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Global Strategies for Marine Environmental Protection

IMO/FAO/UNESCO/WMO/WHO/IAEA/UN/UNEP
Joint Group of Experts on the Scientific Aspects
of Marine Pollution (GESAMP)

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GESAMP Reports and Studies No. 45

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Joint Group of Experts on the Scientific Aspects
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NOTES

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Definition of marine pollution by GESAMP:

Pollution means the introduction by man, directly or indirectly, of substances or energy into the marine environment (including estuaries) resulting in such deleterious effects as harm to living resources, hazards to human health, hindrance to marine activities including fishing, impairment of quality for use of seawater and reduction of amenities.

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Foreword

This publication is a result of the GESAMP Working Group on "A Comprehensive Framework for the Assessment and Regulation of Waste Disposal in the Marine Environment" which was established by GESAMP following a proposal by the Consultative Meeting of Contracting Parties to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (the London Dumping Convention).

The Consultative Meeting requested GESAMP to examine regulatory approaches to, and environmental assessments of, the disposal of wastes in the marine environment and to identify opportunities for developing a common, comprehensive and holistic approach for the regulation of dumping at sea.

The Working Group is jointly sponsored by the International Maritime Organization (IMO), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the International Atomic Energy Agency (IAEA), the United Nations (UN) and the United Nations Environment Programme (UNEP).

The Working Group met twice at IMO Headquarters, London, to prepare this report. The meetings were attended by Mr. R.G. Boelens (Chairman), Mr. J.M. Bowers, Mr. R. Fern, Mr. H. Levenson, Mr. R. Lloyd, Mr. J.E. Portmann, Mr. P. Tortell and Mr. P.G. Wells. From the Sponsoring Agencies Mr. M. Nauke (IMO), Mr. D. Calmet (IAEA), Ms. G. Matthews (UN) and Mr. S. Keckes (UNEP) attended sessions of the Working Group. The Secretariat was provided by IMO.

This report was adopted by GESAMP at its twenty-first session (London, 18-22 February 1991) for publication in the GESAMP Reports and Studies series.

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1 Introduction

1.1 Background

It is now more than 30 years since the international community recognized the need for co-operative action in preventing marine pollution. Today, there are almost 50 agreements (including conventions and protocols) that are of regional or global scope ranging in focus from the control of specific contaminants, such as oil and radionuclides, to more broadly-based agreements on regional co-operation (e.g. conventions concluded under the Regional Seas Programme of UNEP).

The effectiveness of international initiatives to protect the seas from damage by human activities depends on a number of factors. These include geographical coverage and membership as well as the particular practices and emissions subject to control. Although good progress has been made, much work remains to be done in extending the scope and application of agreements to achieve more comprehensive control of environmental pollution worldwide.

Human activities cannot be managed successfully if they are dealt with individually or in isolation. Thus, legal instruments for protection of the environment need to take account of interactions, both between different practices and environments and between the various mechanisms developed for regulatory and protection purposes. This requires a process of planning and review that is not easily achieved in the international arena. Inter-relationships between the marine and other environments are of particular relevance to the control of pollution by wastes and substances. Where substances originate on land, their subsequent environmental distributions are strongly influenced both by human intervention and natural processes. Without appropriate management, any substance has the potential to cause unwanted effects in any sector of the environment. For these reasons, the operational elements of international agreements on marine pollution by wastes and other materials need to be implemented as part of integrated control procedures that are formulated and applied at national level.

1.2 Purpose of the study

This report responds to requests from the sponsoring agencies of GESAMP for an analysis of control strategies that deal with the assessment and management of waste disposal in the marine environment. The current heightened awareness of the oceans as a communal resource and as a vital link in the global energy cycle has increased international commitment towards strengthening and extending the protection afforded by international agreements. There is therefore a need to review the strategic approaches of these agreements in the light of experience and to identify any deficiencies.

There have been many recent advances in scientific knowledge concerning the properties and effects of marine contaminants and improvements in techniques for hazard assessment and monitoring. While the degree of scientific progress is encouraging, wider availability of environmental information has led to divergences in opinion regarding approaches to environmental management and greater emphasis is now placed on the uncertainties associated with scientific prediction. This matter needs to be addressed because rational approaches to the regulation of marine pollution are heavily dependent on scientific input.

1.3 Role of GESAMP

GESAMP, in accordance with its principal task of providing scientific advice on marine pollution problems to its sponsoring agencies, promotes the application of science in marine pollution control programmes. The advice presented by GESAMP reflects the latest advances in marine science relevant to protection and management of marine and coastal areas. There is good reason to believe that better use of scientific information will lead to greater success in the field of marine environmental protection.

1.4 Scope of report

GESAMP has approached the present task on the basis that the elements of pollution control strategies should be derived from a careful analysis of the underlying principles of environmental protection. This approach also provides a background against which the adequacy and practicality of existing strategies, and their scientific and technical components, might be assessed. The report is structured accordingly. GESAMP believes that the report is of relevance to policy-makers, legislators and managers with responsibilities for environmental matters as well as to informed members of the public and hopes that the advice provided will serve to make national and international measures for environmental protection more effective.

2 Environmental protection and management: principles and policies

2.1 Background

By developing and using technology, man has the ability to make far greater changes to the environment than any other species. However, man's need to control and stabilize parts of the environment in order to survive and develop must lead to inadvertent changes occurring elsewhere. Man's activities will add to the environmental changes caused by physical factors and by other species. Thus, although changes as a result of man's activities are unavoidable, in practice they must be regulated to prevent undesirable impacts.

2.2 Principles

The report of the United Nations Conference on the Human Environment, Stockholm, 1972, adopted 26 General Principles of environmental protection. These include:

- development in a manner that avoids prejudicing environmental amenities for future generations;
- avoidance of serious/irreversible damage to the environment;
- avoidance of measures that transfer damage from marine to other environments;
- concerted international action for environmental protection and preservation.

The role of science and technology was defined as follows:

Science and technology, as part of their contribution to economic and social development, must be applied to the identification, avoidance and control of environmental risks and the solution of environmental problems and for the common good of mankind.

The need to control sources of contaminants to prevent environmental degradation is reflected in Principle 6:

The discharge of toxic substances or of other substances and the release of heat, in such quantities or concentrations as to exceed the capacity of the environment to render them harmless, must be halted in order to ensure that serious or irreversible damage is not inflicted upon ecosystems.

The Conference endorsed a set of "Principles for assessment and control of marine pollution" (Annex III of the Stockholm Conference report) and forwarded them to the Law of the Sea Conference, then scheduled to convene in 1973. These principles were translated into General Obligations set forth in the Law of the Sea Convention, Part XII. The General Principles of Stockholm and the Law of the Sea Obligations must thus be seen as a coherent package. They recognize that States have the right to develop their own resources but they also emphasize the obligation of States to protect and preserve the marine environment.

An equally important principle is the requirement to plan and manage activities within a broader, holistic, perspective that considers all environments, viz. "States shall act so as not to transfer, directly or indirectly, damage or hazards from one area to another or transform one type of pollution into another" (Law of the Sea, Article 195).

One principle (Principle 7) deals specifically with the marine environment.

States shall take all possible steps to prevent pollution of the seas by substances that are liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea.

The term "liable to create" implies a greater emphasis on prediction and prevention than the term "resulting in" used in the GESAMP definition of pollution. However, in applying its definition, GESAMP recognizes that scientific predictions can never be wholly accurate and that there is always some degree of uncertainty which requires the inclusion of an appropriate safety margin in the formulation of management action.

Balancing the benefits arising from economic and social development against the cost incurred as a result of inadvertent environmental effects is of primary importance. Used in the human health protection field this is known as "justification". The principle states that no practice should be adopted unless there are clear net benefits to society. Thus application of this principle requires that a prior assessment of both the benefits and the adverse consequences of investment in a new practice be carried out to ensure there will be a net social benefit. Ideally, a practice would constitute a proposed major development, such as investment in pesticides for agricultural purposes. However, the principle can be applied at lower hierarchical levels where it becomes similar to, although more comprehensive than, the process of environmental impact assessment which is an integral part of environmental protection and management.

The application of these principles must be flexible because States differ in their social, political and economic structures, and in the extent to which their coastal waters are vulnerable to environmental damage. Although they are clearly relevant to regulating the impact of substances introduced into the marine environment, the principles are equally applicable to the regulation of other human impacts such as coastal development, over-fishing, loss of wetlands, etc. These forms of impact need to be given equal consideration in protecting and managing the marine environment.

2.3 Policies

There are various policy statements reflecting differing approaches to marine environmental protection; however, analysis of these statements is complicated by ambiguity of terminology or lack of precise meaning. This is particularly apparent in the terms "precautionary principle" and "best available technology" and also in the use of certain technical terms such as "toxic", "hazardous" and "persistent". GESAMP has drawn particular attention to such difficulties in various parts of this document. It is therefore imperative to improve clarity of expression and care in use of terms, both scientific and political, in the environmental protection field. International action to clarify and agree the meaning of important terms is urgently needed.

2.3.1 *Environmental capacity*

This concept was first expressed in Principle 6 of the Stockholm Conference report (quoted above) and later amplified by GESAMP. It is based on discrimination between "contamination", meaning increased presence of substances in the environment as a result of human activities but with no significant adverse effects, and "pollution", signifying the occurrence of adverse effects. The distinction between the terms is important since it implies that environmental change resulting from human activities may, or may not, be judged to have adverse effects. The boundary between these two regimes requires a definition of

“acceptability”. Irrespective of where this boundary is drawn, the concept of acceptable change remains valid. In practice, all prior approvals for the introduction of material to the ocean, made on the basis that adverse effects are limited, reflect an acceptance of the assimilative capacity concept.

2.3.2 Sustainable development

The policy concept of sustainable development was reflected in the 1972 Stockholm Conference report (Principle 13) but was later developed and given particular emphasis in the report of the World Commission on Environment and Development, viz. social and economic development should “meet the needs of the present without compromising the ability of future generations to meet their own needs”.

Sustainable growth would allow for social and economic development while protecting the long-term viability of renewable resources, e.g. by preventing their over-exploitation or destruction. Indeed, the concept of sustainable development reflects the aspiration that the total value of renewable resources should be passed on, intact or enhanced, to succeeding generations.

2.3.3 Best available technology (BAT)

This is a policy of restricting the dissemination of substances to the environment and reducing impacts on the environment through source reduction using the most refined and effective technology currently available. It plays a predominant role in current applications of the precautionary principle. There are numerous variants of BAT, usually involving different criteria for the term “available” and taking account of economic factors. BAT alone cannot be used for rational environmental management because it takes no account of either other sources or the level of environmental protection required.

2.3.4 The Vorsorgeprinzip, or anticipatory environmental protection

The most authoritative statement of this policy principle is in the “Guidelines on Anticipatory Environmental Protection” approved by the Government of the Federal Republic of Germany (FRG 1986). The FRG guidelines were developed in response to a request by the Bundestag for the Government to submit “the overall concept of a gradual and drastic reduction of emission levels of all substances introduced by man into the atmosphere, water or soil which disturb or destroy nature’s ability to regenerate on a permanent basis”. This policy document is a considered and logical statement that sets out principles and mechanisms for environmental protection to be adopted in Germany. The following passage illustrates the intent of the *Vorsorgeprinzip*:

Environmental protection initially entails averting danger. The State must intervene with protective measures if it is possible to recognize that the input of substances is capable of threatening man and the environment. The State must also act if impairment of the natural balance, threat to natural resources or damage to material property is imminent. Protection from environmental burdens of this nature has always been an indispensable constituent of environmental policy. However, not every input of substances poses a threat. The assumption of a risk situation is dependent on the nature and scope of any possible damage as well as on the probability of its occurrence. Active measures will be taken if general experience or scientific findings indicate with sufficient probability that damage will be caused; any remote possibility that damage will be caused is not sufficient.

Furthermore, not every imminent pollution of air, water or soil and not every impending material threat to plants and animals can be categorized as a risk. Only "considerable" burdens are of significance in assuming the existence of a risk. Consequently, measures must be taken based on the principle of averting dangers to prevent their occurrence as far as humanly possible.

The *Vorsorgeprinzip* is entirely consistent with the application of pessimism and conservatism in scientific evaluations. The intent is also compatible with the guidance and conclusions of the World Commission on Environment and Development. However, it really constitutes only an expression of the normal caution that is applied in ensuring that environmental management is based on adequately cautious assessments of risk and reasonable degrees of scientific conservatism.

2.3.5 *The precautionary principle*

It is not clear whether the precautionary principle stems from the same roots as the *Vorsorgeprinzip*, but it is more widely referred to in international fora. Unfortunately, recently adopted expressions of the precautionary principle are not amenable to balanced scientific analysis. One of the most recent of these is the Ministerial Declaration from the Second International Conference on the North Sea held in London in November 1987, which states:

Accepting that, in order to protect the North Sea from possible damaging effects of the most dangerous substances, a precautionary approach is necessary which may require action to control inputs of such substances even before a causal link has been established by absolutely clear scientific evidence.

[The Governments] therefore agree to: accept the principle of safeguarding the marine ecosystem of the North Sea by reducing polluting emissions of substances that are persistent, toxic and liable to bio-accumulate at source by the use of the best available technology and other appropriate measures. This applies especially when there is reason to assume that certain damage or harmful effects on the living resources of the sea are likely to be caused by such substances, even where there is no scientific evidence to prove a causal link between emissions and effects ("the principle of precautionary action").

The Paris Commission, the Governing Council of the United Nations Environment Programme and the Nordic Council's International Conference on Pollution of the Seas all adopted statements of generally similar form during 1989. In many of these statements, there is a lack of clarity regarding what the precautionary principle (or "the principle of precautionary action" quoted specifically in the North Sea Conference and Paris Commission versions) means to those who have adopted it. Nevertheless, it is clear that the precautionary principle is frequently being interpreted as a requirement to proceed towards zero discharge for all materials excepting uncontaminated natural substances.

2.3.6 *The best practicable environmental option (BPEO)*

This concept originated in the Third Report of the UK Royal Commission on Environmental Pollution. BPEO has been defined as "the optimal allocation of the waste spatially; the use of different sectors of the environment to minimize damage overall". It reflects the objective of minimizing damage to the environment as a whole. A *sequitur* to its employment is that all options for the disposal or destruction of waste need to be considered in assessing which option offers the least damage to the environment and human health.

These policy instruments merely represent a selection of those most commonly used for marine pollution prevention. None of them are comprehensive in the sense that they can be used individually to cover all facets of pollution prevention and waste management. It is clear that a single instrument, such as the precautionary principle, cannot deal adequately with the complexities of environmental management and human development. A balanced environmental policy requires a careful selection from all of these instruments to construct an integrated and comprehensive system.

2.4 Conclusions

The following principles, which are derived from the 1972 Stockholm Conference on the Human Environment, the Law of the Sea Convention, and the World Commission on Environment and Development, provide a rational basis for protection and management of the marine environment:

- .1 **Sustainable development:** Social and economic development must be pursued in a manner that does not prejudice options available to future generations for the use of the sea and its amenities.
- .2 **Prevention of harm:** All practical steps shall be taken to prevent, and correct, the harmful effects of anthropogenic activities on human health, on living resources, marine life, marine amenities and other legitimate uses of the sea.
- .3 **Holistic considerations:** Action shall be taken to ensure that measures taken to mitigate harm, or to reduce the risks of harm, to the marine environment do not result in the transfer, directly or indirectly, of damage or hazards to other sectors of the environment, viz. land, air or fresh water.
- .4 **International co-operation:** Co-operation among States, including the harmonization of protection measures, mutual exchange of information, co-ordination of monitoring and the provision of technical and financial assistance, is essential for achieving regional and global objectives for the preservation and protection of the marine environment.

Although the preservation of ecosystems is possibly the most important objective of environmental protection, the above principles nevertheless acknowledge the legitimacy, as well as the inevitability, of human interaction with ecosystems. They therefore form a suitable basis to define an overall goal for protection and management of the marine environment. Such a goal should be common to all jurisdictions and should constitute a unifying force in the design of marine environmental protection strategies. GESAMP suggests that this overall goal could be stated as follows:

To protect the marine environment against the adverse effects of human activities so as to conserve marine ecosystems and to safeguard human health while providing for rational use of living and non-living resources.

3 A strategic basis for controlling pollution by substances and wastes

In formulating solutions to environmental problems, statements of objective will greatly facilitate the development of appropriate strategies and subsequent evaluation of their performance. In the context of protecting the marine environment against substances and wastes, the objective needs to reflect the principles and policies appropriate to this field (section 2) and should give a clear indication of the measures best suited to achieving the objective and to evaluating progress.

The absence of clearly stated objectives may have contributed to the present unease regarding conventional approaches to waste management and marine pollution control. For example, there is a common perception that control measures for the prevention and control of marine pollution, including international agreements, have not been effective in preventing continued deterioration of the marine environment. However, not all sources of pollution are presently covered by formal agreements. Furthermore, the effectiveness of the controls imposed will depend to a considerable extent on the way in which the existing instruments are interpreted and, in this respect, some uncertainty is bound to arise from the rather general declarations of commitment which typify the articles and preambular texts of international agreements. In most cases, the primary purpose of regulating the specified practice is given as "the prevention and control of marine pollution". Such declarations do not adequately fulfill the requirement for a statement of objective, and they provide little guidance on the strategies to be employed or the criteria for judging success.

Dissatisfaction with the rate of progress in combating marine pollution is evident from statements issued by a number of international bodies over the past decade. The need to strengthen legal instruments and to intensify efforts to reduce and reverse degradation of the seas has been identified *inter alia* by the Declaration of the International Conference on the Protection of the North Sea (Bremen Conference, 1984) and further developed in subsequent declarations of North Sea Ministers (London Conference, 1987; The Hague Conference, 1990) and by the World Commission on Environment and Development. It is also implicit in a growing number of statements calling for a more precautionary approach to controlling discharges to the marine environment such as that by the Governing Council of the United Nations Environment Programme (UNEP 15th session, 1989).

One of the messages that emerges from reports and discussions of international bodies is that emissions of wastes and other substances should not be condoned unless the full environmental implications of these emissions are known. In some fora, such as the London Dumping Convention, which provides a legal regime for the global control of waste disposal at sea, this has led to a new, but so far informal, objective that substantially reduces dependence on case-by-case evaluations as the basis for regulating certain waste disposal practices. Within the London Dumping Convention, this has effectively ruled out the disposal at sea of low-level radioactive wastes, as well as a majority of industrial wastes and marine incineration.

This lack of confidence in the regulatory process stems in part from the different approaches, and varying degrees of restriction, applied by national authorities when implementing international requirements; this is another indication of the difficulties associated with

interpretation of legal texts. It also reflects a widely held view that pollution control measures based on estimates of environmental capacity can lead to a rather permissive approach to waste disposal with consequent increases in contamination and risks of pollution. The preferred and frequently advocated alternative is to place increased emphasis on the reduction and containment of substances at source, to encourage the development and use of low-waste technologies and to discourage the authorization of emissions when these are based on uncertain estimates of effects within the receiving environment.

While GESAMP unequivocally supports the active pursuit of cleaner technologies, and endorses the concept that reduced contamination will contribute to better protection of the marine environment, it rejects the proposition that better waste management and stricter application of source controls will obviate the need for regulatory mechanisms that involve responsible use of scientifically based predictions. **However clean the technology, it is inevitable that some waste will continue to be produced. Accordingly, it is essential that informed decisions be made in selecting environmentally preferable means of disposal. Objectives for marine pollution control should recognize the need for, and encourage the development of, improved predictive capabilities.**

A characteristic of the recent trend towards stricter marine pollution control measures is reduced dependency on definitions of the term "pollution" as the basis for regulating the inputs of substances and wastes. Tomczak (1984), Hakapää (1981) and others have noted the differences between the GESAMP (1969) definition, in which pollution is contingent on the occurrence of "deleterious effects", on the one hand, and the slightly modified version of the GESAMP definition contained in the United Nations Law of the Sea (1983) and some international agreements, on the other, in which pollution may be inferred where experience indicates a certain probability of environmental damage. Neither version would appear to satisfy the desire for a working definition that recognizes the uncertainty of predictions and implicitly promotes an overall reduction in the kinds and amounts of material transported to the oceans as a result of human activity.

The possibilities for environmental change arising from human activity are almost limitless, but in practice most physical alterations of the environment are evaluated, accepted or rejected entirely on social or economic grounds. The scientific contribution is to advise society of consequences that may not be directly apparent, especially those which may influence human health or the long-term viability of renewable resources and ecosystems. It is to fulfill this function that scientists see a need to distinguish between chemical changes that do not have widespread or irreversible effects on natural systems (i.e. contamination) and those which are observed or predicted to do so. This is the basis for all definitions of pollution.

GESAMP does not believe that, for purposes of environmental protection, a definition of pollution can or should replace clear and carefully constructed statements of objective. Pollution, however, as it is defined for scientific purposes, is an unacceptable change to the environment and it is logical that the primary objective of pollution control should be one of prevention rather than simply of mitigation.

For these reasons, and taking account of the overall goal for marine environmental protection and management (section 2.4), GESAMP recommends the adoption of a subordinate goal specifically addressing the prevention of marine pollution by substances and wastes. This goal should stress the importance of management in reducing the overall extent of environmental contamination and might be expressed as follows:

To manage human activities and social development in a manner that will limit contamination of the marine environment by substances and wastes, and thereby to ensure that the viability of marine ecosystems and the legitimate uses of the sea are sustained for the benefit of present and future generations.