network of buoys equipped with sensors to measure air pressure and temperature, wind speed and direction, wave height, dissolved oxygen at the water surface, light attenuation and water temperature, chlorophyll-a, salinity, nutrients and radioactivity at depths from 0-50 metres, and in a specialised operational data processing and forecasting centre. Other systems involved a surface buoy linked to submerged buoys held by an anchor, equipped with multi-parametric probes for measurements at depth. A system of moored buoys had been designed to permit real time basin-wide validation of models, and the calibration of eco-system modelling elements. Fouling and sensor calibration were limiting factors. The EU-funded FerryBox system, which was already being applied in the North Sea and was operational in the Mediterranean since November 2003 (Saronic Gulf, Pireus- Crete) meant that at little expense boats or ferries on regular routes could be used: surface water pumped on board was analysed by instruments in a

protected environment, and the data collected was even posted up for passengers. This handful of comments was enough to provide some idea of the long term prospects for fruitful cooperation between MED POL and MedGOOS.

51. The Chairman pointed out that there was currently a slight discrepancy between the MedGOOS issue which concentrated on the high seas, and that of MED POL, which focused on the coasts and on reducing land-based inputs, but that one of the issues at stake for future years would be to reduce this disparity by constantly improving our understanding of how processes taking place out at sea interacted with coastal ones.
52. Mrs. Silvana Vallerga, Scientific Director of the IMC (Oristano, Sardinia) and President of the GOOS-I and MedGOOS Intergovernmental Commission made a general presentation of GOOS, the global ocean observing system which was set up at the time of the Rio Conference under the patronage of UNESCO/IOC, WMO, UNEP and ICSU with the aim of collecting ocean environment monitoring data to meet the needs of the scientific community, particularly for forecasting, to develop products and services based on this data and to coordinate and extend the programme's operations and to ensure that they were integrated into global management strategies. An Intergovernmental Commission convened every two years. GOOS implementation at regional level was organised by 13 Alliances, such as EuroGOOS, MedGOOS, and AfricaGOOS. MedGOOS, which was created in 1997 under the aegis of the IOC and of which Italy currently held the presidency, with its secretariat in Malta, embraced 20 institutions from 17 Mediterranean countries, plus operational agencies. For the current phase the objectives consisted of ensuring the transition from research modes to operational modes involving on-going daily supply of data to users, learning from the regions, building up capacity and cooperation and undertaking operations in exclusive economic areas, conducting pilot projects on the coasts with programmes such as MED POL, exploiting new technologies and exploiting resources. The first stage of MedGOOS had materialised in the previously mentioned MAMA project.
53. After two participants had stressed the issue of complementarity between MedGOOS and MED POL, in other words between research-development which had received the portion corresponding to MED POL Phase III, and the traditional activities of monitoring and combating pollution, and the need to better dovetail these two areas, possibly in the integrated project to be submitted to the EU during 2004, the MED POL Coordinator stated that after an initial period where it had been difficult to identify common objectives, it had become clear that the two programmes could proceed on the common ground of pollution, even though the MedGOOS approach was new to MED POL, which was very enthusiastic at the prospect of collaborating in this manner.

Agenda item 6: Road map for the preparation of MED POL-Phase IV: monitoring as an integral component of the SAP

54. The MED POL Coordinator situated the current period within the programme's general historical evolution, the current period being marked by the transition from Phase III to Phase IV (2006-2013) which was set to be prepared so that it could be adopted by the Contracting Parties at their meeting in late 2005. Each Phase had needed to respond to the requirements and conditions prevalent at the time: Phase I involved pilot projects and the first assessments using UNEP funding, Phase II handed over to the countries, with national monitoring programmes and then, after the Rio Summit and the advent of the sustainable development concept came Phase III which gradually refocused away from assessment alone onto pollution control, with the adoption of the revised "LBS" Protocol and the SAP, intended to identify the

problems, the measures, their cost and their cut-off dates and to assist countries to actually achieve pollution reductions. Ideas and principles for future activities had already been discussed and raised in 2003 at the national coordinators meeting in Sangemini, the NFPs in Athens, and the Contracting Parties in Catania. The forthcoming biennium was going to involve the evaluation of MED POL, and therefore an appraisal of its strengths and weaknesses, and at the same time also the preparation of the content of Phase IV, taking recent developments into account: 1) EU enlargement to embrace new Mediterranean countries, and therefore taking account of the EU's growing clout, its legal and technical provisions, whilst preserving MED POL's identity and respecting the peculiarities and problems of those countries not within the EU fold; 2) The Johannesburg Plan of Implementation on certain essential elements; 3) trends within other conventions and programmes (UNEP/GPA, Basel, Stockholm, etc.); 4) new scope of application of the "LBS" Protocol extended to the drainage basins; 5) need to integrate an economic dimension into the programme formulation; 6) maintaining a sound and precise scientific basis for the programme. Finally, the application of the ecosystem approach would need to be worked on to give it specific definition and content, and also to specify what was meant by integrating drainage basins, and watercourse monitoring about which the countries had certain reservations. The Secretariat was awaiting comments and opinions from the meeting on all these points.

55. Several suggestions were put forward in the course of the ensuing debate. As far as the application of the ecosystem approach was concerned, they were as follows: requesting the scientific community's contribution in defining the various ecosystem typologies depending on North or South, as the approach was set to transform the implementation of monitoring (Slovenia), integrating the work which MAP had already done in this field and particularly in the framework of the research component (Morocco), tightening collaboration with SAP BIO and, for the European countries which in the long term would account for half the riparian countries, emphasising the Water Framework Directive, which refers to ecosystems, whilst cooperating for this purpose with the non-member countries (Italy), not forgetting the political scope of the very concept of ecosystem (EC). On the issue of drainage basins and watercourse monitoring, it was proposed that the countries which wanted to integrate it into their programmes should be supported (Tunisia), but that the reticence expressed by countries was understandable (IAEA), and that first and foremost the capacities and economic resources of each country should be taken into account in order to produce a realistic programme (Egypt) without neglecting the atmospheric input of Northern rim countries into the Mediterranean marine environment (France). Finally, in more general terms, irrespective of whether or not they were EU members, countries should present their case to it to highlight the uniqueness and specificity of the Mediterranean (Slovenia, EC) to ensure that the future programme took account of the on-going preparation of the Mediterranean Strategy for Sustainable Development (EC), so that the Phase IV document was very clear and really assisted countries, and so that a web access system to all information was set up (France), and finally so that research's place could be clarified and the MED POL national coordinators informed of the various scientific projects being conducted or about to be launched in their respective countries in order to avoid duplication (Tunisia).
56. Concluding from these discussions, Mr. Civili felt that, in view of the different interpretations which speakers had given of the ecosystem approach, it was no doubt too early to discuss it at this stage, particularly as in Catania the Contracting Parties had simply asked the Secretariat to consider the means and implications of the ecosystem approach within the framework of MED POL management. This question needed to be studied in much greater detail in any case, and there was a need for close coordination between all the components of MAP. Generally speaking over

recent years, and thanks to the enlightened work of the Coordinator, MAP had broadened its political role and horizons, particularly as far as the EU was concerned, and would now have to integrate all these new tasks, and a programme such as MED POL, for example, would have to conduct joint projects with REMPEC or SPA/RAC, which had never before been the case. Regarding the issue of drainage basins and river monitoring, a programme had been proposed for this area and it should not be abandoned, at least not for the river mouths and estuaries which were "hot spots", an obligation in the context of SAP implementation. Moreover, the Secretariat was aware of the need to keep national coordinators informed about all scientific projects which affected their respective countries, not to exclude those countries which were not in the EU, but rather to involve them in processes such as the preparation of the European marine strategy, to include the economy and a costing study in all pollution abatement plans (as had been done for industrial origin BOD), and finally to give them the financial viability without which they would remain a dead letter. Finally, in respect of atmospheric inputs, this issue had been dealt with jointly in the past with the IMO, and had been suspended for reasons internal to the organisation. It was, however, quite clear that it ought to be re-launched.

Agenda item 7: Management of the database and data flows

57. Mrs. Beken introduced section 2.5 of document UNEP(DEC)/MED WG. 243/3. She recounted the MED POL database restructuring process, which had been got underway in 2001 with the preparation of a conceptual model of the new database which was reviewed at an experts meeting in 2002. The Database was set up in 2002-2003 and loaded with the monitoring data from 1999-2002, which was subsequently updated and assessed. The validation/verification stage had still not been implemented, however, since the database had only recently come on stream. One of the new MED POL database's specific objectives was to boost the data storage capacity, to establish a routine loading system after each data submission period and to apply a verification/validation procedure at various clearly defined stages, and to provide a set of basic reports to facilitate the rapid evaluation of the database, and hence of the monitoring programmes and their results. It had also been planned to publish an internet version of the Database.
58. Mr. Volodymyr Myroshnychenko, MED POL Consultant and database expert from the Institute of Marine Sciences (Erdemli, Turkey), provided some technical details about the base's structure, its functionalities, its Microsoft access, its links to various tables providing information about the programme's monitoring stations, the samples, the matrices and the parameters listed as specific dictionaries, the various select options for the data on offer to users, the data management and administration module, and the Internet module providing free access through the links on the UNEP/MAP website. There was also a mapping module for presenting data on the stations according to the Mediterranean coastal regions and their geographical coordinates.
59. Mr. Myroshnychenko then answered participants' questions, suggestions and comments, stating that: 1) there were no plans to allow direct individual loading of data into the base by the coordinators themselves, because the Secretariat first had to check its quality and return any data to the originators if there were mistakes or omissions, and that in any case entering the data directly could provide an additional source of errors; 2) the time was right to propose other links from the site to other MAP/MED POL partners such as the other conventions, ICES etc.; 3) the website did not allow the originators to correct their data directly, but that they could do so by e-mailing the Secretariat in the near future. Although the possibility existed, the programme was not planning any inter-activity function for the database.

60. Mrs. Beken then presented a progress report on the monitoring programmes and data submitted to the database, which were essentially designed to cover the “hot spots” and “reference/ coastal areas”, for taking management decisions at national level and contributing to trend assessment and the overall qualitative state of the Mediterranean. She ran through the mandatory and recommended matrices and parameters for marine coastal waters and hot spots as well as for direct and river discharges and for atmospheric loads. She further mentioned that countries were obliged to submit disaggregated (raw) data for trend and state monitoring as well as for discharges and loads annually. After submission of monitoring data was completed, the data would be loaded to the database and later sent again to the countries for data verification. The verified data sets were re-submitted to MED POL and re-loaded to the Database, internally validated and flagged and stored for expert validation. The procedure was expected to be finalized in the first half of a current year for the previous year’s data. She also informed the Meeting how to access information on monitoring activities and a data inventory of MED POL Phase III and data of Phase I and II through web. Finally, Mrs. Beken noted that her presentation was by way of an introduction to the ad hoc working group’s discussion scheduled for that afternoon on data flow.
61. A question from the representative of the EEA about publishing data on the Internet sparked a discussion about the confidential nature of MED POL data. The MED POL Coordinator stated that although the question had already been raised on several occasions, and particularly at Sangemini, the countries had never given a clear answer. The EC representative felt that it was a sensitive point, since the Commission followed a policy of transparency with the exception of some specific data. The other views expressed on the issue varied: 1) this was not something to be decided by the MED POL coordinators but rather by the meeting of NFPs or even the Contracting Parties, in view of its political nature; 2) this could well be one of the reasons why European countries were reticent about sending in their data, and their reticence could be more easily dissipated if confidentiality were assured; 3) the Secretariat could find a means of presentation for publishing reports on trends, conformity etc. which did not expose the countries, along the lines as the IAEA approach to the inter-comparison data it received; 4) any researchers and countries wanting to release their data could publish it either before or after it was submitted to MED POL; 5) using a data stratification strategy would mean that data could be released for the scientific community; and finally on data submission and use, a reference to what was being done with other conventions or the Framework Directive might avoid bureaucratic hold-ups. The MED POL Coordinator concluded from the discussions that for the first time the Secretariat was getting some feedback on this issue, no doubt as a result of the way in which the database had progressed.

Agenda item 8: Ad hoc working sessions on eutrophication and data flows

Ad hoc group on eutrophication

62. Mrs. Beken first opened the session on eutrophication in plenary so that all participants could hear her introduction. She briefly summed up its objectives, and Mr. Franco Giovanardi (ICRAM, Italy) made an introductory presentation on the matter. The session then went into a restricted committee whilst the remaining participants convened for the ad hoc meeting on data flows.
63. The minutes from the ad hoc meeting on eutrophication can be found in **Annex III** of this report.

Ad hoc group on data flows

64. Opening this ad hoc session, Mr. Civili stated that it was mainly intended for the representatives of current and future EU Member States, but was open to any other representatives and experts who may wish to attend. Based on the mechanisms which the EEA representative was about to introduce, the idea was to identify how European countries which were members of MAP could enter the data flows to and from the EU.
65. Mr. Hermann Peifer of the European Environment Agency (Copenhagen, Denmark) made a detailed presentation of how the EIONET worked, this being the EEA and its Member countries' network for collaboration. It was both organisational and electronic, involving the national focal points in the EU Member States and the accession countries, the European thematic Centres and national reference Centres to pool all information which could be used by decision-takers to improve the state of the environment in the EU and to make relevant policies more effective. Mr. Peifer then went on to describe how Reportnet was organised, an innovative integrated reporting system made up of a series of Internet-based tools for supporting data collection for policy-relevant indicators, ensuring the visibility, traceability and transparency of this data. This system could be used by other organisations, countries and conventions.
66. After they had asked for more information about various aspects of the EEA's data collection and transmission mechanisms, several participants noted that because MED POL and the EEA's data submission formats, procedures and timetables did not completely match, if each country individually transmitted its data to the EEA this would result in an administrative overload. Some countries also had other commitments under other regional marine conventions, not to mention the fact that their commitments to the EEA came on top of their EC obligations in applying its directives.
67. Picking up on the suggestion made by one delegate, the participants felt that for the time being the best proposal would be to try out a system whereby all Mediterranean Contracting Parties to the Barcelona Convention would send their data to MED POL according to the approved procedures and format, and that MED POL would transmit the same data to the EEA. Given that for internal reasons some Mediterranean European countries currently reported to the EC or EEA and not to MED POL, it was explicitly stressed that these countries were firstly "legally" bound to report to the Barcelona Convention, and that they were asked to transmit their data to the EEA for statistics, assessments, etc. If they so authorised MAP, the Mediterranean countries which were not members of the EU could request that their data also be transmitted to the EEA, pending reciprocity. One delegate commented that it was initially up to the EU Member States and MED POL to agree on a formal framework of cooperation for the data before considering the contribution to be made by the non-EU member states.
68. Mr. Giovannardi and Mr. Civili informed the plenary of the conclusions from their respective working groups on eutrophication and data flows.

Agenda item 9: Conclusions and Recommendations

69. The meeting adopted the conclusions and recommendations set out in section 4 of document UNEP(DEC)/MED WG. 243/3 to be found in **Annex IV** to this report, having modified and added to them.

Agenda item 10: Other Business

70. Nothing was raised under this agenda item.

Agenda item 11: Closure of the Meeting

71. Following the usual courtesies, the Chairman declared the meeting closed on Thursday, 11 December 2003 at 17h30.

Annex I

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Annex II

**REVIEW MEETING OF MEDPOL – PHASE III MONITORING ACTIVITIES,
SARONIDA (Attica, Greece, 9-11 December 2003)**

AGENDA

Agenda

1. Opening of the meeting
2. Election of Officers
3. Adoption of the Agenda and Organisation of Work
4. Review and Analysis of MED POL Monitoring Activities
5. Research Activities and Emerging Issues
6. Road Map for the Preparation of MED POL-Phase IV: monitoring as an integral component of the SAP
7. Management of the data base and data flows
8. Ad hoc working sessions on eutrophication and data flows
9. Conclusions and Recommendations
10. Other business
11. Closure of the Meeting

Annex III

**MINUTES OF THE AD HOC MEETING ON THE MED POL STRATEGY FOR
EUTROPHICATION MONITORING, 11 December 2003 (16h.)**

The meeting, which was led by F. Giovanardi (ICRAM, Rome, Italy), was attended by several experts and representatives of Mediterranean countries (Croatia, Egypt, Israel, Italy, Morocco, Tunisia and Turkey). The discussions were based on the lecture given at the opening of the meeting by Mr. Giovanardi on the concept of coastal eutrophication. The main objectives of the meeting were:

1. To establish a joint vision of coastal eutrophication monitoring strategies.
2. To focus efforts on pilot sites for the launch of the project.
3. To review the availability of relevant information and data.
4. To discuss technical capacity and standardisation of techniques.

At the start of the meeting some questions were raised by delegates following the lecture, in particular regarding use of the TRIX trophic index as an appropriate tool for defining the trophic state of water bodies and setting trophic quality objectives.

The conclusions from this discussion can be summed up as follows:

- a. Generally speaking, an index is essential, and duplication is to be avoided. The TRIX index formula is based on the linear combination of four main trophic state indicators, following the principle of the “most enlightening variables”.
- b. Light and temperature were not included in the TRIX index equation since they need to be taken into account in the description of the development of isolated events.
- c. Although the Secchi depth is a fundamental indicator of trophic state the TRIX index does not include this parameter because of its dual nature as an indicator of phytoplankton biomass along the water column, but also of mineral turbidity from riverine inputs and discharge of land-based origin affecting the coastal waters.
- d. The isolated values of the TRIX index should therefore only be seen as a measurement of the effective trophic state of a body of coastal water. Also, as an index variable, the distribution of the TRIX data points should also be analysed in the same way as any statistical distribution variable.
- e. The criterion for trophic ranking should be based on the annual mean values of the TRIX measurements. The corresponding trophic scale bears a close resemblance to similar scales for describing other natural phenomena likely to show differing levels of intensity (such as the Mercalli or Richter scales for earthquakes).
- f. Sampling activities and analyses should be conducted at the same frequency all year long; **no one season or month is better suited** for the correct application of the TRIX ranking criterion to a given stretch of coast.
- g. Full knowledge of seasonal variations to the agreed variables in the area or areas covered by the study needs to be available before the programme is launched. Local situations with a total risk of eutrophication should be identified and notified.
- h. Since the TRIX index was originally tested in the Adriatic sea where prevailing conditions are of phosphorus limitation, there is now the opportunity to also test the TRIX Index for waters where nitrogen limitation is the rule.
- i. This being the case, the procedures and objectives for all monitoring activities are communicated in the reference document on the MED POL eutrophication monitoring strategy.

Finally, various country representatives gave their opinions and spoke of their experiences with the MED POL eutrophication monitoring strategy when **selecting one or more sampling sites**:

1. **Croatia**: seven sites have been monitored in the Adriatic over 30 years. A concentration gradient was detected in the surface water, clearly decreasing from

West to East. TRIX values were situated between 2 and 4 (with a peak of 5 in 1974). Values were high near the Po plume, mainly due to high concentrations of phosphorus. Data analysis also helped identify sources of pollution along the Croatian coast from the influx of nutrients (1998-2001). Using the TRIX index mean values, it was possible to link the impact of nutrient influx directly to algal blooms, decrease in biodiversity, and the appearance of toxic algae. The TRIX index was also used as a new management tool in the coastal area management plans for promoting nutrient control and elimination policies.

2. **Tunisia:** The INSTM has been conducting a monitoring programme since 1980 with the research vessel "Hannibad". Eight stations covering the coast (4), Bizerte lagoon (2), and the lagoon of Tunis (2) are regularly sampled. *Mytilus galloprovincialis* and *Tapes decussatus* are commonly used as bio- indicators. Twelve sites are monitored in the Gulf of Gabes to detect toxic phytoplankton. Samples and analyses cover most variables in the programme, including algal biotoxins. Diversity indexes were used from 1996 to 2000 to establish the trophic level in the Gulf of Gabes....Monitoring activity focuses primarily on checking conformity with EU quality standards with an eye to exporting mussel products to European markets. Tunisia has therefore proposed the Gulf of Gabes and Djerba island as suitable sites for launching the eutrophication monitoring programme.
3. **Israel:** Thirty-nine sampling sites were analysed for riverine inputs over two years. Also, two research cruises were conducted in the coastal waters. The bay of Haifa is deemed to be a "hot spot" where 27 sites were monitored. The samples were analysed for temperature, salinity, dissolved oxygen, turbidity and chlorophyll-a.
4. **Morocco:** Two sites were proposed: a) Nador lagoon (surface area of 114km²), a coastal lagoon which receives the waste water from urban settlements, which hosts an aquaculture facility and which also receives industrial effluent from a river tributary. Site b) is the coastal area affected by inputs from the Moulouya, whose drainage basin is mainly characterised by farming activity, a major diffuse source of nutrient loads, particularly phosphates. A UNEP expert may be required to conduct a visit to design the details of the monitoring programme.
5. **Turkey:** The bay of Mersin is the proposed site. It is characterised by major treated domestic inputs, particularly in the Eastern portion. Data from seasonal monitoring which could be used to calculate the TRIX index is readily available, which is an advantage.
6. **Egypt:** three sites could be proposed: a) Alexandria Eastern port (fishing port) where a large volume of data is available on water quality and algal blooms since the mid 60s. The port has long been receiving untreated waste water discharges; b) the bay of Aboukir, which receives a mixture of agricultural and industrial discharge and waste water, and has been deemed a "hot spot"; and c) Manzalah lagoon, the biggest and most productive coastal lagoon in North Africa. The data and information from these sites could help calculate the TRIX index.

Questions on sampling and analysis

Participants raised several common questions, particularly on the issue of sample analysis:

1. Ammonia contamination of the samples during analysis with high levels of blanks may compromise the results because of the method's low detection limit (0.01µM). This problem can be solved by eliminating the filtration stage (0.45µm) which affects the TRIX index

because the index refers to DIN forms. Another solution could be to use ambient air cleaning mechanisms.

2. Phosphorus concentrations as P-PO₄ are often very low (below the detection limit), but this does not compromise the TRIX index calculations, since the index covers total phosphorus. Although, generally speaking, eutrophication phenomena are not expected when bio-available phosphorus is depleted, P-PO₄ recycling with rapid fixing/release renewal rates should be considered.
3. It is difficult to standardise the use of cadmium reducing columns for nitrate analysis.

Participants agreed on the need to adopt common general rules, for example: a value of 0 µM is nonsensical for nutrient concentrations, and therefore the analytical limit of detection should be taken as the minimum concentration value which can be achieved and communicated.

The preparation of a common practical manual was highly recommended for the sampling procedures and methods of analysis officially advocated by UNEP. This manual could be circulated to all countries with best available practices, also taking into account each country's capacity...

The delegates also reviewed the following points:

1. Eutrophication should not only be tackled when there is a real problem. Participants agreed how important it was to assess the nutrient loads coming into the coastal area (bays or lagoons) in order to identify the sources, assess the causes and plan priority interventions.
2. Case by case variability (in other words the frequency of algal blooms and intensity in terms of maximum chlorophyll values) from one site to another depends on several factors: season, local currents and hydrological conditions, stratification of the water column density, nutrient inputs, etc. In all cases, log processing of the variables (data related to biomass, chlorophyll and nutrients) greatly reduces the variation interval at annual level, with stabilisation of the variance. It is then possible to compare the various coastal areas (or different annual campaigns) using parametric statistical rules.
3. The document on the eutrophication monitoring strategy provides a clear definition of monitoring design. The positioning of the transects (or grids), the number of sampling stations and the sampling depths, the distance from the shore, time frequency etc., as well as the socio-economic characterisation of the tributary basins affecting the coastal area in question is mandatory information required in order to compare different local situations (including reference areas).
4. It may prove more effective to sample a restricted number of stations in order to increase sampling frequency. Seasonal sampling at three depths is recommended, however. At least 50 data/yr. per zone are required to give the size of samples any statistical significance.
5. On the factor which limits primary production, the usual criterion applied is, however, represented by the N/P ratio, a statistical expression which can be easily and constantly assessed. Nevertheless, a dynamic nutrient limitation concept could be tackled. The limiting conditions would appear to be

determined by the element (N or P) which in the input appraisal, fixing and losses passes through the system fastest when compared with the other, in other words stays for the shortest time compared with the other, and/or in relation to the fixing/release speeds (recycling). In this respect, the case of the North-western Adriatic should be stressed. These coastal waters appear to be very limited by phosphorus, yet they usually show high chlorophyll concentrations in spite of the very low levels of available reactive phosphorus in the water column.

6. Nitrogen could be the limiting nutrient as in the bay of Haifa, the Italian Tyrrhennian sea and the Greek waters. It has been observed that: the ranking criterion based on the TRIX trophic scale is not affected by the N/P ratio (a factor which does not appear in the index formulation). Consequently, the use of the TRIX index could be a valid means of classification for the entire Mediterranean eco-region. However, the identification of the limiting factor is still the most important stage in order to take the correct approach in nutrient control and elimination policies to combat coastal eutrophication.

Annex IV

CONCLUSIONS AND RECOMMENDATIONS

Monitoring Activities

Compliance monitoring activities, being the major link to the pollution control component of MED POL and its Strategic Action Programme (SAP), need to be implemented more widely by the Mediterranean countries. Compliance reports for bathing and shellfish/aquaculture waters as well as for effluents related to regional common measures and/or national legislation have to be transmitted to the MED POL Secretariat annually. Countries, which do not have a current monitoring agreement with MAP/MED POL, are also expected to transmit their compliance reports to MED POL.

Concerning trends monitoring activities, all the countries which have not yet initiated a trends monitoring programme at their "hot spots" and "coastal waters" are urged to formulate/finalize their programmes as priority and start to implement the programmes to ensure sustainable implementation of SAP.

On the other hand, those countries which have ongoing trend monitoring within their national monitoring programmes are urged to cooperate with MED POL and to harmonize their monitoring strategies with those agreed for the region in the framework of MED POL to enable the preparation of regional assessments.

The Mediterranean countries already active in MED POL Phase III and implementing the Monitoring programmes urge those countries having well developed monitoring programmes but not yet involved in MED POL to cooperate with MED POL and provide data to the MAP/MED POL Database.

The preliminary statistical analysis of the available data for trends monitoring in biota has shown that most of the countries do face some difficulties in implementing the trend monitoring programmes according to the agreed sampling objectives. In order to overcome these difficulties, the countries are recommended to prepare clear and step-by-step programme implementation manuals to be used by each implementing unit during sampling, application of laboratory methodology etc. The within-year sampling and analytical variances have to be checked systematically against thresholds of the statistical power of the programme. Country-specific comments will be provided by the Secretariat on the basis of the results of the first analysis of data.

Trends monitoring criteria of MED POL for sediments have to be revised. The present monitoring activities for sediments are only partly adequate for state assessment.

Regarding the quality assurance of trends monitoring data, participation to intercomparison exercises should certainly be improved by the MED POL designated laboratories. An overall performance report on data quality review should be prepared to cover the period of 1996-2003. Assistance to laboratories for maintenance of analytical instruments is needed and MED POL is asked to organize a regional training course or laboratory visits as required.

As a result of the training activities organized within the quality assurance programme of biological effects monitoring, a number of new laboratories are ready to launch the programme and should therefore be involved in national MED POL monitoring programmes. The results obtained in intercalibration exercises are quite satisfactory. The quality of data achieved on field samples is also good; however, all the results have to be coupled with chemical analysis data of the same sample or at least with the data gathered at the same sampling date and site. An overall detailed expert evaluation of the whole data set gathered within biological effects monitoring studies is needed.

The new biomarkers of stress and exposure recently established by UN international experts could be possibly integrated with the present set of biomarkers of the MED POL programme.

The short-term strategy of the new eutrophication monitoring programme of MED POL is ready to be launched for a number of priority sites selected by the countries. The first step would be to establish a list of affected areas within the definition of the three different site typologies mentioned in the MED POL programme. The mandatory criteria will later be used to formulate the pilot programmes. The second training course for eutrophication monitoring is planned for the year 2004 with a content similar to the first course.

It is commonly agreed that atmospheric inputs of both nutrients and hazardous substances are important for the Mediterranean marine ecosystem but that data and information on them is very limited and needs to be improved.

Database management and data flow

The work initiated for the establishment of the new MED POL Database has nearly been finalized and the only major step that has to be accomplished is launching a standard data verification/validation procedure. A three-step procedure is proposed and will be introduced very soon for the 2003 data submission period. On the other hand, the same procedure will be used to complete the missing steps of verification of the 1999-2002 data.

Regarding data flow, countries will continue to submit MED POL Phase III monitoring data to the Secretariat using the MED POL data exchange formats. Later the Secretariat will operate the proposed data verification/validation steps in consultation with countries in order to achieve quality coding of data in the Database.

Disaggregated data transferred to MED POL by the European countries would be made available to EEA and these countries would not be asked to re-submit the same data to EEA through EUROWATERNET. Nevertheless the present direct link between EEA and some Med-European countries, that are transferring data to EEA and not to MED POL, will continue until the data transfer to MED POL from these countries will be achieved.

Research and cooperation

Scientific research, observations and management issues have to be considered as interdependent elements of pollution control and prevention. Being MED POL interested in the synthesis of these elements, support to research activities should continue as well as the involvement in regional and international projects and initiatives related to its specific objectives and needs.

Concerning cooperation with MedGOOS, the following objectives, actions and recommendations are agreed:

Further develop the objectives of cooperation between MedGOOS and MED POL, including building capacity, transferring best practice, applying innovative technologies for the benefit of all Mediterranean countries working together in joint projects.

Specific recommendations to enhance MED POL and MedGOOS cooperation:

1. MED POL and MedGOOS will join forces complementing each other's role to address the common issue of monitoring and prediction of the quality of the marine environment addressing problems especially in relation to chronic and acute pollution. MedGOOS will contribute to support the research underpinning the monitoring obligations of MED POL and address the prediction of the ecosystem.

2. MED POL is invited to contribute to next MedGOOS phase, and MedGOOS to the planning MED POL Phase IV.
3. To establish a joint working group to devise a strategy for the short, medium and long term cooperation leading to a joint plan of action.