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STATUS AND TRENDS IN THE DEVELOPMENT OF THE GIPME-MARPOLMON SYSTEM

This document was prepared by the Secretariat in consultation with the Chairman of the Working Committee for GIPME with the purpose of summarizing the developments and activities within the GIPME Programme and the MARPOLMON System.

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1. INTRODUCTION

The IOC adopted the Global Investigation of Pollution in the Marine Environment (GIPME) Programme in response to Recommendation 90 of the UN Conference on the Human Environment (Stockholm, 5-16 June 1972). The overall objective of GIPME is to provide a scientifically sound basis for the assessment and regulation of marine pollution, including sensibly planned and implemented monitoring programmes. It is envisaged that this goal will be realized through, inter alia, evaluating data acquired through national and regional activities which when taken together represent a Marine Pollution Monitoring System (MARPOLMON), and constitutes a marine chemical component of the Global Environment Monitoring System (GEMS).

When information arising from regional contaminant monitoring activities is viewed within the context of reference information (such as that derived from baseline studies) and combined with a current understanding of marine processes, a predictive capability will result for estimating the "chemical" consequences of an environmental insult. It also provides the basis for an assessment of contamination to be made. Central to this, as well as providing for the scientific and technical basis of conducting regional monitoring activities and baseline measurements, is the work of the GIPME Group of Experts on Methods, Standards and Intercalibration (GEMSI). This group is jointly sponsored by IOC and UNEP.

The extrapolation of a contaminant assessment to a pollution* assessment (as described in the Comprehensive Plan for GIPME, IOC Technical Series no. 14, and its Implementation, IOC Technical Series no. 25) requires an additional component; that is, an accurate evaluation of the effects of contaminants (either singly or in combination with others) upon components of the marine ecosystem (either on the cellular level or the ecosystem level). It is here, that the GIPME Group of Experts on the Effects of Pollution (GEEP) plays a critical role.

It is noteworthy to point out that these GIPME Groups of Experts work in concert to enable the GIPME Programme to achieve its objectives. There is also continual collaboration with other organizations and expert groups having programmatic responsibilities regarding environmental pollution. Fig. 1 depicts the working structure of the IOC GIPME Programme.

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* As defined by the Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP), pollution of the marine environment means : "The introduction by man, directly or indirectly, of substances or energy into the marine environment (including estuaries) which results in such deleterious effects as harm to living resources, hazards to human health, hinderence to marine activities including fishing, impairment of quality for use of seawater and reduction of amenities".

At the present stage in the implementation of the Comprehensive Plan for GIPME, MARPOLMON constitutes the vital data-gathering activity, being directed to determine accuratly levels of selected contaminants in several phases of the marine environment in various regions of the World's Oceans. Subsequent stages of the GIPME Comprehensive Plan are envisaged to utilize MARPOLMON generated data for the purposes of, inter alia, construction of mass-balances and making contamination and pollution assessments in a global context. The recently established GEEP will be evaluating means for assessing the biological impact of contamination, and recommending the most effective procedures for adoption in regional and global programmes.

It should be noted that although major data gathering activities being conducted around the world may not be motivated by marine pollution problems, the information being acquired is nonetheless compatible for use by GIPME in general and in particular as a contribution to the MARPOLMON System. Many such programmes are directed towards gaining an understanding of the processes driving the various cycles of elements and energy in the ocean and the ocean-atmosphere-land-sediment interactions. New concepts are being developed in modelling aimed at reproducing distribution of various tracers and indirectly obtaining flows and flow rates. Many contaminants are being included in such activities in that they are very useful tracers; for example, tritium, cesium-137, various gases and organics. Knowledge gained from such research is essential if the objectives of GIPME are to be met. It is also important to realize that activities providing such knowledge can simultaneously provide a data base for the MARPOLMON System, important in its own right. As a result, chemical oceanographic programmes being conducted by Member States for reasons other than resolving marine pollution problems are encouraged to become associated with GIPME in general, and MARPOLMON in particular.

Regional components of the MARPOLMON System are considered to be the monitoring activities conducted at the international level covering a regional-sea and individual national efforts of concerned Member States. The major proviso governing the suitability of any data made available through the System lies in the assurance of the quality and comparability of such data. Meeting this requirement constitutes the primary function of the GEMSI in GIPME.

Where capabilities exist, region-wide monitoring activities should be undertaken to provide as broad an approach as possible for the comparison of data, and to serve as significant inputs for a global evaluation. Examples at this time are the IOCARIBE and WESTPAC Regions, where MARPOLMON activities are either in operation (e.g. MARPOLMON-Petroleum, in IOCARIBE) or in the initiation phase (e.g. Mussel Watch-like measurements in WESTPAC).

In other regions (e.g. CPPS and West Africa) efforts are being initiated to develop such capabilities. In any case, once sufficient data have been accumulated, assessments should be made by a selected individual or Steering Group from the region and a symposium or workshop convened to discuss the results in a broader context. The Symposium on Petroleum Pollution Research and Monitoring in the Caribbean Region convened at the University of Puerto Rico, Mayaguez, December 1985 serves as an example of such follow-on activity.

Other activities that can be considered as having an input to MARPOLMON are the various Action Plans of the UNEP Oceans and Coastal Areas Programme, the monitoring activities of various Commissions and Conventions (e.g. Oslo, Paris, Helsinki, Barcelona, London, etc.) and the laboratories participating in ICES Projects. By submitting data to RNODC's, a data base will gradually develop and can be used to achieve the objectives of GIPME, either by Member States alone, or through international collaboration.

As pointed out above, data provided to the MARPOLMON System may not be gathered expressly for GIPME purposes. In addition to the examples given previously, they could result from monitoring activities conducted to meet human health quality criteria standards as, for example, in the analysis of fish and shellfish. The data nevertheless constitute significant inputs to the MARPOLMON System, if the quality and comparability of sampling and analysis techniques employed are assured.

Many of the considerations that apply to GEMSI will apply also to GEEP. Indeed, effective monitoring activities at national and international levels will need to incorporate both chemical and biological assessments, and it is an important medium-term goal of GIPME to recommend the most effective ways in which such integrated monitoring can be carried out. In considerint the biological elements in particular, GEEP is working in close consultation with the International Council for the Exploration of the Sea (ICES), the Food and Agriculture Organization (FAO), and the United Nations Environment Programme (UNEP).

2. GIPME STRUCTURE AND ACTIVITIES

The Working Committee for GIPME was established on the basis of resolutions adopted at the Ninth Session of the IOC Assembly, Paris, 1975. The present Chairman is Dr. Neil Andersen, and the Vice-Chairman Dr. Roger Chesselet. The Fifth Session of the WC/GIPME was held in Bangkok, August 1984 and the Sxith Session is scheduled for September 1986 in Paris.

The scientific and technical work of the Working Committee is, to a large extent, carried out through its two Expert Groups, namely on Methods, Standards and Intercalibration (GEMSI) and on Effects of Pollutants (GEEP). A diagrammatic outline of the present programme components and structure of operation is given in Fig. 2.

2.1 GROUP OF EXPERTS ON METHODS, STANDARDS AND INTERCALIBRATION (GEMSI)

The Group of Experts on Methods, Standards and Intercalibration (GEMSI) was established under Resolution 3 of the Eighth Session of the Executive Council, Paris 1977, with the following Terms of Reference :

(i) To review existing manuals concerned with the analysis of sea water and related environmental samples, identify where conventional analyses, standards and intercalibration procedures included in the manuals are suitably developed for use in these programmes, and identify additional analyses, standards and intercalibration procedures that are not included in these manuals.

(ii) To identify development efforts which are needed to improve or complement these analyses, standards and intercalibration procedures, to ensure that, in the long term, such analyses, standards and intercalibration procedures are available for research and monitoring studies on all priority pollutants.

(iii) To distribute information on the most appropriate methodologies, standards and intercalibration exercises, with a view to ensuring the widest possible utilization of ongoing activities in marine pollution of the methods acceptable for use in measuring priority pollutants and draw attention to deficiencies in the methods where research efforts are needed.

(iv) To work closely with other appropriate intergovernmental and non-governmental bodies concerned with research and monitoring of marine pollutants to maximize effective cooperation and minimize duplication of effort in activites related to development of methods, standardization and intercalibration. As one of its first tasks, the group will undertake a detailed examination of the feasibility in terms of methodology available, and the present state of the art of sampling, storage and analysis for the pollutants proposed for measurement in the Programme for Monitoring Background Levels of selected Pollutants in Open-Ocean Waters.

The first three sessions of GEMSI (1977, 1978 and 1980) worked under these Terms of Reference. However, in view of the development of the Programme and the need for an Expert Group on Effects of Pollutants, new Terms of Reference were formulated by the WC/GIPME at its Fourth Session, January 1982 and at its Fifth Session, August 1984. There were subsequently endorsed by the Thirteenth IOC Assembly, March 1985. These are :

(i) To serve as a source of scientific advice, with specific emphasis being given to methods, standards and intercalibrations for the implementation of the Comprehensive Plan for GIPME and MARPOLMON, as well as the Regional Research and Monitoring Programme sponsored through UNEP Regional Seas Programmes.

(ii) To identify development efforts which are needed to improve or complement these analyses, standards and intercalibration procedures to ensure that, in the long term, such analyses, standards and intercalibration procedures are available for research and monitoring studies on all priority pollutants.

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(i) To serve as a source of scientific advice, with specific emphasis being given to methods, standards and inter-calibrations for the implementation of the Comprehensive Plan for GIPME and MARPOLMON, as well as the Regional Research and Monitoring Programme sponsored through UNEP Regional Seas Programmes.

(ii) To identify research and development needs in relation to the conduct of baseline or monitoring operations, and to suggest ways of fulfilling them.

(iii) To promote and assist with technical development and methodological intercomparison as required.

(iv) To advise on operational planning of intercomparisons, training and baseline activities.

(v) To advise on, and develop, methods for the accurate assessment of pollutant inputs and sinks, and to attempt estimate of fluxes and mass-balance calculations.

(vi) To serve as a mechanism enabling the Working Committee for GIPME to co-operate on scientific and technical matters with other international bodies.

Presently, GEMSI is working mainly through several ad hoc Groups which work intersessionally by correspondense and through separate or combined meetings :

2.1.1 Ad Hoc Group on the Analysis of Individual Organic Contaminants

The activities of this Group include :

(i) Continued methods development to separate fats from the hydrocarbon contaminants and reaction products of high fat samples using HPLC, or other appropriate procedures.

(ii) Relative retention indexing system for common electrode capture detection contaminants.

(iii) Testing the efficiency of various adsorbants for common contaminants in seawater and further investigations on the distribution of organic contaminants in marine water colomns.

(iv) Continue identification of marker compounds for future incorporation of candidate molecules into monitoring programmes.

(v) Investigation of availability of standards of important marker compounds.

(vi) Evaluation of methodologies to determine the concentrations and deposition rates of organic contaminants in the atmosphere, in order to determine flux.

(vii) Continued investigations on the rates of photo-oxidation of organic contaminants and the products formed at the sea surface.

(viii) Development of the strategy for including organic measurements in the open-ocean monitoring programme.

(ix) Review of the report resulting from the Bermuda Intercomparison exercise.

2.1.2 Ad Hoc Group on the Use of Marine Organisms in MARPOLMON and Regional Seas Programmes

The activities of the Group include :

(i) The organization and conduct of an organochlorines workshop for tissue, jointly sponsored by IOC/UNEP.

(ii) The organization and conduct of a second trace metal intercalibration exercise for tissue in collaboration with Dr. Aston, Monaco, jointly sponsored by IOC and UNEP.

(iii) The review of musselwatch activities.

2.1.3 Ad Hoc Group on the Use of Marine Sediments in MARPOLMON and Regional Seas Programmes

The activities of the Group include :

(i) Complete preparation of the Strategy Manual for Use of Marine Sediments in Monitoring Pollution.

(ii) Continue work (including the collection of comments on the efforts to date) on a manual detailing the methods of sampling and analysis to be used in such a programme.

(iii) Collect suggestions and comments on a standardized data reporting formats for use in such a programme and develop improved formats.

(iv) Review questionnaires collected by the ad hoc Group on Use of Marine Organisms in MARPOLMON and to determine how to use this information and what further steps to take.

2.1.4 Ad Hoc Group on River Inputs of Pollutants to the Coastal Environment

The activities of the Group include :

(i) Send out questionnaires to prospective participants for the River Input Workshop in Bangkok.

(ii) A steering Group meeting to plan detailed schedule for the workshop and to make on-site arrangements.

2.1.5 Ad Hoc Group on the Development of Methods and Manuals for MARPOLMON and UNEP-OCA/PAC

The activities of the Group include :

(i) To review and provide comments on the scientific content of Guidelines and Reference Methods for marine pollution studies prepared for use in UNEP's Regional Seas Programme.

(ii) To periodically review and provide comments on revisions of the Guidelines and Reference Methods referred to (i) above.

2.1.6 Ad Hoc Group on the Co-ordination of International Activities on the Preparation and Distribution of Reference Materials for Marine Chemistry

The activities of this Group include :

(i) To assess the need for "reference" materials (that is standards, certified "reference" materials, intercomparison samples and research materials) for quality assurance purposes in future marine chemical and contamination investigations and monitoring activities, particularly in respect to on-going and planned international programmes.

(ii) To collate and assess the numbers and types of "reference" materials currently available and specify the extent to which they satisfy the needs identified in (i) above.

(iii) To specify the types of "reference" materials that are both needed and currently unavailable for marine quality assurance activities, assign priorities for the urgency with which these materials need to be prepared and identify which agencies might be capable and willing to prepare them.

(iv) To formulate a preliminary proposal and work plan that could be used for soliciting the preparation and distribution of "reference" materials needed by the various international programmes identified in (i) above.

(v) To identify an international infrastructure whereby the distribution of the above materials could be co-ordinated.

Two meetings of this ad hoc Group were convened, in Geneva at UNEP-OCA/PAC, 3-4 June 1985, and in Washington DC, at NOAA, 28-30 October 1985, to review the present status of reference materials and to develop a work plan and proposal for an effective international mechanism. Several organizations (ie. NRC, NBS, US-EPA, USGS) involved in the preparation and distribution of such materials, were in attendance for the latter meeting. The Reports, Workplan and Proposal of the ad hoc group were discussed at the Seventh Session of GEMSI (13-20 November 1985, Monaco). On the basis of this, proposals for an international mechanism of co-ordination was made (see Document IOC/EC-XIX/8, Annex I).

2.1.7 Ad Hoc Group on the Design of an Open-Ocean Baseline

The activities of this Group include :

The design of an open-ocean survey for trace metals in the Atlantic Ocean.

2.1.8 Seventh Session of GEMSI

The Seventh Session of GEMSI was held at the International Laboratory for Marine Radioactivity, Monaco, 13-20 November 1985. The recommendations of the Session include :

(i) That the eighth Session of GEMSI be organised after the Working Committee for GIPME in order to respond in a timely fashion to the requests of the parent body. That the venue for the Session be decided through consultations between the Chairman and the Joint Secretariats but noting that the Bermuda Biological Station and the Instituto Bio-Organica, Barcelona, have both kindly offered to provide facilities.

(ii) That IOC Secretariat finalise arrangements for the Workshop on River Inputs in Thailand in early 1986 according to the guidelines laid down in report of the sessional subgroup on river inputs.

(iii) That early attention be paid to the provision of edequate instrumentation to the key laboratories involved should funds become available. The Group has provided a series of proposals for consideration of the joint secretariats in support of the planned activities and envisaged needs.

(iv) That in all future meetings of GEMSI, appropriate representation of regional programmes of the IOC and UNEP be ensured, as necessitated by the Agenda.

(v) That two members of GEMSI should attend the proposed IOC/UNEP Training Intercalibration exercise in Port Moresby, Papua New Guinea, in order to provide instruction in capillary gas chromatography for the analysis of individual organics. It is also suggested that UNEP prepare a draft reference method on the analysis of individual PCB congeners for this workshop.

(vi) That the addendum concerning the use of synchronous scanning spectrofluorimetry should be issued for Manual and Guides 13. Intersessional work carried out by the group on individual organic contaminants. Manuals and Guides No. 11 on the analysis of petroleum hydrocarbons in marine sediments should also be revised in consideration of results of intersessional work carried out by members of the ad hoc group.

(vii) That a meeting of the ad hoc Group on Reference Materials (composed of producers and users) be held during 1986 under the chairmanship of Dr. Walton. The purpose of the meeting will be :

(a) To pursue the publication of the document listing all available materials for use as standards, intercalibration and intercomparison purposes.

(b) To compose and priorize a listing of needed materials.

(c) To secure the co-operation of the producer organizations in meeting the needs as identified - to the extent possible.

(d) To develop the procedures whereby the various international organizations can ensure the distribution of material to laboratories - particularly those in developing countries.

(viii) That the IOC and UNEP Secretariats together with the officers of the Working Committee for GIPME initiate actions for the production of Guidelines for the design and conduct of a programme of contamination in Marine Sediments based on the perceived needs within regional activities. The level of the manual describing these guidelines should depend on specific requirements in the regional programmes.

(ix) That appropriate action be initiated by the Secretariat to acquire a regional data base to allow GEMSI to undertake an assessment of mass balance calculations, as directed by GOPPS.

2.2 GROUP OF EXPERTS ON EFFECTS OF POLLUTANTS

The Group of Experts on the Effects of Pollutants (GEEP) was established in 1982, on the basis of a Recommendation by the Working Committee for GIPME, at its Fourth Session (January 1982), and subsequently approved by the IOC Executive Council at its Fifteenth Session, March 1982. The present Terms of Reference for the Group of Experts are :

(i) To serve as a source of scientific advice in this field, for the preparation required for Stage 3 of the Comprehensive Plan (Fig.1) for GIPME, to refine further the strategy for that Stage and to develop a Plan of Action for related work under GIPME. (Stage 3 involves the conversion of the contamination assessment into a pollution assessment).

(ii) To assess related work being carried out by other international bodies.

(iii) To formulate international co-operative research proposals for the study of the effects of pollutants on marine organisms and at different levels in the marine ecosystem.

(iv) To advise on methods required for quantification of the effects of contaminants on marine organisms and ecosystems.

(v) To recommend appropriate reviews and studies to be undertaken by IOC Advisory Bodies.

The participation of experts in the sessions of GEEP was initially limited to about 5. Dr. Brian Bayne is Chairman.

At its First Session (Plymouth, 4-6 December 1984), GEEP formulated its workplan which includes the following activities :

(i) To evaluation of effects measurements, which was done in a preliminary way during the session on the basis of the principles outlined by GESAMP, to be followed by practical evaluation in the field.

(ii) The organization of a First Biological Effects Workshop, to be carried out in Oslo in September 1986, with the objectives of comparing, contrasting and evaluating in quantitative, practical terms, techniques currently available or proposed for measuring the biological effects of pollution in the sea.

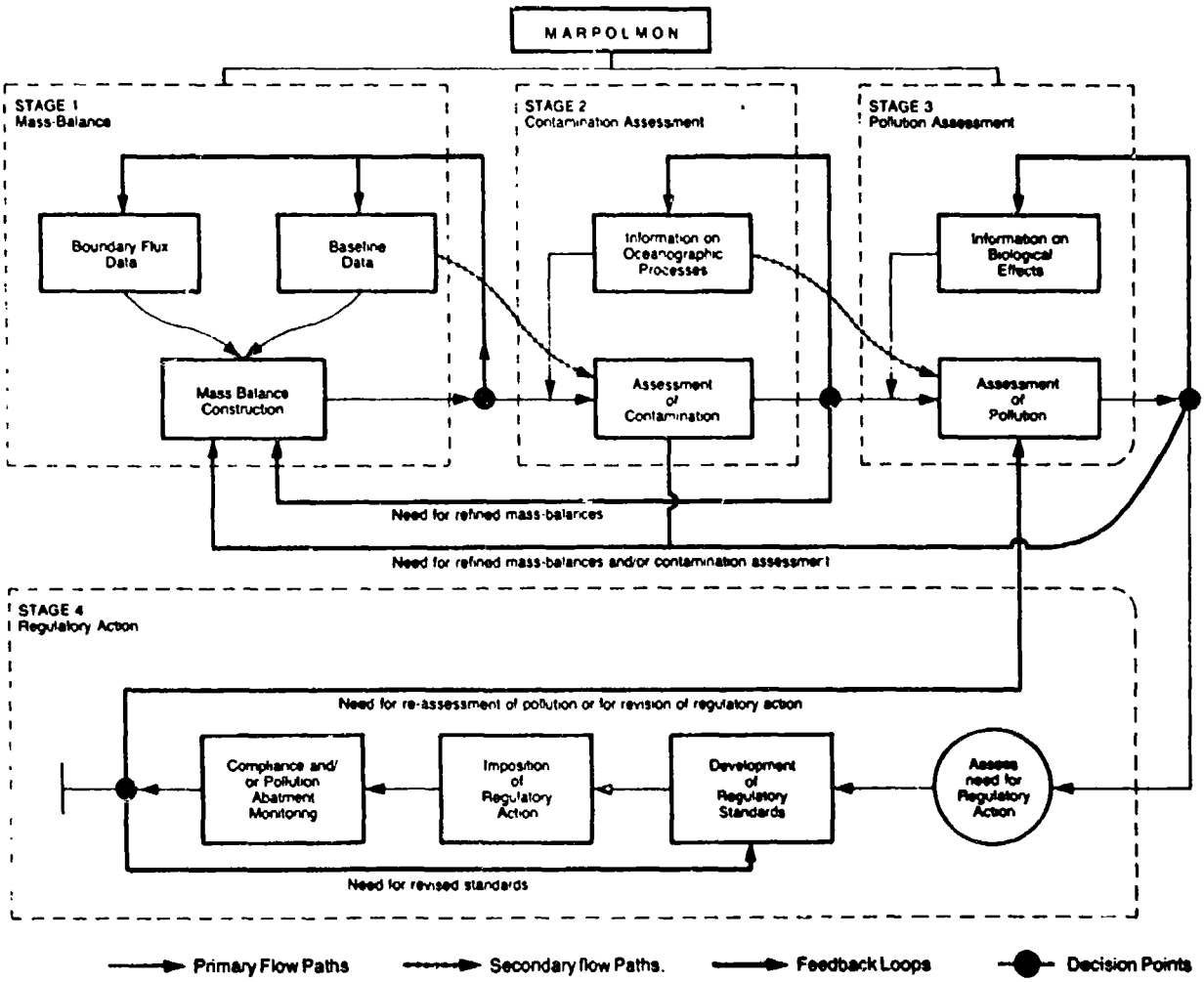
(iii) The development of appropriate elements of training on effects measurements, possibly including a Training Course on Biological Effects Measurements as a precursor to the Second Biological Effects Measurements as a precursor to the Second Biological Effects Measurements Workshop.

(iv) The development of a scientific basis for assessing biological vulnerability or for identification of ecologically vulnerable areas in biological terms, starting with an examination of appropriate ecological procedures for assessing the vulnerability of marine ecosystems to pollution.

(v) The reviewing of biological effects measurements and components in national and international Musselwatch and similar programmes. The review will be carried out together with the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration (GEMSI).

The Group also agreed to form the following ad hoc groups which would work intersessionally, by correspondence.

Figure 1. Components and Logic of the GIPME Comprehensive Plan



2.2.1 Ad Hoc Group on Biological Effects Workshop (BEW-1)

The activities of this Group include :

(i) Preparation of questionnaires to go with an IOC letter to potential participants in the Workshop, soliciting information and comments.

(ii) Review of replies received from potential participants.

(iii) Review of proposed Workshop sites and selection of most favourable site(s).

(iv) To consider the need for advice and information from GEMSI, in formulating "plans" for the Workshop.

(v) To advise the Chairman of GEEP and of IOC on aspects relevant to formulating proposals for funding support outside IOC.

(vi) To consider the need for the de novo investigations at the agreed site prior to holding the Workshop.

2.2.2 Ad Hoc Group on Review of Biological Effects in National and International Musselwatch Programmes

The activities of this Group include :

(i) To review biological effects components (if any) of existing national and international Musselwatch Programmes.

(ii) To assess quality of data produced in these programmes.

(iii) To make recommendations concerning enhancement of biological effects component of future Musselwatch Programme.

(iv) To report to the Second Session of GEEP on the above items.

2.2.3 Ad Hoc Group on Vulnerable Areas

The activities of this Group include :

(i) To compile information from IOC Secretariat on reports or studies containing aspects related to classification of the coastal zone for protection purposes, with a view to identifying elements related to biological vulnerability and its quantification.

(ii) To prepare draft guidelines for the practical assessment of ecosystem characteristics/processes of vulnerable areas. In this context, an area with mangrove, coral reef, coral sediment and seagrass areas in Venezuela, earmarked as a national park, is to be considered as a case study area.

(iii) To submit to GEEP-II a summary of its findings in relation to Item I, and a draft guideline for ecological assessment and classification of vulnerable areas.

2.2.4 Ad Hoc Group on Effects of Pollution on Populations

The activities of this Group include :

(i) To consider the concepts appropriate for the measurement of effects of pollution on populations in the marine environment.

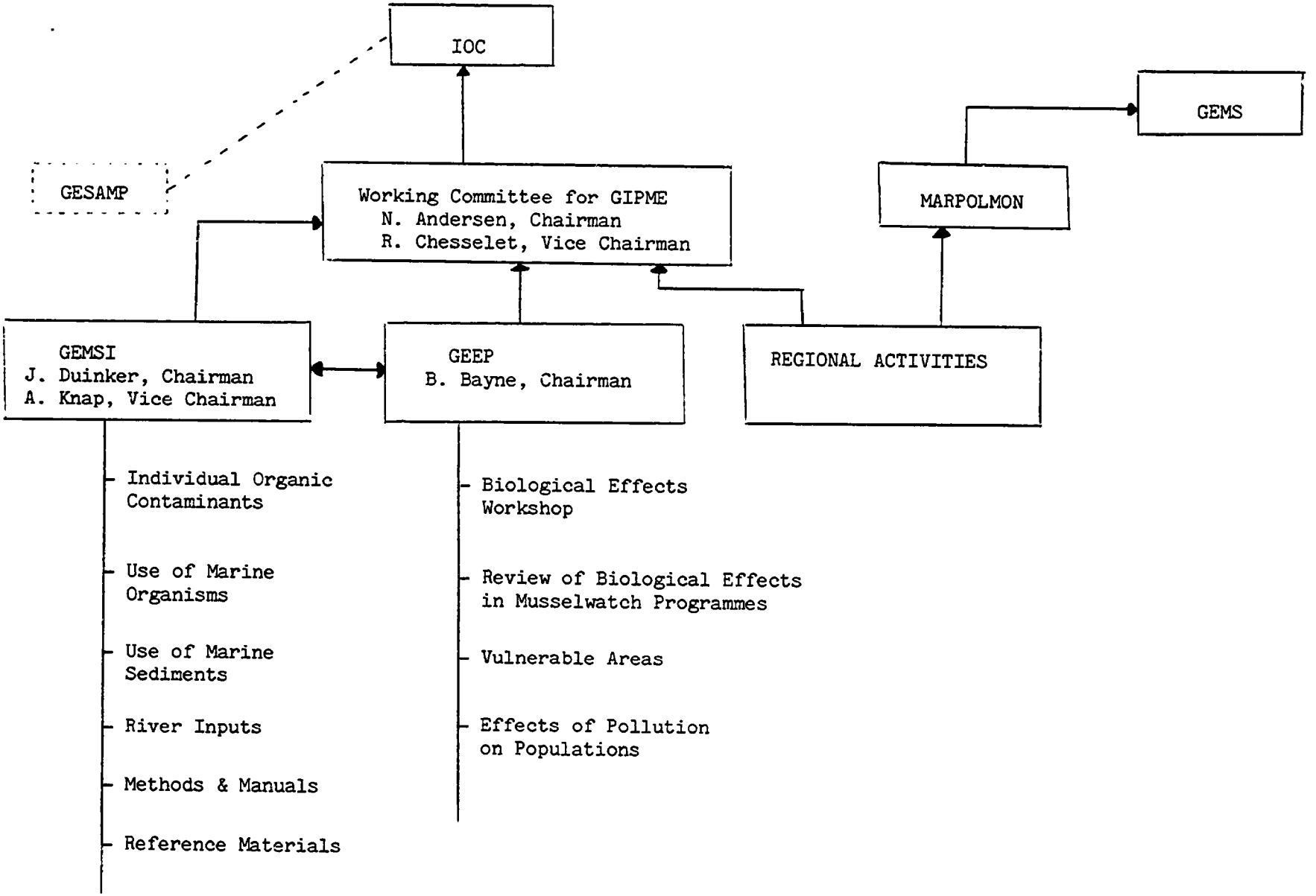
(ii) To examine what population characteristics may be useful in a population monitoring context, such as i_x m_x characters from life table data, size distribution patterns P/B ratios, etc.

(iii) To submit to GEEP-II a report on the state of the art and, if feasible, a draft guideline for the use of population studies in effects assessments.

2.2.5 Second Session of the Group of Experts on Effects of Pollutants (GEEP)

The Second Session of GEEP was held at Headquarters, 2-5 December 1985. Progress has been made in all the areas referred to above. Priority has been given to the preparation and execution of the Intergovernmental Oceanographic Commission Workshop on Biological Effects Measurements, being organized by GEEP.

Figure 2 - THE IOC GIPME PROGRAMME



3. REGIONAL PROGRAMMES

3.1 SUB-COMMISSION FOR THE CARIBBEAN AND ADJACENT REGIONS (IOCARIBE)

The marine pollution research and monitoring programme of IOCARIBE/ CARIPOL is being governed through the IOCARIBE/CARIPOL Steering Committee, which had its Fifth Meeting in Puerto Rico, 7-10 December 1985.

The Symposium on Petroleum Hydrocarbons in the Caribbean Environment, was held at the University of Puerto Rico, 1-6 December 1985.

Publication arrangements have been designed to provide the maximum amount of coverage of an effort, which has and will require individual and committee efforts in the following manner :

(i) The symposium abstracts will be printed in advance by the Caribbean J. Mar. Sci.

(ii) The formal report will be published by the IOC in a suitable series, ie. the Workshop Series.

(iii) The proceedings and papers will be published in a dedicated volume of Carib. J. Mar. Sci.

(iv) A synthesis of the results will be submitted for a peer review, specifically to Mar. Poll. Bull. and the CARIPOL Steering Committee.

(v) A similar expanded synthesis of the results of the entire Caribbean monitoring programme will be included in the IOC Technical Series.

The results of the Bermuda Biological Station Workshop (PANCAL84) as a contribution to the Caribbean Programme, conducted in December 1984, will be considered by GEMSI-VII prior to submission for publication in the IOC Workshop Series, publication in Marine Pollution Bulletin and inclusion in UNEP half Yearly Reports.

The commitment to provide ad hoc training opportunities under the terms of the UNEP agreement are being catered for.

Additional support has been provided for participants to attend the Bermuda Biological Station Summer Course on the Analysis of Marine Pollution, with particular emphasis on the Caribbean region, although the host institution has also guaranted support to participants engaged in WESTPAC programmes of the IOC as far as funds permitted.

3.1.1 Future CARIPOL initiatives

IOC successfully defended a proposal at the Fourth Meeting of the UNEP Monitoring Committee for the Caribbean Environment, Cancun, 21-23 April 1985, and that the adopted project ($65,000) in support of CARIPOL is designed to conduct a Workshop on the analysis of petroleum hydrocarbons in organisms and sediments, with associated intercalibration exercises designed to initiate musselwatch activities for the Wider Caribbean Region. A planning meeting was held in October in the States where details for convening the Workshop in Puerto Moreles in the fall of 1986 were developed.

3.2 PROGRAMME GROUP FOR THE WESTERN PACIFIC (WESTPAC)

The WESTPAC Task Team on Marine Pollution Research and Monitoring met during April 1985 in Townsville, Australia. A final report of the meeting was prepared by the Australian organisers. The wide participation in the meeting under the Chairmanship of Professor Burdon-Jones was an encouraging sign, in that a core of involved scientists, similar to the case of CARIPOL, was evolving. The co-operation with UNEP, and particularly SPREP, appears to be assured through the common representation (John Brodie, Fiji) and joint activities in the planning.

The co-operation with COBSFA is improving but the representation from ESEAN countries is weak (only 2 out of 6) and the representative scientists are not common to both groups.

The Task Team undertook steps to prepare a directory of Marine Scientists involved in pollution studies related to MARPOLMON, and have appointed a co-ordinator to assist in the retrieval of Musselwatch data for a GEMSI review. An investigation of on-going national, bilateral, and multi-national studies in the region has been initiated and a co-ordination mechanism to distribute intercalibration samples for the 2nd round trace metal exercise has been arranged.

An overall timetable for the development of MARPOLMON, considering all components and phases, was drawn up along the lines of the proposals of the Queenscliff Workshop and stretches over the decade.

Although efforts were made under MAPMOPP to promote development of petroleum pollution monitoring in the region, such activities still involve only a modest number of countries. Concernes about the implementation of MARPOLMON-P will be transmitted to the WESTPAC Task Team on Marine Pollution Research and Monitoring at its next meeting.

The Papua New Guinea Workshop on the Analysis of Organochlorines in Biota and Sediments : the dates for this Workshop in Port Moresby are set for 23 June - 4 July 1986.

2nd Round Trace Metals Intercalibration : This activity will be co-ordinated in the case of WESTPAC by Dr. Kwang Lee, KORDI; S. Korea and Dr. J. Brodie of the University of the South Pacific; Fiji in the case of SREP. COBSEA has yet to appoint a co-ordinator. The activity is underway and will be completed during 1986.

Workshop on Analysis of Sediment Contamination : GEMSI is developing a strategy of using sediments to monitor contaminant levels, possibly following up the offers of China to host such a Workshop at the 2nd or 3rd National Institute of Oceanography.

River Inputs : This exercise is described under GEMSI activities and is a major WESTPAC effort which will involve a number of countries of the region.

The GIPME Officers considered that the WESTPAC Group was off th an ambitious start with perhaps a more varied programme than in the case of the Caribbean. However, the UNEP funding base is perhaps weaker and more dispersed and hence IOC, TEMA and Member States contributions are much more required.

3.3 MEDITERRANEAN SEA

3.3.1 Relations with the International Commission for the Scientific Exploration of the Mediterranean Sea (ICSEM)

The next ICSEM/UNEP/IOC Workshop on Marine Pollution in the Mediterranean Sea, Palma, Majorca, 20-25 October 1986, will be oriented to processes at interfaces and levels and trends of specific pollutants.

3.3.2 Relations with UNEP/Mediterranean Action Plan

Research proposals for 1985 have been processed, as were the corresponding proposals for 1984.

An intercalibration exercise for petroleum hydrocarbons in sediments will be carried out in co-operation with IAEA/ILMR and samples from there have been circulated.

The suggestions on methodologies for petroleum hydrocarbon analysis made on the basis of MEDCAL I had been reviewed by selected GEMSI Members. These comments and suggestions are now in the hands of the Chairman of GEMSI, for consideration in order to revise these methods. The intercalibration results from the first round which took place after MEDCAL I are with Dr. J. Albaiges and will be incorporated in the analysis of the results from the second round which is presently going on.

Dr. Albaiges, GEMSI Member, Barcelona, has accepted to co-ordinate an intercalibration Workshop for petroleum hydrocarbons which is planned to be held in the second half of 1986 after GEMSI has revised/developed the Reference Methods as agreed at the Ad Hoo group meeting in Kiel, and further discussed in Paris.

A review is planned of new Reference Methods for determination of chemical contaminants in the form of an expert meeting in 1986 with IAEA as lead agency.

A consultation meeting on Reference Methods dealing with metals and organic contaminants in particulate matter is planned in 1987.

An expert meeting is planned for 1987 to review results of on-going research projects on the transport of pollutants by sedimentation and to determine further research needs. IOC is to be the lead Agency, in co-operation with IAEA. It is considered thatthe help of an associate expert will be required.

Project proposals regarding dispersion in coastal waters in relation to transfer of contaminants from land-based sources and sewage outfalls, and review of physical oceanographic processes in relation to monitoring and contral have been formulated by the Secretariat. These projects could be regarded as a follow-up to preparatory work done by consultants and the Secretariat earlier. On the basis of these proposals, a project has now been started incorporating Mediterranean scientists covering physical oceanography, remote sensing, marine meteorology and modelling.

A review of oil pollution in the Mediterranean Sea was prepared by a consultant; it was reviewed nationally. Comments were to be received by the end of 1985 and the report will be revised by a consultant and ready for publication in 1986, possibly in collaboration with IMO.

A review of pollution by tar balls in the open sea and on beaches together with an evaluation of the usefulness of tar ball contamination monitoring for assessment of pollution by petroleum hydrocarbons will be carried in 1985-1986 by a consultant.

3.4 SOUTH EAST PACIFIC COMMISSION PERMANENTE DEL PACIFICO SUR REGION

IOC agreed to undertake the technical supervision of COMPACSE-Phase I : Programme Component (A) : programme of research monitoring and control of marine pollution caused by hydrocarbons in the SE/PCF region. Monitoring according to agreed programme started January 1985, with 15 participating institutions and first data set was available July 1985. The data needs to be analysed and evaluated and guidance for this undertaking is being supplied by IOC.

IOC was represented at the Quito Meeting (8-11 July 1985) by Dr. A. Vasquez-Botello who reported that the meeting had decided to hold an intercalibration exercise prior to a Workshop on analysis of hydrocarbons in sediments and biota. Dr. Vasquez-Botello has circulated samples directly and will receive and evaluate results. Depending on the results, a follow-up workshop may be arranged in 1986 with support from UNEP (15 participants for 5 days) and IOC in the form of provision of experts. It is being suggested that Dr. J. Albaiges (GEMSI Member) should direct the workshop possibly with Dr. Vasquez Bottello as co-Director.

3.5 OTHER MAJOR OCEAN REGIONS

3.5.1 South West Atlantic Region

To date there has been no concrete follow-up on the Marine Pollution Workshop convened in Montevideo in 1981. Informal discussions with representatives from Argentina, Uruguay and Brazil during the IOC XIII Assembly (March 1985) revealed an interest in accelerating regional co-operation with regard to marine pollution monitoring, and in organizing an intercalibration exercise on petroleum pollution monitoring, as an initial phase of a future, more comprehensive programme.

It is considered worthwhile to take advantage of the International Symposium on Oceanographic Problems (Argentina, April 1986) as a platform for more detailed discussions on such an activity.

3.5.2 Programme Group for the Central Indian Ocean (IOCINDIO)

The results of the First Meeting of the Programme Group for the Central Indian Ocean in Colombo, Sri Lanka (July 1985) provides a basis for a more detailed planning of co-operative marine pollution research and monitoring, which is being initiated.

3.5.3 Programme Group for the Central Eastern Atlantic (IOCEA)

IOC is responsible for oil pollution monitoring and basic oceanography studies in West and Central African Region.

The First Workshop for all WACAF participants was organized by IOC in Dakar, 28-31 October 1985. The report will be published in the Workshop Report Series. The WACAF/2 Programme will continue through the next biennium.

3.6 OTHER REGIONS CONNECTED TO UNEP REGIONAL SEAS

3.6.1 Programme Group for the Co-operative Investigation in the North and Central Western Indian Ocean (IOCINCWIO)

A low level activity is being maintained in this region where only Kenya has so far participated in MARPOLMON. Proposals for the East African Action Plan covering physical oceanography and petroleum hydrocarbon contamination have been submitted to UNEP.

3.6.2 Kuwait Action Plan

Co-operation may increase as a result of discussions and various proposals submitted to ROPME.

4. INTERAGENCY CO-OPERATION

4.1 INTERNATIONAL SYMPOSIUM ON INTEGRATED GLOBAL MONITORING OF THE STATE OF THE BIOSPHERE (ISIGIM)

The International Symposium on Integrated Global Monitoring of the Biosphere was held in Tashkent, 13-20 October 1985. IOC co-sponsored the Symposium and presented a paper describing the developments in the MARPOLMON System, entitled "Objectives, Compounds and Experience in the Development of the GIPME-MARPOLMON System.

4.2 INTERACTION WITH OTHER AGENCIES

4.2.1 Interagency Committee on Programmes Related to Oceanography

Dr. Leif Andren, staff member of the International Maritime Organization (IMO), seconded to IOC under the ICSPRO Agreement, was withdrawn on 1 September 1985. No replacement is being planned for the moment although several areas of co-operation exist between IMO and IOC, recently reviewed at an Inter-Agency Consultation between the Secretariats.

Co-operation with FAO is maintained in several regions, through activities related to both GEMSI and GEEP, partly through joint efforts within the UNEP Regional Seas Programme.

More co-operation with FAO within the GIPME field might prove mutually beneficial. This could well come out of an interaction with the OSLR programme and through GEEP activities. It is also inherent in a marine mammals project, within the context of the FAO/UNEP Global Plan of Action for the Conservation, Management and Utilization of Marine Mammals.

Co-operation with WMO mainly occurs through the climate-oriented programme, in which GIPME involvement, as yet, is very limited.

Co-operation with IAEA needs to be strengthened. This is desirable in view of the great use of radioactive tracers now used in relation to various studies, and which many are directly or indirectly pollution-oriented.

Co-operation with WHO may come in at a later stage through the work of GEEP.

4.2.2 IOC/UNEP

Relations between the two organizations have developed very satisfactorily, in particular the jointly sponsored Group of Experts on Methods, Standards and Intercalibration has received high priority in the framework of the co-operation. Support in regional areas can be further developed, although some support is presently available for the Mediterranean (MAP). The Regional Seas Programme is bound by legal agreements in the different regions which relates to priorities set by each region. Project proposals are being developed for various regions.

IOC involvement in the Regional Seas Programme is being developed within the GIPME framework in the form of a transfert to operational applications of the basic science components developed and under development in GEMSI and GEEP. The GEMSI review and development of Reference Methods is one specific example of this transfer of basic scientific knowledge to operational phases.

4.2.3 IOC/ICES

Co-operation between these organizations is continuing to go well. Overlaps in activities and meetings are avoided as much as possible. Specifically attention is being given to joint meetings and activities whenever feasible. Consultations between the Chairman of GEEP and the Chairman of the corresponding ICES Working Group at ICES Statutory Meeting was aimed at avoiding duplication of effort in this field, as far as possible.

5. CONCLUSIONS

The objectives and components of MARPOLMON have been established on firm, scientifically credible principles, with data gathering on contaminant levels in the marine environment a necessary activity. Data gathering, reporting and exchange requires stringent control of the quality of the information retrieved, which in turn dictates the development and testing of standard methodology, its widespread adoption and intercomparison of methods and feed-back/ refinement of original methods or hypotheses. This requires continued support.

Reliable standards and reference materials are required to enable laboratories to intercalibrate and perform in-house quality controls. Experience has demonstrated that the availability of such materials may be the single most severe problem facing both developed and developing laboratories coupled with, but not always restricted to, access to state of the art methodology. Inexperience in performing the particular analyses is also a major contributing factor to failure to meet standards of intercomparison. Significant strides have been made recently in identifying needs and making available reference materials. Continuing, and if possible, enhanced support from IOC Member Countries actively involved in the preparation of reference material is required if this aspect of the GIPME Programme is to bear fruit.

The IOC's Marine Pollution Research and Monitoring Unit services the GIPME Programmes, has technical responsibilities for activities being conducted in various regions under several Action Plans for UNEP, serves as the Technical Secretary for GESAMP, is maintaining and upgrading collaboration activities with other agencies and programmes, and serves as the mechanism for initiating GIPME activities in regional areas.

During the last 3-4 years, the GIPME Programme has been strongly developed, essentially due to the fact that at least minimal adequate staffing has been available at the Secretariat. As a result of this, the activities of the programme now cover a considerable span of responsibilities for the IOC Secretariat.

In terms of the prospects for global ocean monitoring of priority environmentally hazardous contaminants the following comments can be made :

(i) Given that certain criteria are met with regard to intercomparability of data produced by individual laboratories, it is felt that the monitoring of trace metals in the major phases of the marine environment (seawater, sediments and biota) from an analytical perspective, is feasible on a global scale and that the establishment of an "oceanic baseline" is a near-sighted goal.

(ii) UV-fluorescence techniques for the screening of petroleum hydrocarbon-related compounds in the dissolved/dispersed phase in seawater have proved to be sufficiently comparable to allow widescale monitoring. Interpretation or interpolation of the data for mass balance calculations or assessment of effects on marine biota populations should be treated with caution since the technique provides little "definition" of the discreet hydrocarbon contributions to this signal.

(iii) Individual petroleum hydrocarbon or purolysis product assessment can only be estimated by more advance techniques of HPLC, GC/MS. The intercomparison of these techniques amongst laboratories to date has proved unsatisfactory, in all extracts from marine environmental samples and the embarking of widescale monitoring at present would be irresponsible. Standards, reference materials, further intercomparisons and extensive training are the short-terms solutions, and must be supported by Member States if the GIPME Programme is to be implemented.

(iv) Research into organochlorines in the marine environment has progressed remarkable to an advanced stage. If the concept of individual component (congener in the case of PCB) is accepted by the scientific community, which appears likely, and the appropriate methodology/ instrumentation employed, then there is no reason, given certain prerequisites, why monitoring of these well defined compounds should not preceed. The prerequisites, however, again include the provision of adequate reference

materials, further and extensive intercalibration of techniques for quantifying individual components and stringent adherence to quality control procedures designed to reduce sample contamination during extraction and processing procedures. In the case of organochlorines, it is felt that all of the above is achievable depending upon the level of investment, time, expertise and facilities and hence can be a short-terms goal. Once again, however, the degree of success realized will be a direct function of Member State support.

(v) The prospects for integrated monitoring of the state of the marine environment depend not only on a good deal of goodwill, sacrifice and scientific integrity on the part of the expert scientists, but for wider regional coverage on fundamental training and education in the state of the art techniques. The MARPOLMON System has been designed to assume this additional responsibility since no chain is stronger than its weakest link, and bad data is worse than no data.