ENVIRONMENTAL LAW
GUIDELINES AND PRINCIPLES

7

Marine Pollution from Land-based Sources

MONTREAL GUIDELINES FOR THE PROTECTION OF THE MARINE ENVIRONMENT AGAINST POLLUTION FROM LAND-BASED SOURCES

(Decision 13/18/II of the Governing Council of UNEP, of 24 May 1985)

Introduction

This set of guidelines is addressed to Governments with a view to assisting them in the process of developing appropriate bilateral, regional and multilateral agreements and national legislation for the protection of the marine environment against pollution from land-based sources. They have been prepared on the basis of common elements and principles drawn from relevant existing agreements, drawing upon experience already gained through their preparation and implementation. Principal among these agreements are the United Nations Convention on the Law of the Sea (Part XII), the Paris Convention for the Prevention of Marine Pollution from Land-Based Sources, the Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area, and the Athens Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources.

These guidelines are suggested as a broad framework for the development of similar agreements in those regions where such agreements are called for; for the guidance of Governments in areas which are not at present covered by any regional agreements; and for the preparation in the long term, should the need arise,of a global convention on pollution from land-based sources designed to strengthen international institutional arrangements to ensure the harmonization and application of global and regional rules, criteria, standards and recommended practices and procedures and to review the effectiveness of measures taken.

The guidelines are of a recommendatory nature. They are presented as a check-list of basic provisions rather than a model agreement, which Governments may select from, adapt or elaborate upon, as appropriate, to meet the needs of specific regions. They are without prejudice to the elaboration of cross-sectoral guidelines/principles within the framework of the Montevideo Programme for the Development and Periodic Review of Environmental Law, as recommended by the UNEP Ad hoc Meeting of Senior Government Officials Expert in Environmental Law.

- - - - -

The guidelines were drafted, in response to UNEP Governing Council decision 10/24 of 31 May 1982, by an Ad Hoc Working Group of Experts on the Protection of the Marine Environment against Pollution from Land-based Sources which met between 1983 and 1985 and adopted them in Montreal, Canada, on 19 April 1985. In the light of the Working Group's report (UNEP/WG.120/3), the Governing Council by decision 13/18 (II) of 24 May 1985 encouraged "States and international organizations to take the Montreal Guidelines for the Protection of the Marine Environment against Pollution from Land-based Sources into account in the process of developing bilateral, regional and, as appropriate, global agreements in this field".

1. Definitions

For the purposes of these guidelines:

(a) "Pollution" means the introduction by man, directly or indirectly, of substances or energy into the marine environment which results or is likely to result in such deleterious effects as harm to living resources and marine ecosystems, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities;

(b) "Land-based sources" means:

(i) Municipal, industrial or agricultural sources, both fixed and mobile, on land, discharges from which reach the marine environment, in particular:

a. From the coast, including from outfalls discharging directly into the marine environment and through run-off;

b. Through rivers, canals of other watercouses, including underground watercourses; and

c. Via the atmosphere:

(ii) Sources of marine pollution from activities conducted on offshore fixed or mobile facilities within the limits of national jurisdiction, save to the extent that these sources are governed by appropriate international agreements.

(c) "Marine environment" means the maritime area extending, in the case of watercourses, up to the freshwater limit and including inter-tidal zones and salt-water marshes;

(d) "Freshwater limit" means the place in watercourses where, at low tide and in a period of low freshwater flow, there is an appreciable increase in salinity due to the presence of sea water.

2. Basic obligation

States have the obligation to protect and preserve the marine environment. In exercising their sovereign right to exploit their natural resources, all States have the duty to prevent, reduce and control pollution of the marine environment.

3. Discharges affecting other States or areas beyond the limits of national jurisdiction

States have the duty to ensure that discharges from land-based sources within their territories do not cause pollution to the marine environment of other States or of areas beyond the limits of national jurisdiction.

4. Adoption of measures against pollution from land-based sources

(a) States should adopt, individually or jointly, and in accordance with their capabilities, all measures necessary to prevent, reduce and control pollution from land-based sources, including those designed to minimize to the fullest possible extent the release of toxic, harmful or noxious substances; especially those which are persistent, into the marine environment. States should ensure that such measures take into account internationally agreed rules, criteria, standards and recommended practices and procedures.

(b) In taking measures to prevent, reduce and control pollution from land-based sources, States should refrain, in accordance with international law, from unjustifiable interference with activities carried out by other States in the exercise of their sovereign rights and in pursuance of their duties in conformity with internationally agreed rules, criteria, standards and recommended practices and procedures.

5. Co-operation on a global, regional or bilateral basis

(a) States should undertake, as appropriate, to establish internationally agreed rules, criteria, standards and recommended practices and procedures to prevent, reduce and control pollution from land-based sources, with a view to co-ordinating their policies in this connection, particularly at the local and regional level. Such rules, criteria, standards and recommended practices and procedures should take into account local ecological, geographical and physical characteristics, the economic capacity of States and their need for sustainable development and environmental protection, and the assimilative capacity of the marine environment, and should be reviewed from time to time as necessary;

(b) States not bordering on the marine environment should co-operate in preventing, reducing and controlling pollution of the marine environment originating or partially originating from releases within their territory into or reaching water basins or watercourses flowing into the marine environment or via the atmosphere. To this end, States concerned should as far as possible, and, as appropriate, in co-operation with competent international organizations, take necessary measures to prevent, reduce and control pollution of the marine environment from land-based sources;

(c) If discharges from a watercourse which flows through the territories of two or more States or forms a boundary between them are likely to cause pollution of the marine environment, the States concerned should co-operate in taking necessary measures to prevent, reduce and control such pollution.

6. Duty not to transfer or transform pollution from land-based sources

In taking measures to prevent, reduce and control pollution from land-based sources, States have the duty to act so as not to transfer directly or indirectly, damage or hazards from one area to another or transform such pollution into another type of pollution.*

---

* Guideline 6 does not prevent the transfer or transformation of pollution in order to prevent, reduce and control pollution of the environment as a whole.

7. Specially protected areas

(a) States should, in a manner consistent with international law, take all appropriate measures, such as the establishment of marine sanctuaries and reserves, to protect certain areas to the fullest possible extent from pollution, including that from land-based sources, taking into account the relevant provisions of annex I;

(b) States should, as practicable, undertake to develop, jointly or individually, environmental quality objectives for specially protected areas, conforming with the intended uses, and strive to maintain or ameliorate existing conditions by comprehensive environmental management practices.

8. Scientific and technical co-operation

States should co-operate, directly and/or through competent international organizations, in the field of science and technology related to pollution from land-based sources, and exchange data and other scientific information for the purpose of preventing, reducing and controlling such pollution, taking into account national regulations regarding the protection of confidential information. They should, in particular, undertake to develop and co-ordinate to the fullest possible extent their national research programmes and to co-operate in the establishment and implementation of regional and other international reseach programmes.

9. Assistance to developing countries

(a) States should, directly and/or through competent international organizations, promote programmes of assistance to developing countries in the fields of education, environmental and pollution awareness, training, scientific research and transfer of technology and know-how, for the purpose of improving the capacity of the developing countries to prevent, reduce and control of pollution from land-based sources and to assess its effects on the marine environment;

(b) Such assistance should include:

(i) Training of scientific and technical personnel;

(ii) Facilitation of the participation of developing countries in relevant international programmes;

(iii) Acquisition, utilization, maintenance and production by those countries of appropriate equipment; and

(iv) Advice on, and development of, facilities for education, training, research, monitoring and other programmes;

(c) States should, directly and/or through competent international organizations, promote programmes of assistance to developing countries for the establishment, as necessary, of infrastructure for the effective implementation of applicable internationally agreed rules, criteria, standards and recommended practices and procedures related to the protection of the marine environment against pollution from land-based sources, including the provision of expert advice on the development of the necessary legal and administrative measures.

10. Development of a comprehensive environmental management approach

States should undertake to develop, as far as practicable, a comprehensive environmental management approach to the prevention, reduction and control of pollution from land-based sources, taking into account relevant existing programmes at the bilateral, regional or global level and the provisions of annex I. Such a comprehensive approach should include the identification of desired and attainable water use objectives for the specific marine environments.

11. Monitoring and data management

States should endeavour to establish directly or, whenever necessary, through competent international organizations, complementary or joint programmes for monitoring, storage and exchange of data, based, when possible, on compatible procedures and methods, taking into account relevant existing programmes at the bilateral, regional or global level and the provisions of annex III, in order to:

(a) Collect data on natural conditions in the region concerned as regards its physical, biological and chemical characteristics;

(b) Collect data on inputs of substances or energy that cause or potentially cause pollution emanating from land-based sources, including information on the distribution of sources and the quantities introduced to the region concerned:

(c) Assess systematically the levels of pollution along their coasts emanating from land-based sources and the fates and effects of pollution in the region concerned; and

(d) Evaluate the effectiveness of measures in meeting the environmental objectives for specific marine environments.

12. Environmental assessment

States should assess the potential effects/impacts, including possible transboundary effects/impacts, of proposed major projects under their jurisdiction or control, particularly in coastal areas, which may cause pollution from land-based sources, so that appropriate measures may be taken to prevent or mitigate such pollution.

13. Development of control strategies

(a) States should develop, adopt and implement programmes and measures for the prevention, reduction and control of pollution from land-based sources. They should employ an appropriate control strategy or combination of control strategies, taking into account relevant international or national experience, as described in annex I;

(b) States should, as appropriate, progressively formulate and adopt, in co-operation with competent international organizations, standards based on marine quality or on emissions, as well as recommended practices and procedures, taking into account the provisions of annex I;

(c) Where appropriate, States should undertake to establish priorities for action, based on lists of substances pollution by which should be eliminated and of substances pollution by which should be strictly limited on the basis of their toxicity, persistence, bioaccumulation and other criteria as elaborated in annex II, or in relevant international agreements.

14. Pollution emergencies arising from land-based sources

States and, as appropriate, competent international organizations should take all necessary measures for preventing and dealing with marine pollution emergencies from land-based sources, however caused, and for reducing or eliminating damage or the threat of damage therefrom. To this end States should, as appropriate, individually or jointly, develop and promote national and international contingency plans for responding to incidents of pollution from land-based sources and should co-operate with one another and, whenever necessary, through competent international organizations.

15. Notification, information exchange and consultation

Whenever releases originating or likely to originate from land-based sources within the territory of a State are likely to cause pollution to the marine environment of one or more other States or of areas beyond the limits of national jurisdiction, that State should immediately notifiy such other State or States, as well as competent international organizations, and provide them with timely information that will enable them, where necessary, to take appropriate action to prevent, reduce and control such pollution. Furthermore, consultations deemed appropriate by States concerned should be undertaken with a view to preventing, reducing and controlling such pollution.

16. National laws and procedures

(a) Each State should adopt and implement national laws and regulations for the protection and preservation of the marine environment against pollution frin land-based sources, taking into account internationally agreed rules, criteria, standards and recommended practices and procedures, and take appropriate measures to ensure compliance with such laws and regulations;

(b) Paragraph (a) above is without prejudice to the right of States to take more stringent measures nationally or in co-operation with each other to prevent, reduce and control pollution from land-based sources under their jurisdiction or control;

(c) Each State should, on a reciprocal basis, grant equal access to and non-discriminatory treatment in its courts, tribunals and administrative proceedings to persons in other States who are or may be affected by pollution from land-based sources under its jurisdiction or control.

17. Liability and compensation for pollution damage emanating from land-based sources

(a) States should ensure that recourse is available in accordance with their legal systems for prompt and adequate compensation or other relief in respect of damage caused by pollution of the marine environment by natural or juridical persons under their jurisdiction;

(b) To this end, States should formulate and adopt appropriate procedures for the determination of liability for damage resulting from pollution from land-based sources. Such procedures should include measures for addressing damage caused by releases of a significant scale or by the substances referred to in guideline 13 (c).

18. Implementation reports

States should report, as appropriate, to other States concerned, directly or through competent international organizations, on measures taken, on results achieved and, if the case arises, on difficulties encountered in the implementation of applicable internationally agreed rules, criteria, standards and recommended practices and procedures. To this end, States should designate national authorities as focal points for the reporting of such measures, results and difficulties.

19. Institutional arrangements

(a) States should ensure that adequate institutional arrangements are made at the appropriate regional or global level, for the purpose of achieving the objectives of these guidelines, and in particular for promoting the formulation, adoption and application of international rules, criteria, standards and recommended practices and procedures, and for monitoring the condition of the marine environment;

(b) The functions of such institutional arrangements should include:

(i) Periodic assessment of the state of the specific marine environment concerned;

(ii) Formulation and adoption, as appropriate, of a comprehensive environmental management approach consistent with the provisions of guidelines 7 and 10;

(iii) Adoption, review and revision, as necessary, of the lists referred to in guideline 13;

(iv) Development and adoption, as appropriate, of programmes and measures consistent with the provisions of guidelines 10 and 13;

(v) Consideration, where necessary, of the reports and information submitted in accordance with guidelines 15 and 18;

(vi) Recommendation of appropriate measures to be taken for the prevention, reduction and control of pollutioin from land-based sources, such as assistance to developing countries, the strengthening of regional co-operation mechanisms, consideration of aspects of transboundary pollution, and the difficulties encountered in the implementation of agreed rules; and

(vii) Review of the implementation of relevant internationally agreed rules, criteria, standards and recommended practices and procedures, and of the efficacy of the measures adopted and the advisability of any other measures.

Annex I

STRATEGIES FOR PROTECTING, PRESERVING AND ENHANCING THE QUALITY OF THE MARINE ENVIRONMENT

INTRODUCTION

In controlling marine pollution from land-based sources, an overall approach to the uses and the natural values of the marine environment should be taken, while still considering the needs of populations and industries for waste disposal. It is important to note that for many types of waste, the use of the marine environment is only one option among several. However, in some instances, marine disposal may be a feasible alternative. The present annex describes a number of strategies which can be employed to protect the marine environment against pollution from land-based sources and, where necessary, restore areas that have been affected. The goal is to protect the marine ecosystem by maintaining its quality within acceptable levels as determined on the basis of scientific, institutional, social and economic factors. It should be recognized that there are many activities competing to derive benefits from the marine environment. None of these activities, save the perpetuation of a marine ecosystem as a vital component of global life support, should be regarded as having guaranteed rights. Compromise and consideration of all alternatives must always be considered. Consequently, in the course of the decision-making process determining the use of a particular sector of the marine environment, social, economic and political factors, as well as natural environmental factors must be taken into account.

Once decision-makers have determined the desired present, interim and long-term uses and associated objectives for a water body, a number of control strategies may be employed to achieve those objectives. Flexibility will be an important consideration in the strategies or regulatory instruments implemented for various water bodies, reflecting their different environmental capacities and other properties and differences in regional socio-economic conditions. The principal strategies in use are based on marine quality standards, on emission standards and on environmental planning. Experience shows that a combination of strategies is often needed. Practical constraints may prevent full implementation of a strategy based on quality standards. Where such an approach cannot be fully implemented, other strategies should be employed.

1.0 CONTROL STRATEGIES

Pollution control strategies in use have been categorized as follows:

(a) Those based on marine environmental quality standards;

(b) Those based on emission standards;

(c) Those based on environmental planning.

Priorities for control are often established by the classification of substances into a "black" and a "grey" list. Substances are assessed according to the criteria described in annex II. States undertake to eliminate pollution by those substances in the black list and strictly to limit pollution by those in the grey list.

1.1. Strategies based on marine quality standards

Such strategies relate directly to the quality of water, biota or sediments that must be maintained for a desired level of quality and intended use. Several applications of such quality-based strategies exist.

1.1.1 Direct derivation from quality objectives

Technical assessments are conducted to determine the maximum allowable inputs that will ensure that the desired levels of environmental quality are met. The assessments consider the fates and effects of various contaminants, amounts of input, and the existing natural characteristics of the relevant marine ecosystem. Numerical standards are then established, to which concentrations measured in the receiving environment may be compared. They are usually more restrictive than numbers derived from the technical assessment to allow for monitoring and enforcement capabilities and safety requirements. They may apply to water, sediment, fish or the tissues, health or community composition of organisms in the marine ecosystem.

Monitoring is required to detect changes and compliance with the standards. Changes in the items monitored, after adjustment for natural fluctuation, may signal a need to reduce inputs further and vary existing standards and controls.

1.1.2. No change above ambient

Standards are set based on existing levels which must not be exceeded. This strategy is employed in situations where the aim is to prevent any increase in prevailing specific contaminant levels. It is an interim strategy to allow time to develop a solid scientific base on which more precise quality criteria may be employed for a specific use. It does not imply that an existing state of the environment is satisfactory, nor does it eliminate the need for its improvement.

1.1.3 Dilution

Some contaminants discharged at the source are assumed to attenuate as they spread from that source. Dynamic characteristics of the receiving environment are employed to determine the rate and level of dilution. Standards are derived from measured parameters taken at given distances from the discharging source. This strategy may accept short-term or local excess of a potential pollutant at the source of discharge. Application is generally used with effluent that is considered biodegradable, and avoided where scientific evidence suggests that the effluent may accumulate in a given receiving environment.

1.1.4 Loading allocations

These impose priority of control on the larger sources in consideration of the most cost-effective solutions. Allowable discharge are measured in terms of the total allowable for an entire receiving environment, regardless of specific site quality. Application is suited to relatively self contained receiving environments, such as lagoons and semi-enclosed bodies of water. It allows flexibility of contaminant output, in that certain sources may emit more than adjacent ones as long as loading limits are not exceeded. All these

strategies may employ criteria for water, air or sediment quality, as well as criteria related to specific marine life. Receiving environment quality standards are most prevalent for uses - e.g. swimming, direct harvesting of fish for human consumption - where sound scientific criteria exist to determine levels of harm. Emissions of potential pollutants are usually controlled to ensure that the desired quality is achieved. If the quality needs to be upgraded, additional controls are placed on allowable emissions.

1.2 Strategies based on emission standards

These strategies may be based on:

(a) A general principle of pollution control;

(b) Achievable technology;

(c) Distribution of control costs;

(d) Enforceability.

They differ from strategies based on marine quality in that the standards set are not primarily determined by the level of contaminant in the environment.

1.2.1 Technology-based standards

These standards are usually applied on a sectoral basis, thus providing a means of imposing similar costs across a particular sector. Alternatively, they may be determined on a case-by-case basis. The standards will need to be reviewed periodically in the light of developing technology.

Standards may be based on:

1.2.1.1 Best practicable technology

This reflects the application of demonstrable and sound treatment technology or a spectrum of technologies which is affordable by the sector concerned.

1.2.1.2 Best available technology

This reflects state-of-the-art technology in use in contaminant control. In general, the standards set would reflect a more stringent level of control as compared to best practicable technology. Application is generally for the control of emissions of the most noxious substances or to protect a sensitive environmental use.

1.2.1.3 As low as reasonably achievable

This is mainly applied to radio-nuclides, and is based on the principles of "optimization". This, as defined by the International Commission on Radiological Protection, requires radiation doses to be kept to levels that are "reasonably achievable", by technological improvements and by a suitable choice among alternative options. "Reasonably achievable" takes into account both the ease with which the technology can be applied and the balance between the benefits, in terms of dose reduction, and the social and economic costs of its application.

1.2.1.4 Zero discharge

In a situation where stringent protection of a sensitive marine environment is deemed appropriate, consideration may be given to the denial of any release of a contaminant to the environment.

1.2.2 Uniform regional emission standards

Such standards are usually applied in situations where there are existing pollution problems of a similar nature and there is an urgent need to reduce pollution. They do not give primary consideration to the nature of sources, their economic base, or the receiving environment.

1.3 Planning strategies

This set of strategies draws in part on those mentioned in section 1.1 and 1.2 above and will often be used to supplement them (the reverse is also true). Planning strategies allow an approach to the management and protection of particular environments which may involve restrictions on, or modification of, activities and sites as well as discharges.

1.3.1 Activity management

Certain activities are deemed inappropriate or inconsistent with the value or uses of an environment. Consideration should be given to whether the activity is essential, and if so, whether it can be accommodated elsewhere or in a different manner.

1.3.1.1 Use designation

Use of the receiving environment is the determining factor for pollution control standards as well as the basis for regulations or guidelines affecting other activities. For example, if the desire is to maintain or develop a shellfish harvest (a socio-economic decision), then quality standards and uses are developed with this in mind.

The application may result from a perceived threat to an established economic base or cultural value, or a conscious effort to change the existing use of a receiving environment.

1.3.1.2 Environmental assessment of activities

Siting of any activity significantly affecting the marine environment is subject to a comprehensive analysis and assessment of:

(a) The ecological characteristics of the receiving environment;

(b) The direct and indirect potential effects/impacts of the activity on the environment; and, as appropriate,

(c) The direct and indirect potential effects/impacts on the environment of any reasonable alternative to the activity.

1.3.2 Regional planning

Plans are drawn up for particular regions, taking into account socio-economic and ecological factors, which are then used as a basis for development.

1.3.2.1 Coastal zone management

The strategy employs planning capabilities to make the best use of the coastal zone.

It is not use-specific or source-specific but area-specific. Potential activities are assessed as components of a coastal zone. Planning is based on regional socio-economic and ecological considerations. Zoning and other land use restrictions or modifications are major regulatory tools. Many States make use of regional planning authorities or councils which are given the task of managing overall resource planning within a particular coastal area.

1.3.2.2 Watershed or drainage basin planning

This strategy acknowledges that a large proportion of pollution enters the marine environment via watercourses. It does not necessarily account for inputs via the atmosphere, though air management areas have also been employed for control purposes.

Through consideration of socio-economic and environmental factors, taking the area of a drainage system as the planning unit, the desired uses and level of quality that can be attained for any given marine water body are determined.

Pollution via watercourses is controlled through regulation of point and diffuse sources of such pollution within the given watershed.

1.3.2.3 Specially protected areas

This strategy involves the identification of unique or pristine areas, rare or fragile ecosystems, critical habitats and the habitat of depleted, threatened or endangered species and other forms of marine life.

Those areas to be protected or preserved from pollution, including that from land-based sources, are selected on the basis of a comprehensive evaluation of factors, including conservational, ecological, recreational, aesthetic and scientific values.

States should notify an appropriate international organization of the establishment of an any modification to such areas, with a view to the inclusion of such information in an inventory of specially protected areas.

2.0 CONTROL INSTRUMENTS

This section outlines the various types of mechanism which can be invoked to implement control strategies:

2.1 Regulations

Regulations are developed pursuant to enabling legislation and can exist in forms such as:

2.1.1 - Emission standards (air/water)

Standards based on best practicable technology, best available technology, geographical area, etc.

2.1.2 - Environmental quality standards

Standards for the receiving environment which vary according to its intended use.

2.2. Guidelines/codes of practice

These are descriptions of practices and abatement technologies that may be developed to meet the pollution control needs of various point and non-point sources. They provide a listing of basic requirements that may be implemented or adopted by industry or local authorities.

2.3 Permits

Legislation may require a discharger to have a permit to satisfy the requirements for the release of pollutants. These requirements can be based on standards in the form of emission control regulations, guidelines, codes of practice or specific requirements derived from environmental quality standards prescribed to protect the receiving environment.

2.4 Equipment standards certification

Environmental considerations may be incorporated directly in association with particular equipment. To this end, the equipment or configuration of equipment may be designed, manufactured, tested and certified to comply with the requirements for source releases of pollutants.

2.5 Product controls

If a particular substance or assemblage of substances in the form of a commercial product is deemed to be of environmental significance, a restriction may be placed on the production, use and export/import of the product.

2.6 Planning restrictions

Under planning law or practice, restrictions may be placed on the use of certain land.

2.7 Economic measures

These may take a variety of forms, e.g. tax incentives, subsidies and effluent charges. To be effective, the incentive offered must be strong enough or the charge levied high enough to pursuade the discharger or user that it is in his own financial interest to limit his discharge or use of the substance concerned.

3.0 FACTORS INFLUENCING CHOICE OF STRATEGIES AND CONTROL INSTRUMENTS

There is a wide range of strategies and control instruments which can be utilized either individually or in combination to address pollution of the marine environment from land-based sources. A number of factors may influence such a choice. In general terms, they may be categorized as economic, scientific/technical or social/cultural/political, as follows:

3.1 Economic

General economic conditions and trends (deficit, balance of trade, inflation, etc.);
Availability of public financing;
Availability of external funding;
Unemployment;
Economic viability of various sectors;
The "polluter pays" principle;
Availability of institutions and infrastructure.

3.2 Scientific/technical

3.2.1 Availability/accessibility of scientific data, including:

Physical characteristics affecting flushing and mixing;
Natural nutrient cycles and geochemical cycles;
Biological processes and nature of communities.

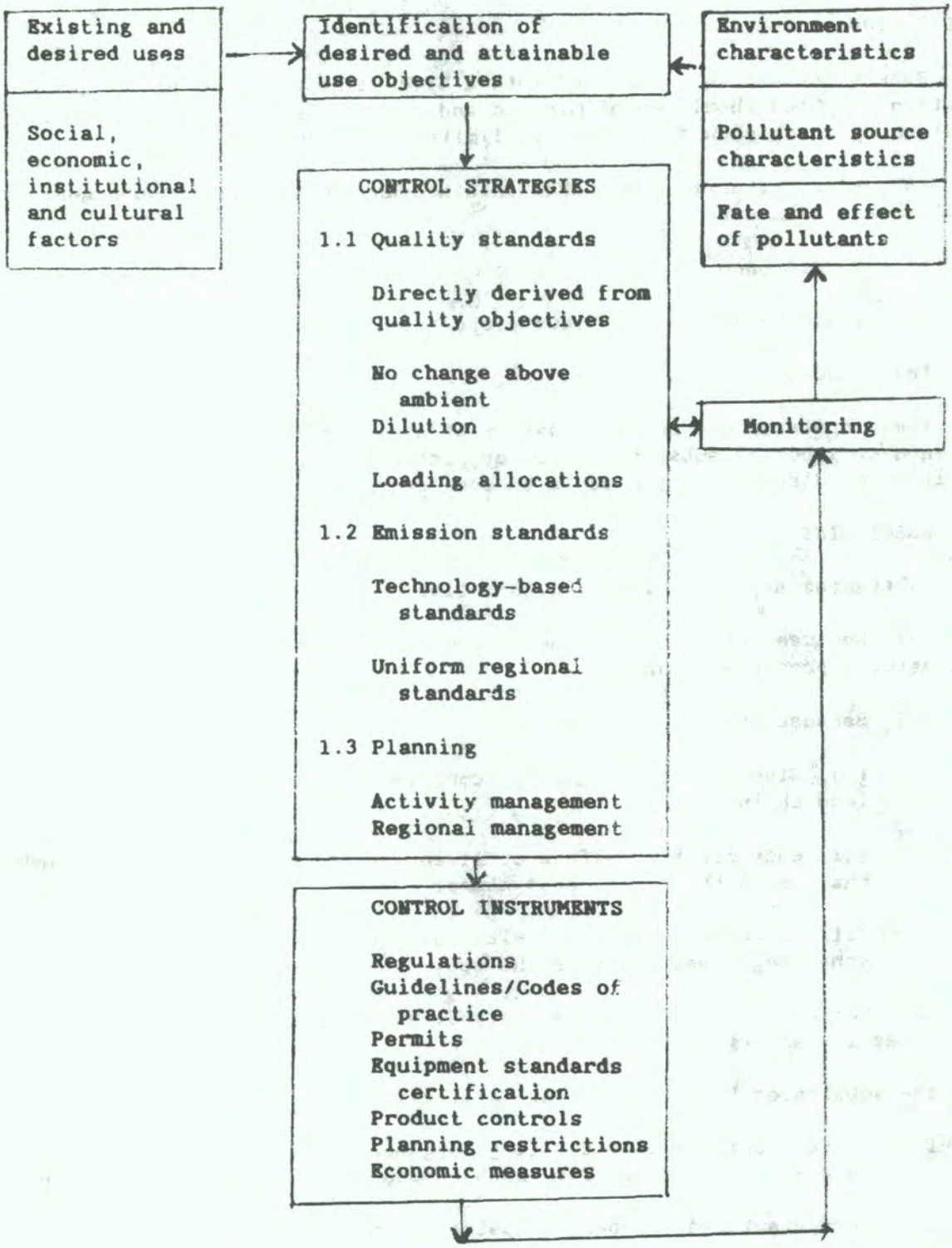
3.2.2 Availability/accessibility of technology, including:

Basic information on industry types and on total effluent releases, and specific data on waste stream constituents;
Availability of expertise;
Capability for monitoring;
Existing engineering infrastructure;
Experience with implementation of strategies or instruments elsewhere;
Sensitivity of ecosystems to be affected;
Climatic considerations;
Current level of pollution of the receiving environment and identified trends in municipal, agricultural and industrial waste releases.

3.3 Social/cultural/political

Infrastructure;
Existing and proposed uses of the marine environment;
Political realities;
Social/cultural awareness of the population;
Perception of environmental, social and cultural values.

ENVIRONMENTAL PROTECTION



Annex II

CLASSIFICATION OF SUBSTANCES

INTRODUCTION

Substances may be classified into a black list of those substances pollution by which should be eliminated and a grey list of those substances pollution by which should be strictly limited and reduced.

The basic criteria to be taken into account in allocating substances to one of these lists are:

(a) Persistence;

(b) Toxicity or other noxious properties;

(c) Tendency to bioaccumulation.

These criteria are not necessarily of equal importance for a particular substance or group of substances. Other factors such as location and quantities of discharge may need to be considered.

1.0 BLACK LIST

Substances may be included in this list:

(a) Because they are not readily degradable or rendered harmless by natural processes; and

(b) Because they may either:

(i) Give rise to dangerous accumulation of harmful material in the food chain; or

(ii) Endanger the welfare of living organisms causing undesirable changes in the marine ecosystems; or

(iii) Interfere seriously with the harvesting of sea foods or with other legitimate uses of the sea; and

(c) Because it is considered that pollution by these substances necessitates urgent action.

The substances that fulfil these criteria may include:

1.1 Certain organic biocides (e.g. organohalogen compounds and substances which may form such compounds in the marine environment);

1.2 Persistent hydrocarbons of petroleum origin;

1.3 Certain metals and their compounds (e.g. mercury);

1.4 Persistent synthetic materials which may seriously interfere with legitimate use of the sea;

1.5 Radioactive materials;

1.6 Substances which have been proved to possess carcinogenic properties in or via the aquatic environment;

1.7 Materials in whatever form (e.g. solid, liquid, semi-liquid, gaseous or in a living state) produced for biological and chemical warfare.

2.C GREY LIST

Substances may be included in this list because, although exhibiting similar characteristics to the substances in the black list and requiring strict control, they seem less noxious or are more readily rendered harmless by natural processes. The substances to which this may apply include:

2.1 Organic biocides not included in the black list;

2.2 Hydrocarbons of petroleum origin and their derivatives not included in the black list;

2.3 Certain elements and their compounds (e.g. fluorides and cyanides);

2.4 Inorganic and synthetic organic materials, other than those included in the black list, which are likely to produce harmful effects on marine organisms or to make edible marine organisms unpalatable, as well as chemicals which may lead to the formation of such substances in the marine environment;

2.5 Acid and alkaline compounds of such composition and in such quantity that they may seriously impair the quality of the marine environment;

2.6 Substances which, though not producing toxic effects, may become harmful because of the concentrations or quantities in which they are discharged, or which are liable to reduce amenities seriously or to endanger human life or marine organisms or to impair other legitimate uses of the sea;

2.7 Pathogenic micro-organisms which are or may become harmful because of the concentrations and quantities in which they are discharged or which are liable to endanger human life or marine organisms, or to impair other legitimate uses of the marine environment and coastal waters in particular.

Annex III

MONITORING AND DATA MANAGEMENT

1.0 MONITORING

In the protection of the marine environment against pollution from land-based sources, monitoring can be defined as the measurement of a pollutant or its effects on either man or marine resources for the purposes of assessing and controlling exposure to that pollutant. Thus monitoring is used to assess, first, the need for pollution prevention measures, and subsequently the effectiveness of any protection measures introduced. If monitoring is to meet these objectives and be cost-effective it must be carefully designed and implemented.

1.1 Resources to be protected

One of the first things to ascertain is what resources need protecting in the area concerned and the various pollutant sources and ways in which each could possibly be threatened. For example, the well-being of a nature reserve, fish hatchery or fish resource might be threatened by a variety of substances. Similarly, the suitability of fish or shellfish for human consumption might be affected by other substances such as mercury or arsenic which may adversely affect man whilst not affecting fisheries

1.2 Information on inputs

It is also important at an early stage to establish for each area the activities already practised and the pollutants likely to reach the sea via point, non-point and riverine sources.

A knowledge of the resources to be protected and the pollutants which are most likely to affect them will allow attention to be focused on those substances which appear most likely to be of concern, thereby reducing the amount of effort devoted to establishing a data base on inputs. Information on inputs can also be used to focuse environmental monitoring efforts on those pollutants most likely to be encountered in each area. If possible the scale of input should also be established, at least in order-of-magnitude terms. This will normally be fairly easy but more accurate qualification will require improvements in the quality of data on both concentration and flow.

Information on inputs from direct discharges may be determined from descriptions of unit processes in use. If permit programmes have been established, information on controlled pollutants should be available from the permit issuing authority. Inputs from non-point sources are generally estimated by employing accepted formulae describing land use in the watershed and the associated run-off. In estimating inputs from point and non-point sources, the pollutants of concern may include a broad range of substances, for example, toxicants and nutrients.

1.3 Establishing baseline concentrations

Having decided what needs to be monitored, on the basis of what resources must be protected and which pollutants are likely to be of interest, the concentrations actually present in the environment can be established. This information can then be used to assess those protection measures necessary and their effectiveness. The need for control measures may be judged by comparing the concentrations found either with some form of water quality criteria, for example maximum permissible concentration, or with similar data from other areas known not to be contaminated.

When baseline concentrations are being ascertained, the most appropriate substrate should be selected. Three options exist: water, biota and sediments. Only rarely should it be necessary to analyse samples of all three. The choice will depend on the pollutant concerned, the water quality criteria selected and the nature of the pathways exposed. For example, water would be most suitable for nutrients, biochemical oxygen demand (BOD),pH and certain metals, but biota would be more appropriate for polychlorinated biphenyls (PCBs) or mercury, and undisturbed sedmiments can be particularly useful in time or spatial trend assessments.

1.4. Ongoing monitoring

Monitoring will be required to establish the effectiveness of pollution protection measures. Even if no reductions in inputs are deemed necessary, it may be desired to check that the situation does not deteriorate. Whatever their purpose, monitoring programmes should be designed to consider the receiving capacity of the environment as well as inputs. This means considering present water quality in relation to the desired quality, and the scale of environmental protection measures taken in relation to the existing concentrations, the nature of the pollutants present, the scale of their input and their removal processes. On this basis it will be possible to define what should be monitored and with what frequency.

1.5 Sampling and analysis

The number and nature of the samples collected should be representative of the substrate being monitored. Water quality, biological tissues and sediments can all be very variable even over short distances, and the sampling strategy should, when necessary, be tested statistically to ensure it is sound. The programme design should take account of the hydrographic characteristics of the area so as to avoid sampling the same body of water at different places as it moves under the influence of a current. Finally, the sample collected must be adjusted to the form in which the pollutant occurs in the environment or in the discharge streams.

Once a suitable sampling programme has been designed, it may be possible to bulk samples for analysis in order to reduce the analytical workload and costs. This will inevitably lead to the loss of some information, and should be considered only if the complexity of the analytical technique demands it, the loss of information can be tolerated or the monitoring is to be used only to pick up abnormalities, as in compliance monitoring.

1.6 Resource monitoring

In addition to monitoring the pollutants of interest in the selected substrate, it is essential that the state of the resource(s) be monitored. However, if adverse changes do occur it should not be assumed the protection measures taken were inadequate. For example, fish stocks decline due to fishing effort as well as pollution and undesirable planton blooms occur for reasons other than nutrients enrichment. Monitoring of biological effects is desirable but very few techniques can be applied routinely on a wide scale and most give unspecific responses. Once suitable effect monitoring techniques are available, they may be more attrative alternatives than purely chemical monitoring in environmental matrices.

2.0 DATA AND DATA MANAGEMENT

Before the data from any monitoring programme are used, it is important that confidence limits be established and reported in order to ensure that the confidence with which recorded numbers are handled and interpreted is not misplaced. It is also necessary to decide how the data should be handled for future reference and use.

2.1. Limitations in the data and the extent to which they can be tolerated

The results obtained from any monitoring programme will be subject to errors of accuracy and precision, the size of which must be quantified. If precision is high and accuracy poor then all results for a set of analyses of the same sample will be very close together, for example, differing by no more than 1 per cent, though they may differ from the true result by much more, possibly by as much as an order of magnitude. Some errors will derive from the nature of the samples. These can be minimized by proper statistical design of the sampling procedures and attention to the collection of uncontaminated samples.

All analytical procedures have inherent errors in precision and accuracy. To a greater or lesser extent either or both types of error can be compounded by operator or laboratory errors, which are often not recognized. However, by using good analytical equipment and methods and following a rigorous analytical quality assurance scheme, it should be possible to achieve high accuracy and precision for all analytical data, and allow quantification of the scale errors.

2.2. Intercomparability requirements

In most cases where monitoring programmes are operated on a multilateral basis it is essential that the results obtained by all contributors are truly comparable. Establishing comparable monitoring programmes may prove difficult. However, it is desirable that targets be set for comparability of the data.

Analytical comparability is only one aspect of monitoring data. The actual programmes run by different countries must also be comparable. It obviously will not be possible to compare results from three countries if one analyses water, another a fish species and another sediments. Even when agreement is reached on whether to sample water, biota or sediments it will be necessary to agree, for example, which species of fish should be used, whether the water should be filtered before analysis or whether whole sediment should be analysed or only a particular size fraction.

2.3 Requirements for analytical quality control

It may be impossible to arrange that all contributors use identical analytical procedures. Even if they do, for the reasons given previously, intercomparability is not guaranteed. To establish whether differences do exist and to minimize them a programme of intercalibration is essential. Each laboratory should assure the quality of its data by participating in intercalibration exercises and analysing at intervals reference materials containing certified concentrations of the pollutants of interest in appropriate matrices and concentrations.

2.4 Data storage, rgtrieval and exchange

Depending on the scale of the monitoring programme various methods of data storage and transfer may be appropriate. It is essential that the design of the storage/retrieval system be carefully worked out to reflect the end use of the data in both raw and interpreted form. The most efficient method in many respects is to use a computer. It is essential that the limitations of any set of data be instantly recognizable when it is retrieved. To this end, information such as performance in a recognized intercalibration exercise, analysis of reference materials, etc., should be retrievable with the data. Ideally the data should be freely accessible by all contributors and the scientific community in general. However, if a country or group of countries wish certain types of data to be available only to a limited audience that wish must be safeguarded.

Regions may exhibit different natural background or baseline concentrations, have different resources to be protected and be exposed to different pollutants. As a consequence their monitoring programmes may differ - for example, different fish species may be used as indicators, permissible limits differ according to exposure patterns and different targets may be set for sampling and analytical accuracy. Therefore it will probably be more practical and effective, at least intially, to organize monitoring programmes and data storage on a regional rather than a global basis.

Once a satisfactory level of regional comparability has been achieved, interregional comparability should follow as a logical progression.

- - - -

UNITED NATIONS ENVIRONMENT PROGRAMME

UNEP

Environmental Law
Guidelines and Principles

1. Stockholm Declaration (1972)
2. Shared Natural Resources (1978)
3. Weather Modification (1980)
4. Offshore Mining and Drilling (1982)
5. World Charter for Nature (1982)
6. Banned and Severely Restricted Chemicals (1984)
7. Marine Pollution from Land-based Sources (1985)

UNEP
P.O. Box 30552
Nairobi
Kenya