



# REGIONAL SEAS

*An approach to  
environmental impact assessment  
for projects affecting the  
coastal and marine environment*

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The document contains the procedures and guidelines which may be used for the preparation of environmental impact assessments in the context of regional action plans and agreements adopted in the framework of the UNEP Regional Seas Programme, as well as the rationale used in designing these procedures and guidelines.

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AN APPROACH TO  
ENVIRONMENTAL IMPACT ASSESSMENT  
FOR PROJECTS AFFECTING THE COASTAL  
AND MARINE ENVIRONMENT

prepared by the  
Oceans and Coastal Areas Programme Activity Centre of UNEP  
with the assistance of  
Arne JERNELOV and Uri MARINOV  
and with the co-operation of the  
Priority Actions Programme Regional Activity Centre and the  
Co-ordinating Unit of the Mediterranean Action Plan

## PREFACE

Environmental impact assessment is a process analyzing the positive and negative effects of a proposed project, plan or activity on the environment. The specific purpose of the assessment is to provide the decision makers with information allowing them to introduce environmental protection considerations in the decision-making process leading to the approval, rejection or modification of the project, plan or activity under examination.

The requirements for environmental impact assessments of projects or plans which may have adverse effects on the human environment are today embodied in the national legislation of many countries and in a number of international agreements. However, the procedures used for preparation of such assessments vary considerably from country to country, and at present there is no agreement, on a global or regional level, on procedures which may lead to comparable results.

The present document has been prepared in response to frequent requests from developing countries for simple and yet adequate procedures and guidelines for the preparation of environmental impact assessments which could be used in the context of regional agreements on the protection of the marine environment adopted in support of UNEP's Regional Seas Programme.

The approach outlined in this document is neither totally new nor comprehensive: it is limited to a narrowly defined practical and easily applicable methodology which could be used to assess or predict the environmental consequences of projects or activities proposed for a given site. Since the approach utilizes analogies it is not applicable to projects that are unique in size or scope. The document does not cover some equally important considerations related to planning of sustainable development, such as environmental accounting, cost-benefit analysis of environmental protection measures, comparative analysis of available alternatives, risk assessment and management, physical planning, etc. These considerations have been left aside on purpose, not because their importance is not recognized, but because their mandatory association with the approach to the environmental impact assessment recommended in this document may distract from the central goal: prediction of the environmental consequences of a planned activity, based on

- simple and easily understandable goals and principles;
- methodology which can be essentially handled by national expertise available in most developing countries;
- information either already available or deducible from analogous situations; and on
- public participation.

The approach advocated in this document has developed gradually and was tested on concrete case studies organized by the Priority Actions Programme Regional Activity Centre and the Co-ordinating Unit of the Mediterranean Action Plan, in co-operation with the relevant national authorities in Cyprus and Egypt.

The first draft of the approach was commissioned by UNEP from two consultants (Messrs Arne Jernelov and Uri Marinov) and was used in the preparation of environmental impact assessments for a marina <sup>1</sup> and for a submarine sewer outfall of a medium-sized town <sup>2</sup> in Cyprus. These two case studies, together with the first draft of the approach, were reviewed at the Review Meeting on EIA Procedures held in Nicosia, Cyprus, from 24 to 27 October 1988.

Based on experience gained through the review meeting in Nicosia, the approach was modified and further tested through the analysis of the environmental impact of a sewage treatment plant <sup>3</sup> for a medium-sized city in Egypt. The results were reviewed at the Interregional Workshop on the Application of the EIA Procedures held in Cairo, Egypt, from 19 to 22 November 1989.

The meetings in Nicosia and Cairo were attended by 83 experts from 20 countries.

The comments and suggestions received from these meetings are incorporated in the substantive part of the present document.

This document is planned to be used in further testing of the approach which emerged from the meetings in Nicosia and Cairo, and will be revised on the basis of the experience gained through the preparation of additional case studies.

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# 1. INTRODUCTION

## Historic background

The formal process known today as environmental impact assessment (EIA) resulted from the raising of environmental awareness during the 1950s and 1960s. During those two decades it became increasingly evident that many industrial and other projects were producing undesirable environmental consequences. In response to these problems several governments realized the need for a mechanism ensuring that the environmental consequences of all major projects and plans were examined before their execution was formally authorized.

The Congress of the United States of America was among the first to enact, in January 1970, a comprehensive environmental legislation, the National Environmental Policy Act (NEPA) <sup>4</sup>, using the concept of EIA and requiring a systematic interdisciplinary evaluation of the potential environmental effects of all major federally funded projects.

Since the adoption of NEPA, national legislation requiring EIAs have increased worldwide and, today, even countries without such legislation produce EIAs selectively.

Due to the concern about the potential transboundary environmental effects of national development projects, several international agreements specifically require EIAs for projects or plans which may have wider than national impacts. This is particularly evident in the case of agreements dealing with the protection of the marine environment (see annex I). The draft of a convention on environmental impact assessment in a transboundary context is at present being negotiated under the sponsorship of the UN Economic Commission for Europe.

The Action Plan adopted in June 1972 by the United Nations Conference on the Human Environment recognized environmental management as "functions designed to facilitate comprehensive planning that takes into account the side effects of man's activities and thereby to protect and enhance the human environment" <sup>5</sup>.

As a follow-up of this recognition the Governing Council of UNEP requested the formulation of principles and guidelines which could be used as a guide to countries in establishment of laws and machinery for EIA. Through a series of meetings of national experts the goals and principles of EIA were developed (see section 2 of this document) and adopted in 1987 by a decision of the Governing Council <sup>6</sup>. By the same decision the Governing Council recommended that the adopted goals and principles "should be considered for use as a basis for preparing appropriate national measures, including legislation, and for international co-operation in the field of environmental impact assessment, including further international agreements" and requested UNEP:

- (a) "to assist States, as appropriate, in implementing the goals and principles;
- (b) to conduct a survey of States and relevant international organizations on their experience in applying the goals and principles; and
- (c) to investigate measures which could be undertaken to further international co-operation and agreement in the field, including the application of environmental impact assessment, to development projects with possible transboundary environmental effects".

## Basic concepts

The first step in understanding EIAs is to define what the process actually entails. While many definitions and descriptions are given in the literature <sup>7, 8, 9, 10, 11, 12, 13</sup> and in national legislative acts, the actual working definition varies between countries. In general, an EIA can be defined as the process of identifying, predicting, interpreting and communicating the potential impacts that a proposed project or plan may have on the environment. In some countries (USA, for instance) if an EIA indicates that a project may have significant or controversial environmental impacts, a more detailed environmental impact statement (EIS) is required.

An EIA is often described as a process for assessment of how a project or plan may affect, negatively or positively, various impact indicators, i.e. elements or parameters that provide some sort of measure of the magnitude of an environmental impact<sup>12</sup>. Level of employment, loss of forest and vegetation, changes in water quality are examples of such indicators. The indicators may be either qualitative or quantitative, depending on the parameter and the means by which it is evaluated. For instance, some indicators may be evaluated against pre-existing standards or laws (e.g. air and water quality, level of noise). Other indicators (e.g. morbidity and mortality) may have numerical values. In some cases, it may be necessary to use a purely subjective value-based scale of assessment, such as acceptable and unacceptable change. However, even when using such evaluation scale, the basis for evaluation may be somewhat quantitative, such as the number of trees expected to be lost or the number of residents expected to be dislocated.

An ambitious attempt was made by the IMO/FAO/Unesco/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP) to define, on a purely scientific ground, the EIA procedures applicable to the protection of the marine environment and the capacity of the marine environment to receive safely a certain amount of waste. Unfortunately, the attempt fell short of expectation both on scientific grounds, because solely on the basis of theoretical considerations it is impossible to forecast ecological effects, and on practical grounds, because the exercise became too theoretical and unsuitable for management decision-making. Nevertheless, the GESAMP report on that subject<sup>14</sup> contains many thought-provoking concepts and ideas and provides interesting reading.

The responsibility for carrying out EIAs depends on the national legislative requirements of individual countries, and varies considerably from country to country in order to fit into the specific socio-economic and political system of the country.

#### **Past experience and justification for a more practical approach**

EIAs have been extensively carried out and used over the last 15 years. Their wide application clearly indicates a need to ensure that environmental considerations are included in the decision-making process. However, particularly in developing countries, the procedures established for EIA in developed countries have met much criticism.

From the standpoint of developing countries the most often experienced shortcomings of procedures for EIA prepared according to the conventional "standards" of developed countries are:

- the frequently inadequate institutional infrastructure, as well as the lack of adequate expertise, experience and information (database), requires assistance of foreign experts and consulting firms which only occasionally results in transfer of know-how and in training of local experts;
- collection of data, frequently of little substantive relevance, takes considerable time and often delays urgently needed projects and plans;
- frequently, a large proportion of the only marginally relevant background material included in the EIAs has been excerpted from the memory of the foreign consultants' word processors, and is identical regardless of whether the project is proposed for the wetlands of Bangladesh or the arid area of Chile;
- EIAs are too voluminous (frequently more than 1,000 pages), too technical, and often attempt to cover every theoretical possibility, with the result that they have been of little value as practical management tools in developing countries; and
- the cost of preparing EIAs is frequently very high.

#### **The approach**

Realizing the shortcomings listed above and responding to frequent requests for simple and practical, but still adequate administrative and predictive EIA procedures, an attempt was made to formulate such procedures, supplemented with guidelines which could be used in preparing EIAs for typical development projects which may affect the marine environment.



The approach suggested in this document:

- is based on the goals and principles <sup>8/</sup> endorsed by the UNEP Governing Council (see section 2);
- recognizes and utilizes the fact that very few projects are unique in nature or size and, therefore, assumes that knowledge about observed environmental effects in analogous cases can be used in carrying out EIAs;
- includes monitoring of environmental impact as an integral part of the EIA process, thus allowing that errors in the initial predictions can be observed and corrected, more knowledge about environmental consequences can be gathered on an on-going basis, and more accurate predictions can be made; and
- requires less time-consuming and costly collection of site-specific data by using knowledge from analogous cases.

The advantages of this approach to the EIA process are that in most cases the EIA document, which is the key output of the EIA process, could be:

- based on existing or deducible information;
- prepared within a few months;
- prepared at relatively low cost;
- prepared by national civil servants, administrators, managers and scientists of developing countries with minimal initial training, thus making the heavy involvement of foreign experts unnecessary.

Any assessment of environmental consequences involves various degrees of uncertainties. It may be argued that the approach suggested in this document, i.e. an EIA process largely based on existing knowledge and analogies from previous experience of similar projects, is even more uncertain than the more elaborate, time consuming and costly approaches usually used.

In order to minimize the occurrence of unexpected adverse effects due to the uncertainties in the assessment, a monitoring programme is advocated as an integral part of every EIA process. The monitoring programme associated with and carried out as part of the EIA process would gradually add to the information on which the initial assessment of the environmental impact (i.e. the EIA document) is based and would allow for the reassessment of the measures which may have to be taken in order to safeguard the environment. With the monitoring programme the EIA process - instead of being a rigid document which once and for all defines the conditions under which a project or plan can be executed and operated - becomes a continuous process with a built-in corrective mechanism for periodic reassessment of the conditions under which the project or plan can be allowed to operate.

### **Contents of the EIA document**

The EIA document, which is the key document of the EIA process, should normally include the following:

- description of the project or plan and of the activities it is likely to generate;
- description of the site where the project or plan is proposed to be carried out, including the natural environment and the socio-economic structures which may be affected by the project or plan on the site and in its vicinity;
- reasons for selecting the proposed site and the technology proposed to be applied, including the description of alternatives which have been considered;
- identification and assessment of anticipated or forecasted negative and positive impacts on environmental quality and environmental health as a consequence of implementing the project or plan;

- description of measures proposed for eliminating, minimizing or mitigating the anticipated adverse impacts; and
- proposed programme of monitoring the environmental impact of the project.

#### **Preparation of the EIA document**

Depending on the national legislative requirements, essentially three basic options exist for the preparation of the EIA document <sup>19</sup>. It can be prepared by

- the agency, company or individual proposing the project;
- the government agency controlling or authorizing the project; or
- an independent party.

To eliminate possible bias which could arise when a project proponent prepares the EIA, guidelines for form and content of the EIA can be prepared by a responsible government agency, supervision can be provided by a reviewing or controlling body with no interest in the project, and/or publication and public review of the final EIA can be required <sup>19</sup>.

#### **Role of EIA In the decision-making process**

A satisfactory decision can no longer be made on any project without consideration of its environmental consequences although in many cases socio-economic and/or political considerations may be of decisive importance. The role and function of EIA is to contribute to the decision-making process by focussing on the environmental issues and by ensuring that the potential impacts are considered in a thorough and systematic manner; when such impacts cannot be avoided, they may at least, with foresight, be minimized or mitigated.

## 2. GOALS AND PRINCIPLES OF ENVIRONMENTAL IMPACT ASSESSMENT

The Governing Council of UNEP adopted in 1987 the following goals and principles and recommended them to be considered for use as a basis for environmental impact assessments <sup>6/ 13/ 16/</sup>. The General Assembly of the United Nations, later in the same year, endorsed the goals and principles and the recommendations of the Governing Council regarding their application <sup>17/</sup>.

### PRELIMINARY NOTE

EIA<sup>\*</sup> means an examination, analysis and assessment of planned activities with a view to ensuring environmentally sound and sustainable development.

The EIA goals and principles set out below are necessarily general in nature and may be further refined when fulfilling EIA tasks at the national, regional and international levels.

### GOALS

1. To establish that before decisions are taken by the competent authority or authorities to undertake or to authorize activities that are likely to significantly affect the environment, the environmental effects of those activities should be taken fully into account.
2. To promote the implementation of appropriate procedures in all countries consistent with national laws and decision-making processes, through which the foregoing goal may be realized.
3. To encourage the development of reciprocal procedures for information exchange, notification and consultation between States when proposed activities are likely to have significant transboundary effects on the environment of those States.

### PRINCIPLES

#### Principle 1

States (including their competent authorities) should not undertake or authorize activities without prior consideration, at an early stage, of their environmental effects. Where the extent, nature or location of a proposed activity is such that it is likely to significantly affect the environment, a comprehensive environmental impact assessment (EIA) should be undertaken in accordance with the following principles.

#### Principle 2

The criteria and procedures for determining whether an activity is likely to significantly affect the environment and is therefore subject to an EIA, should be defined clearly by legislation, regulation, or other means, so that subject activities can be quickly and surely identified, and EIA can be applied as the activity is being planned.

For instance, this principle may be implemented through a variety of mechanisms, including:

- (a) list of categories of activities that by their nature are, or are not, likely to have significant effects;
- (b) lists of areas that are of special importance or sensitivity (such as national parks or wetland areas), so that any activity affecting such areas is likely to have significant effects;

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\*In the context of the identified goals and principles an assessment of the impact of a planned activity on the environment is referred to as an environmental impact assessment.

- (c) lists of categories of resources (such as water, tropical rain forests, etc.), or environmental problems (such as increased soil erosion, desertification, deforestation) which are of special concern, so that any diminution of such resources or exacerbation of such problems is likely to be "significant";
- (d) an "initial environmental evaluation", a quick and informal assessment of the proposed activity to determine whether its effects are likely to be significant;
- (e) criteria to guide determinations whether the effects of a proposed activity are likely to be significant.

If a listing system is used, it is recommended that states reserve the discretion to require the preparation of an EIA on an *ad hoc* basis, to ensure that they have the flexibility needed to respond to unanticipated cases;

### **Principle 3**

In the EIA process the relevant significant environmental issues should be identified and studied. Where appropriate, all efforts should be made to identify these issues at an early stage in the process.

### **Principle 4**

An EIA should include, at a minimum:

- (a) a description of the proposed activity;
- (b) a description of the potentially affected environment, including specific information necessary for identifying and assessing the environmental effects of the proposed activity;
- (c) a description of practical alternatives, as appropriate;
- (d) an assessment of the likely or potential environmental impacts of the proposed activity and alternatives, including the direct, indirect, cumulative, short-term and long-term effects.
- (e) an identification and description of measures available to mitigate adverse environmental impacts of the proposed activity and alternatives, and an assessment of those measures;
- (f) an indication of gaps in knowledge and uncertainties which may be encountered in compiling the required information;
- (g) an indication of whether the environment of any other state or areas beyond national jurisdiction is likely to be affected by the proposed activity or alternatives;
- (h) a brief, non-technical summary of the information provided under the above headings.

### **Principle 5**

The environmental effects in an EIA should be assessed with a degree of detail commensurate with their likely environmental significance.

### **Principle 6**

The information provided as part of EIA should be examined impartially prior to the decision.

### **Principle 7**

Before a decision is made on an activity, government agencies, members of the public, experts in relevant disciplines and interested groups should be allowed appropriate opportunity to comment on the EIA.

**Principle 8**

A decision as to whether a proposed activity should be authorized or undertaken should not be taken until an appropriate period has elapsed to consider comments pursuant to principles 7 and 12.

**Principle 9**

The decision on any proposed activity subject to an EIA should be in writing, state the reasons therefore and include the provisions, if any, to prevent, reduce or mitigate damage to the environment. This decision should be made available to interested persons or groups.

**Principle 10**

Where it is justified, following a decision on an activity which has been subject to an EIA, the activity and its effects on the environment or the provisions (pursuant to principle 9) of the decision on this activity should be subject to appropriate supervision.

**Principle 11**

States should endeavour to conclude bilateral, regional or multilateral arrangements, as appropriate, so as to provide, on the basis of reciprocity, notification, exchange of information, and agreed-upon consultation on the potential environmental effects of activities under their control or jurisdiction which are likely to significantly affect other States or areas beyond national jurisdiction.

**Principle 12**

When information provided as part of an EIA indicates that the environment within another State is likely to be significantly affected by a proposed activity, the State in which the activity is being planned should, to the extent possible:

- (a) notify the potentially affected State of the proposed activity;
- (b) transmit to the potentially affected State any relevant information from the EIA, the transmission of which is not prohibited by national laws or regulations; and
- (c) when it is agreed between the States concerned, enter into timely consultations.

**Principle 13**

Appropriate measures should be established to ensure implementation of EIA procedures.

### 3. SUGGESTED PROCEDURE FOR EIA

The goals and principles contained in section 2 of this document are general in nature and can lead to all types of EIAs. However, they are insufficient for practical application unless they are supplemented with specific methodology describing the procedures and guidelines which could be used in applying the EIA process.

Sections 3 and 4 of this document contain the description of the methodology advocated for carrying out EIAs in the context of regional agreements on the protection of the marine environment adopted in support of UNEP's Regional Seas Programme.

#### Introduction

An EIA consists not only of a written report (i.e. the EIA document) through which information is provided to the decision makers, but also procedural provisions ensuring that the decision makers take the information into consideration. Therefore, a successful EIA procedure should contain all those elements which may be necessary for decision makers in order to "ensure that all relevant impacts associated with proposed projects are adequately and fully taken into account in the decision-making process" <sup>18/</sup>.

An EIA should be viewed as an integral part of the project planning process, beginning as early as possible with identification of the potentially significant environmental impacts, continuing throughout the planning cycle and including, as much as possible, public participation.

#### Definition of terms

*Applicant:* A person, company or organization applying for permission to carry out a project, plan or activity which may have an environmental impact.

*Authorization:* Permission to carry out a project, plan or activity which may have an environmental impact.

*Authorizing Authority (A.A.):* The national authority legally authorized for issuing authorization for carrying out the project proposed by the applicant.

*Environmental Authority (E.A.):* The national authority in charge of environmental management and protection. The Environmental Authority could be independent from, but could be also part (branch) of or even identical with the Authorizing Authority.

*Environmental Impact:* Effects on the environment caused by man.

*Environmental Impact Assessment (EIA):* A process for the assessment of the nature, magnitude and persistence of the effects on the environment which might be caused by the proposal of the applicant, including a programme of subsequent monitoring of these effects and a mechanism for reassessment of conditions under which the issued authorization may have to be modified.

*Environmental Impact Assessment Document:* A document prepared on request of the Environmental Authority as part of the documentation considered by the Authorizing Authority at the approval of a project or activity.

*Environmental Protection Measures:* Any action taken in order to minimize, mitigate or eliminate the damage or risk of damage to the environment.

*General Guidelines:* Set of generic issues, specific for various types of projects, with which the applicant, or the organization entrusted with the EIA should deal in the preparation of the EIA document. They are prescribed by the Environmental Authority and are used as the basis for preparation of Specific Guidelines.

*Specific Guidelines:* Set of specific issues, based on General Guidelines, with which the applicant, or the organization entrusted with the EIA, should deal in preparing the EIA document for the concrete proposal submitted by the applicant.

*Contamination:* Introduction by man into the environment of substances or energy that will lead to changes in ambient levels or concentrations.

*Pollution:* Adverse environmental effects resulting from the introduction by man into the environment of substances or energy.

*Marine Pollution:* "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 sea water and reduction of amenities" (as defined by GESAMP).

### **Steps in applying the EIA process** (see simplified flow chart on page 10)

- (a) Request for authorization to carry out a project or activity submitted to the Authorizing Authority.

The request for authorization for carrying out a project or activity should be prepared by the applicant according to formal requirements prescribed by national legislation and submitted to the Authorizing Authority. The request may contain a section indicating a preliminary estimate of the potential environmental impact of the project.

If the Authorizing Authority considers the proposed project or activity as unsuitable in principle, it informs the applicant that the request is rejected. If the proposal is considered as suitable in principle, the Authorizing Agency proceeds with consideration of the need for EIA.

- (b) Need for an EIA considered by the Authorizing Authority and the Environmental Authority.

If the proposed type of project (activity) requires an EIA by the provisions of national legislation, the preparation of an EIA document is mandatory. If such provisions do not exist, the Authorizing Authority should consult with the Environmental Authority as to whether or not an EIA is needed for the decision-making process. The Environmental Authority should determine whether an activity is likely to affect significantly the environment and is therefore subject to an EIA procedure (see principle 2 in Section 2). If there is no need for an EIA, the Authorizing Authority will proceed with the decision-making process and will determine, without an EIA document, whether or not to approve the project.

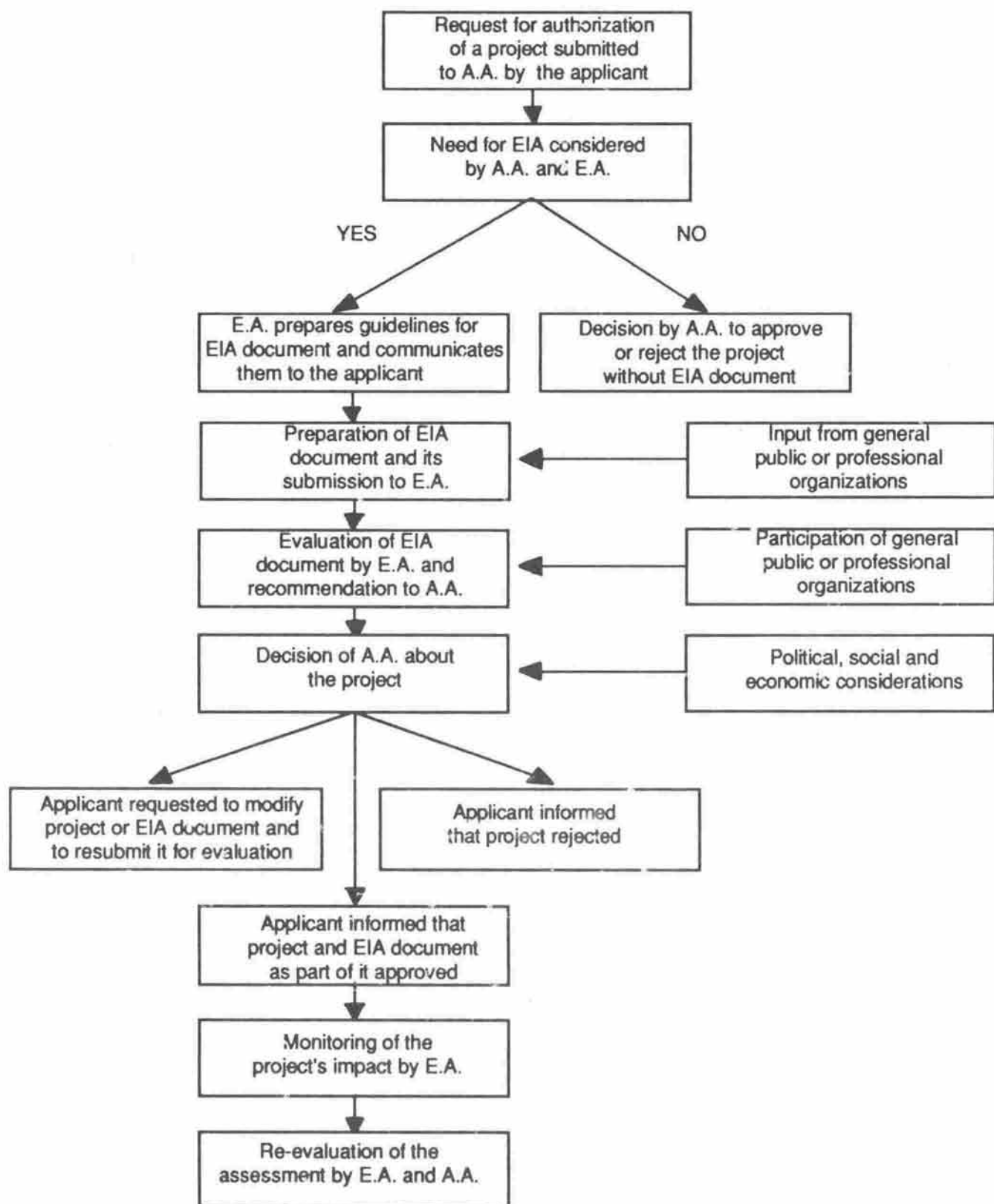
- (c) The Environmental Authority prepares guidelines for the EIA document and submits them to the applicant.

If an EIA is required by the provisions of the national legislation, or if the Authorizing Authority decides that an EIA is needed, on the basis of general guidelines, the Environmental Authority will prepare, with involvement of the applicant, specific guidelines for the EIA document. The guidelines should be submitted in writing to the applicant or the organization charged with the preparation of the document. This is done in order to ensure that the EIA document includes all information specifically relevant to the proposed project. The inclusion of irrelevant issues in the specific guidelines should be carefully avoided.

- (d) Applicant (or an appropriate organization) prepares the EIA document and submits it to the Environmental Authority.

Unless it is contrary to the provisions of the national legislation it is suggested that the applicant should be made responsible for the preparation of the EIA document, at his own cost. This would ensure that the environmental implications are fully recognized and taken into account in the planning of the project's implementation, and as early as possible in the decision-making process.

## SIMPLIFIED FLOW CHART FOR THE EIA PROCEDURE



A.A. = Authorizing Authority  
 E.A. = Environmental Authority



During the preparation of the EIA document the applicant (or the organization preparing the EIA document) should be encouraged to be in contact with the Environmental Authority as well as with the potential "end-users" of the project in order to ensure that the EIA document fully meets the requirements of the Environmental Authority and satisfies the "end-users". The document should refer to these consultations and to the inputs received from various sources.

The completed EIA document is submitted to the Environmental Authority for evaluation.

The EIA document should be considered as a public document and should be accessible to the general public.

- (e) Evaluation of the EIA document by the Environmental Authority and recommendation to Authorizing Authority.

The Environmental Authority evaluates the received EIA document and solicits the involvement of professional organizations and general public in this process, particularly those who are likely to be affected. The results of the evaluation and the recommendation of the Environmental Authority are transmitted, together with the EIA document, to the Authorizing Authority. The recommendation could be

- to approve the EIA document and the project as it was submitted;
- to reject the project on the basis of the information contained in the EIA document; or
- to ask for modifications of either the EIA document or the proposed project.

- (f) Decision of the Authorizing Authority.

The Authorizing Authority will decide whether to accept the recommendation of the Environmental Authority, taking also into account broader political, social and economic considerations.

The EIA document, if approved, should be considered as part of the proposed project and not as a separate entity. Once the EIA document has been approved, it should be binding in the same way as all the other project documents.

- (g) Monitoring of impact of the project by Environmental Authority.

Every EIA document will be largely based on predictions, and the validity of these predictions needs to be verified during the operation of the project. Therefore, a follow-up monitoring programme and re-evaluation of the assessment is necessary as an integral part of the EIA process. The components of such a monitoring programme should be specified by the Environmental Authority when recommending approval of the EIA document to the Authorizing Authority. The programme may involve lists of parameters which should be checked at specific intervals and locations. The monitoring could be required from the applicant as a condition of the issued authorization. The data from the monitoring programme should be submitted to and evaluated by the Environmental Authority and the Authorizing Authority.

- (h) Re-evaluation of the assessment by Environmental Authority and Authorizing Authority.

When issuing the authorization, the Authorizing Authority should specify a time frame for the re-evaluation of the authorization based on data from the follow-up monitoring programme. This re-evaluation should be done in consultation with the Environmental Authority, should be documented very carefully and could lead to the reassessment of conditions under which the project or plan could continue operating. The results of the re-evaluation should be used both by the Environmental Authority and the Authorizing Authority in future decisions regarding similar projects.

#### **General comments**

Early planning is the key to development without unacceptable changes in the natural environment. If environmental concerns are considered concurrently with technical and economical planning of a major

project, and precautions are applied from the outset of the planning process and through all phases of the project's development, it may very well be possible to develop a project and at the same time protect the natural resources of an area. An EIA document will help the decision maker with his task by providing, at an early stage of the decision-making process, a statement identifying, describing and evaluating the likely consequences to the environment of a proposed programme of action. Furthermore, the EIA document will support efforts aimed at preventing or reducing environmental damage in the short and long term. Thus EIAs provide insight into the nature of the options and trade-offs open to the decision maker. At the very least, EIAs are useful reminders of the environmental consequences resulting from various actions; at best, EIAs provide quantitative estimates of the magnitudes of these consequences and of the costs of subsequent remedial actions.

Although it is desirable for the preparation of the EIA document to be entrusted to the applicant, in cases where the data available for the preparation of the document is lacking, or the applicant clearly lacks adequate capabilities ensuring a satisfactory EIA document, it is preferable to engage, at the expense of the applicant, an organization which is competent in this type of work.

It is better to prepare an EIA document based on partial or incomplete information than not to prepare one at all. The applicant or the organization which prepares the document should use, as much as possible, existing information or analogous information from similar cases. One should always remember that an EIA process (including the EIA document) is only one method or tool among many to be used in the decision-making process, and should not be used exclusively.

In most cases a synoptic analysis, based on existing information, will usually be sufficient. However, if the planned project is extensive, and particularly if it involves considerable risks to the environment, it is usually necessary to carry out some type of field study in order to assess the background situation. This may also be needed if the local environment, for some reason, is particularly vulnerable or sensitive. Data generated through the EIA process should be compiled and compared with existing data from similar cases elsewhere.

The EIA document should assess possible impacts (type and degree), and the use of technical solutions, such as production technology, anti-pollution measures, etc. Based on this assessment, the proposed action may have to be revised and changed to an alternative which will cause less impact on the environment.

The project proponent (applicant), technical experts, government departmental experts and representatives of concerned community should participate and interact from the stage of scoping of the EIA process. This should help ensure that the resultant assessment will be "cost-effective" and "practical". This is so because it is from the stage of scoping that the information on previous EIAs made in similar circumstances for comparable projects and activities can begin to be drawn upon.

#### 4. GENERAL GUIDELINES FOR PREPARATION OF EIA DOCUMENTS FOR SELECTED TYPES OF DEVELOPMENT PROJECTS

As indicated in Section 3 of this document, the Environmental Authority of each country is expected to develop general guidelines for preparation of EIA documents suitable for various types of development projects. They should be used as the basis of specific guidelines for the preparation of EIA documents required for concrete plans, projects or activities submitted for approval to the Authorizing Authority.

Examples of five general guidelines are given in this section of the document. Three of them have been actually used <sup>1/</sup>, <sup>2/</sup>, <sup>3/</sup> in testing the approach to EIA process advocated in this document.

It is useful to preface the guidelines with a short description highlighting the causes of the main environmental problems which may be encountered by the execution of the proposed project or activity. Such a description would assist the Authorizing Authority and the person or organization preparing the EIA document in focusing on the main issues on which the document should concentrate and on the essential elements which should be included in the follow-up monitoring and re-evaluation programme.

In preparing the specific guidelines some elements of the general guidelines could be omitted (if they are not relevant for the concrete proposal) or modified (i.e. tailored to the specific characteristics of the proposal submitted by the applicant or to the specific characteristics of the proposed site). In order to ensure that the EIA document becomes a concise and easily usable document, the specific guidelines should avoid asking for a large volume of information which may be only of marginal relevance in the decision-making process.

##### 4.1 GENERAL GUIDELINES FOR PREPARATION OF AN ENVIRONMENTAL IMPACT ASSESSMENT DOCUMENT FOR A MARINA

###### Basic considerations

Marinas are constructed to offer safe shelter and berth for pleasure boats. Duration of stay of boats varies from one night to a longer stay, particularly during the winter period. A well organized marina complements the touristic potential of the area and is an important source of income and place of employment for the local community.

A properly constructed and organized marina should offer all the basic facilities needed by the users of the marina, such as: supply of drinking water, electricity and fuel; sanitary and recreational facilities; reception facilities for sanitary waste and garbage generated on boats; telecommunication, postal, health, customs, police and boat maintenance and repair services; restaurants and shops.

The main environmental problems associated with the construction and operation of marinas are:

- alteration of the physical environment; marinas are most frequently constructed in sheltered bays which may be rare and of special ecological importance; piers and boats associated with marinas may alter significantly the system of sea currents and sedimentation pattern;
- pollution generated by the operation of the marinas and the associated infrastructures typically include: sewage, garbage and spilt fuel and lubricants from the pleasure boats; antifouling agents used in the paints of the hulls; pollution from the infrastructure associated with marinas depending on the nature of the infrastructure;
- the main ecological effects of an improperly constructed and operated marina may be extensive growth of planktonic and attached algae which may not be restricted only to the marina; spilt oil and fuel as well as elevated levels of intestinal and pathogenic microorganisms which may affect the quality of bathing and shellfish-growing waters in the vicinity of the marina;
- increased sea traffic which may affect the marine life (fish, seals) and safety of bathers;

- impact on the social environment: visual and landscape impact, noise, disturbance to public access, increased traffic and parking problems, loss of sea surface for fishing, boating, swimming and other recreational activities.

The waters of the marina as well as the bathing and shellfish-growing waters which may be affected by the marina should comply with existing national standards and internationally accepted environmental quality criteria.

Examples of measures to prevent, reduce or mitigate the environmental impact:

- sediments: frequency of periodic dredging or harbour maintenance;
- pollution: construction of sanitary systems; de-oiling tanks for parking lots; equipment for recovery of spent oil; limitation of use of certain boat paints and detergents; equipment for waste collection and clearing of floating waste; collection of effluents from ship repair docks;
- landscape: development of green zones between the marina and natural environment; selection of fitting rock quality and colour for jetties; use of high quality architecture;
- legal: creation of protected zones; local regulations safeguarding the environmental quality;
- financial: arrangements for compensation in case of damage caused by the construction or operation of the marina;
- information and public awareness.

Elements specifically recommended for inclusion in the follow-up monitoring and re-evaluation programme are: microbiological indicators; oil, lead, copper and organotin compounds; solid waste (litter).

#### **Description of the proposed project**

The proposed plan of the marina should be described including the following:

- General description of the entire project including location and structure of main and lee breakwaters, depth of water at the entrance to the marina, the number and type of boats for which the marina is planned, water and power supply, roads, dry docks, boat maintenance and repair facilities, slipways, housing units, hotel accommodation, restaurants, commercial areas, parking, etc.
- Access for vehicles, boats and parking.
- Breakwaters, jetties, bridges, causeways, reclaimed land, and dredged channels.
- Sources of construction material for breakwaters, and means of their transport to the construction site.
- All areas to be dredged and the quantity and quality of the dredged material. The area where the dredged material is to be disposed.
- All areas to be reclaimed. Source of reclamation material.
- Drainage and sewage systems, solid waste disposal system and fuel supply to boats.
- Expected quantity of sanitary waste and the means for its disposal both on land and on sea.
- Description of the proposed stages of construction with timetable.
- Description of the expected normal operation of the marina such as its maintenance and measures to ensure quality of the water.

- Description of built structures in relation to natural landscape.
- Expected movement of population during construction and operating periods.

### **Reasons for selecting the proposed site and the technologies**

The reasons for selecting the proposed site, including the short description of alternatives which have been considered, should be provided under this section.

### **Description of the environment**

A description of the environment of the site without the proposed marina in the form of maps and cross sections should include the following:

#### **(a) Physical site characteristics**

- An onshore topographic and offshore bathymetric map of the site and its surroundings, preferably at a scale of 1:5000 or 1:2500, covering at least 2 kilometers in each direction along the coast of the proposed site, and to an offshore water depth appropriate to the proposed project.
- In the case of a cliff shore, details of the base, face and head of the cliff and at least 50 meters inland from the cliff head.
- Details of any existing or proposed offshore structures within 5 kilometers of the proposed project.
- Cross sections every 250 meters along the shore, showing offshore water depth and topography.
- Physiographic features such as cliffs, terraces, beach rock, sand dunes, and a description of their level of stability and erosion.

#### **(b) Meteorological, hydrographic and hydrologic information**

- Wind velocity and intensity.
- The tidal conditions and the probability of extreme conditions.
- The wave climate and currents at the proposed site, including the probability of extreme conditions.
- Hydrologic conditions of natural or artificial water channels and outlets to the sea.
- Dissolved oxygen and nutrients concentration, and other parameters.

#### **(c) Sedimentological information**

- Longshore sand movement at the area proposed for development.
- Present on and offshore sand accumulation and sand loss, seasonal and over a period of time.
- Detailed information on the stability and erosion of coastal cliffs within 2 kilometers of the proposed site, based on aerial photographs over a period of time, and analyzed by cross section every 250 meters along the cliff shore.

#### **(d) Biological conditions**

- Identification on maps of onshore and offshore habitats.
- Identification of species which could be used as indicators of the condition of the ecosystem.

- Location of main components of the habitats, e.g. areas for feeding, refuge and reproduction, and areas important for migrating species.
  - Protected or rare species.
  - Fishing areas and species important to commercial fishing.
- (e) **Present land and sea uses on site and in surroundings**
- Location and size of nearby settlements.
  - Location and description of cultural properties.
  - Roads and patterns of vehicular access.
  - Existence of aquaculture: fish or shell fish farms, fisheries.
  - Existence of beaches used by swimmers in the immediate surroundings.
- (f) **Aesthetic values**
- (g) **Vulnerability to natural hazard**

#### **Identification of possible impacts**

An assessment of anticipated or forecasted positive or negative impacts, using accepted standards wherever possible, should be given, including the following:

- Topographic and bathymetric changes, and the occurrence of the changes during and after construction until stable conditions are resumed.
- Sand movements and where increased sand accumulation and coastal erosion is likely to occur.
- Oceanographic changes likely to occur over a period of some 10 years, including the location and risk of wave reflection on adjacent shores and the concentration of wave energy and currents which could endanger swimming or disturb fisheries.
- Risk of sea pollution inside and outside of marina by uncontrolled sewage, polluted surface runoff, oil and gasoline, paints and anti-fouling materials resulting in adverse environmental impacts such as change of dissolved oxygen and nutrients concentration and/or microbial pollution due to pollution and/or change in circulation patterns.
- Impacts on flora and fauna in the area likely to be effected by the proposed project, the risk of loss of a habitat, changes likely to occur in existing habitats and the possible creation of a new habitat, and the impact of barriers to movement on migrating species.
- Impacts on nearby present or proposed land and sea uses.
- Socio-cultural impacts.
- Visual impacts of construction on landscape.
- Impacts on fish and seafood production and safety.
- Impacts on the quality of bathing water and on the cleanliness of beach sand, if any.

Secondary impact of the proposed measures:

- Impact due to the proposed measures to reduce sand depletion and coastal erosion, with assessment of their impact on the surrounding environment.
- Combined effects with outside activities.
- Anticipated or foreseeable impacts on the areas outside of national jurisdiction.

#### **Proposed measures to prevent, reduce or mitigate the negative effects of the proposed marina**

This section should describe all measures - whether technical, legal, social, economic or other - to prevent, reduce or mitigate the negative effects of the proposed marina.

#### **Proposed programme for monitoring of the environmental impact of the project**

Measures to be used to monitor the effects on a long term basis, including the collection of data, the analyses of data, and the enforcement procedures which are available to ensure implementation of the measures.

### **4.2 GENERAL GUIDELINES FOR PREPARATION OF AN ENVIRONMENTAL IMPACT ASSESSMENT DOCUMENT FOR A TOURIST COMPLEX**

#### **Basic considerations**

Tourism has been a vigorously growing activity during the last decades, contributing considerably to the economic growth of many countries (job opportunities, use of local products, influx of foreign exchange, etc.). However, this growth, often inspired by short-term economic interests, has had in many cases a strong negative impact on the environment. Examples of that impact are over-exploitation of the environment's physical capabilities, including over-building; alteration of the aesthetic quality of the most valuable parts of the coastline, frequently leading to depreciation of the landscape; erosion of the traditional socio-economic and cultural values; pollution. The impact is highly dependent on the type of the tourism (high and medium class tourism, mass tourism, subsidized tourism on non-commercial conditions, camping, etc.).

The siting of a tourist complex should be considered in the context of already existing or planned activities in the wider area of the proposed site, as some of them may be incompatible or in direct conflict with the proposed complex and their cumulative impact on the environment should be carefully considered.

The layout of the complex and the siting of individual buildings and activities should take into account the maximum possible preservation and protection of existing beaches, coastal strips and other elements of high environmental value (e.g. forests, and even individual trees).

Pollution by sewage and solid waste (garbage) are, aside from landscape alterations, the most serious potential environmental problems associated with the construction and operation of tourist complexes. When sewage is proposed to be treated or disposed within the complex, particular account should be taken of the seasonal load, and the methods of treatment or disposal, and their reliability, should be carefully examined. If the use of treated sewage water is envisaged within the complex, it should strictly comply with existing national standards and internationally accepted environmental quality criteria. Special attention should be paid to the potential "overspill" of pollution generated by the complex to the recreational objects outside of the complex (beaches, marinas) and to the neighbouring aquaculture areas.

Elements specifically recommended for inclusion in the follow-up monitoring and re-evaluation programme are: regular compliance with methods approved for sewage treatment and disposal, for the use of treated sewage water, and for solid waste disposal within and outside of the complex; contamination of beaches and aquaculture areas in the vicinity of the complex by pollutants generated by the complex.

### **Description of the proposed project**

The proposed complex should be described, accompanied by plans, preferably on a scale of 1:2500, including the following:

- Types of overnight accommodation, number of beds, hotels, campsites, etc.
- Entertainment facilities, e.g. theatres, cinemas, nightclubs, discotheques, restaurants, bars.
- Intensive recreation activities, e.g. water sports, swimming pools, beaches, sports facilities.
- Extensive recreation activities, e.g. areas for walking/hiking, golf, mountain climbing.
- Associated development, e.g. commercial (shops), tourist agencies, cafes, restaurants.
- Circulation patterns and facilities for vehicles, pedestrians, heavy traffic and light traffic (e.g. cycle), including parking areas (number of vehicles).
- Infrastructure, including facilities for sewage and solid waste disposal, water and electricity supplies.
- Changes to surface topography, including locations and levels of cuttings, terraces, fills and embankments.
- Location, height and volume of buildings, and types of building materials.
- Location, height and volume of other built structures, e.g. retaining walls, lookout towers, sport facilities, marine structures.
- Location and surface of areas to be covered by asphalt or other artificial surfaces.
- Sources of construction materials.
- Areas to be protected in their natural state, types of landscape and methods of protection.
- Areas to be landscaped for recreational activities.
- Areas to be landscaped after building construction.
- Present and anticipated demand for proposed facilities.
- Additional bodies of fresh water to result from the project, if any.
- Stages of construction of building facilities and infrastructure.
- Expected movement of population during construction and operating periods.

### **Reasons for selecting the proposed site and the technologies**

The reasons for selecting the proposed site, including the short description of alternatives which have been considered, should be provided under this section.



## **Description of the environment**

A description of the environment of the site without the proposed project should include the following:

### **(a) Physical site characteristics**

- Site location on a map at a scale of 1:10,000, including access roads, settlements, topography (contour) within 5 km radius.
- Slope and relative relief of site and its surroundings, viewpoints and sightlines.
- Physiographic features of the site and its surroundings, e.g. cliffs, dunes, water bodies, shore types, caves, waterfalls, springs.
- Geomorphological processes in area, e.g. cliff erosion, beach, recession, landslides.
- Seismic processes in area, e.g. earthquake risk.

### **(b) Vegetation and habitats**

- Vegetation and soil types, including height and density of vegetation cover.
- Location and type of areas and sites of attractive landscape.
- Location and type of areas and sites of sensitive and natural scientific importance.
- Location and rare species, flora and fauna.
- Marine habitats, fishing grounds, aquaculture sites.

### **(c) Climatological and meteorological conditions**

- Time and length of visitor season for different types of activities.
- Sources and impacts of air pollution which could affect the site's potential.

### **(d) Hydrological and oceanographic conditions**

- Location and type of surface water bodies on site and in surroundings and their potential for attracting visitor activity.
- Surface and subsurface water sources sensitive to pollution and present levels of water quality.
- Dissolved oxygen and nutrients concentration, microbial quality of coastal water and beaches.
- Suitability of sea conditions for recreation activities, including swimming and water sports.

### **(e) Present land uses on site and in surroundings**

- Location and size of nearby settlements.
- Roads and patterns of vehicular access.
- Present tourist and recreation land uses.
- Present protected areas, e.g. nature reserves.
- Land used for agriculture, forestry and horticulture production.

- Quarries, industries, power stations and engineering structures.

(f) **Present environmental quality of site and surroundings**

- Air quality.
- Water quality.
- Noise levels.

(g) **Present Infrastructure**

- Water and electricity supply.
- Sewage and solid waste disposal.
- Community amenities.

(h) **Present health conditions**

- Endemic diseases, if any, and zoonosis.
- Availability of medical care services.
- Presence of insect vectors of diseases.

**Identification of possible impacts**

An assessment of anticipated or forecasted positive or negative impacts, using accepted standards whenever possible, should be given, including the following:

- Loss of natural features, habitats and species by construction and building.
- Intrusion into sensitive visual landscape.
- Visitor access to sensitive habitats.
- Landscape impacts of quarrying, cutting and embankments;
- Creation of new habitats.
- Risks of erosion, e.g. cliffs, shores.
- Loss of agricultural land and forested areas.
- Impacts on size and character of nearby settlements.
- Creation of potential for further development, e.g. along new road or electricity line.
- Loss or creation of public open space.
- Changes of present drainage patterns.
- Pressure on present or proposed sewage treatment facilities during peak visitor period.
- Capacity of water and electricity services and waste disposal.
- Air pollution, including dust from construction and pollution from vehicles.

- Noise during construction and different types of activities proposed on nearby residential areas and on sensitive habitats.
- Water and sea pollution.
- Loss of fishing grounds and impact on aquaculture sites.
- Anticipated or foreseeable impacts on the areas outside of national jurisdiction.

**Proposed measures to prevent, reduce or mitigate the negative effects of the proposed tourist accommodation complex**

This section should describe all measures - whether technical, legal social, economic or other - to prevent, reduce or mitigate the negative effects of the proposed tourist accommodation complex.

**Proposed programme for monitoring of the environmental impact of the project**

Measures to be used to monitor the effects on a long term basis, including the collection of data, the analysis of data, and the enforcement procedures which are available to ensure implementation of the measures.

**4.3 GENERAL GUIDELINES FOR PREPARATION OF AN ENVIRONMENTAL IMPACT ASSESSMENT DOCUMENT FOR A SEWAGE TREATMENT PLANT FOR A CITY WITH BETWEEN 100,000 AND 1.000.000 INHABITANTS**

**Basic considerations**

Sewage treatment plants are constructed to transform the raw sewage into an easier manageable waste and to retrieve and reuse the treated sewage water.

The end products of a treatment plant are sludge and treated sewage water. Both products may contain, in addition to organic biodegradable substances and microorganisms, non-biodegradable and toxic substances due to the contamination of sewage with industrial waste waters.

From the environmental standpoint the most important aspect of a sewage treatment plant is the proposed disposal or use of the sludge and the treated sewage water.

The most common adverse environmental effects on coastal waters, connected with disposal or use of the sludge and the treated sewage water, are caused by: microbiological contamination, oxygen depletion due to high load of organic faecal matter, eutrophication caused by nutrients, and toxic and non-biodegradable substances originating mainly from contamination of sewage by industrial wastes.

Some treatment processes (e.g. oxydation ponds, aerated lagoons) may lead, under the influence of wind, to the spread of pathogens through air transport over considerable distances.

Most sewage treatment and disposal processes are a serious source of offensive odour.

Improperly constructed or operated sewage treatment plants and improper disposal or use of sludge and treated sewage water may become a most serious public health problem. Therefore, whatever level of treatment and method of disposal and use is approved, it should strictly comply with national standards and internationally accepted environmental quality criteria, taking into account the recipient environment and the biological targets which may be affected, specifically man.

Elements specifically recommended for inclusion in the follow-up monitoring and re-evaluation programme are: regular compliance with methods approved for sewage treatment and disposal, including for use of treated sewage water; seepage of contaminants from the treatment plants or sludge disposal sites into

freshwater aquifers or coastal waters; wind transport of pathogens originating from the treatment plant or sludge disposal site; elements recommended for monitoring of submarine sewerage outfalls (see section 4.5) if such an outfall is part of the project.

### **Description of the proposed project**

The proposed treatment plant should be described, accompanied by plans, preferably on a scale of 1:2500, including the following:

- Types of sewage to be treated (industrial, domestic, agricultural).
- Number of inhabitants to be served by the plant.
- Types of clients to be served, e.g. industrial, residential, commercial, hospitals.
- Quantity of sewage (cubic meters per day, per year).
- Quality of sewage to be treated, including suspended solids (mg/litre), settleable solids (mg/litre), pH, turbidity, conductivity, BOD (mg/litre), COD (mg/litre), nitrogen, ammonia, phosphate, oil, surfactants, and heavy metals such as arsenic, cadmium, copper, lead, nickel and mercury.
- Method to be used in treatment of sewage.
- Layout of the plant (including treatment facilities and service area).
- Use of effluents (agriculture, recharging aquifer, disposal to sea or to nearest river).
- Description of the plant's recipient body of water, if any.
- Sludge quantity and quality.
- Method of sludge treatment and disposal.
- Chemical, physical and bacteriological characteristics of effluents such as suspended solids, settleable solids, pH, turbidity, conductivity, BOD, COD, nitrogen, ammonia, phosphate, oil, surfactants, and heavy metals such as arsenic, cadmium, copper, lead, nickel and mercury, total coliforms, faecal coliforms and faecal streptococci.
- Programme for operation and maintenance of the sewage treatment plant.

### **Reasons for selecting the proposed site and the technologies**

The reasons for selecting the proposed site and the technology proposed to be applied, including the short description of alternatives which have been considered, should be provided under this section.

### **Description of the environment**

A description of the environment of the site without the proposed sewage treatment plant should concentrate on the immediate surroundings of the proposed project. The size of the area described will be determined by the predicted effects of the proposed plant.

#### **(a) Physical site characteristics**

- Site location on a map at a scale of 1:10,000 or 1:50,000 including residential areas, industrial areas and access roads.

(b) **Climatological and meteorological conditions**

- Basic meteorological data such as wind direction and wind velocity.
- Special climatic conditions such as storms, inversions, trapping and fumigation, proximity to seashore, average yearly rainfall and number of rainy days per year.
- Existing sources of air pollution, especially of particulates and odours.

(c) **Geological and hydrological conditions**

- Geological structure of proposed area, including hydrology and aquifers.
- Existing uses of water bodies around the proposed site and the quality of the water.

(d) **Present land use of the site and its surroundings**

(e) **Characteristics of sea area which will be recipient of discharged treated sewage**

- Sea circulation, existence and characteristics of the thermocline, thermohaline structure, dissolved oxygen and nutrients concentration, microbial pollution, fishing grounds, aquaculture sites, marine habitats.

(f) **Existence of endemic water borne diseases**

**Identification of possible impacts**

An assessment of anticipated or forecasted positive or negative impacts, using accepted standards whenever possible, of short term impacts associated with the activities related to the construction of the plant and long term impacts related to the functioning of the treatment plant should be given, including the following:

- Odours and air pollution from the plant and from the disposal of effluents and sludge.
- Infiltration of sewage into topsoil, aquifer or water supply and impact on drinking water quality.
- Mosquito breeding and diseases transmitted by mosquitoes.
- Pollution of water bodies such as rivers, lakes or sea by effluents and impact on bathing water quality.
- Flora and fauna.
- Fruit and vegetable safety, if land disposal of effluent or sludge.
- Noise levels around plant and its sources.
- Solid waste disposal of sludge and other wastes.
- Devaluation of property values.
- Tourist and recreation areas such as nature reserves, forests, parks, monuments, sport centers, beaches, and other open areas which would be impacted.
- Possible emergencies and plant failure, the frequency at which they may occur, and possible consequences of such emergencies.
- Anticipated or foreseeable impacts on the areas outside of national jurisdiction.

### **Proposed measures to prevent, reduce or mitigate the negative effects of the proposed plant**

This section should describe all measures - whether technical, legal, social, economic or other - to prevent, reduce or mitigate the negative effects of the proposed sewage treatment plant.

### **Proposed programme for monitoring of the environmental impact of the project**

Measures to be used to monitor the effects on a long term basis, including the collection of data, the analysis of data, and the enforcement procedures which are available to ensure implementation of the measures.

## **4.4 GENERAL GUIDELINES FOR PREPARATION OF AN ENVIRONMENTAL IMPACT ASSESSMENT DOCUMENT FOR A SEWAGE TREATMENT PLANT FOR A CITY WITH BETWEEN 10,000 AND 100,000 INHABITANTS**

### **Basic considerations**

The basic considerations to be taken into account are identical with those described in Section 4.3.

### **Description of the proposed project**

The proposed treatment plant should be described, accompanied by plans, preferably on a scale of 1:2500, including the following:

- Types of sewage to be treated (industrial, domestic, agricultural)
- Number of inhabitants to be served by the plant.
- Types of clients to be served, e.g. industrial, residential, commercial, hospitals.
- Quantity of sewage (cubic meters per day, per year).
- Quality of sewage to be treated, including suspended solids (mg/litre), settleable solids (mg/litre), pH, turbidity, conductivity, BOD (mg/litre), COD (mg/litre), nitrogen and oil.
- Method to be used in treatment of sewage.
- Layout of the plant (including treatment facilities and service area).
- Use of effluents (agricultural, recharging aquifer, disposal to sea or to nearest river).
- Description of the plant's recipient body of water, if any.
- Sludge quantity and quality.
- Method of sludge treatment and disposal.
- Chemical, physical and bacteriological characteristics of effluents such as suspended solids, settleable solids, pH, turbidity, BOD, COD, nitrogen and oil.
- Programme for operation and maintenance of the sewage treatment plant.

## **Reasons for selecting the proposed site and the technologies**

The reasons for selecting the proposed site and the technology proposed to be applied, including the short description of alternatives which have been considered, should be provided under this section.

### **Description of the environment**

A description of the environment of the site without the proposed sewage treatment plant should concentrate on the immediate surroundings of the proposed project. The size of the area described will be determined by the predicted effects of the proposed plant.

#### **(a) Physical site characteristics**

- Site location on a map at a scale of 1:10,000 including residential areas, industrial areas and access roads.

#### **(b) Climatological and meteorological conditions**

- Basic meteorological data such as wind direction and wind velocity.
- Special climatic conditions such as storms, inversions, trapping and fumigation, proximity to seashore, average yearly rainfall and number of rainy days per year;
- Existing sources of air pollution, especially of particulates and odours.

#### **(c) Geological and hydrological conditions**

- Geological structure of proposed area, including hydrology and aquifers.
- Existing uses of water bodies around the proposed site and the quality of the water.

#### **(d) Present land use of the site and its surroundings**

#### **(e) Characteristics of sea area which will be recipient of discharged treated sewage**

- Sea circulation, existence and characteristics of the thermocline, thermohaline structure, dissolved oxygen and nutrients concentration, microbial pollution, fishing grounds, aquaculture sites, marine habitats.

#### **(f) Existence of endemic water borne diseases**

### **Identification of possible impacts**

An assessment of anticipated or forecasted positive or negative impacts, using accepted standards whenever possible, of long term impacts related to the functioning of the treatment plant should be given, including the following:

- Odours and air pollution from the plant and from the disposal of effluents and sludge.
- Infiltration of sewage into topsoil, aquifer or water supply and impact on drinking water quality.
- Mosquito breeding and diseases transmitted by mosquitoes.
- Pollution of water bodies such as rivers, lakes or sea by effluents and impact on bathing water quality.
- Flora and fauna.
- Fruit and vegetable safety, if land disposal of effluent or sludge.

- Solid waste disposal of sludge and other wastes.
- Tourist and recreation areas such as nature reserves, forests, parks, monuments, sport centers, beaches, and other open areas which would be impacted.
- Possible emergencies and plant failure, the frequency at which they may occur, and possible consequences of such emergencies.
- Anticipated or foreseeable impacts on the areas outside of national jurisdiction.

#### **Proposed measures to prevent, reduce or mitigate the negative effects of the proposed plant**

This section should describe all measures - whether technical, legal, social, economic or other - to prevent, reduce or mitigate the negative effects of the proposed sewage treatment plant.

#### **Proposed programme for monitoring the environmental impact of the project**

Measures to be used to monitor the effects on a long term basis, including the collection of data, the analysis of data, and the enforcement procedures which are available to ensure implementation of the measures.

### **4.5 GENERAL GUIDELINES FOR PREPARATION OF AN ENVIRONMENTAL IMPACT ASSESSMENT DOCUMENT FOR SUBMARINE SEWERAGE OUTFALL OF A CITY OF UP TO 100,000 INHABITANTS**

#### **Basic considerations**

Until fairly recently, the sea was taken for granted as a convenient natural disposal ground for sewage without a serious thought being given to how much sewage it could reasonably accept. However, with growing interest in environmental problems came the realization that there is in fact a limit to the sea's capacity to accommodate sewage and other pollutants and that adequately treated sewage water is an important resource which can be used for many purposes.

Although alternatives are available for disposal of sewage, a sew outfall is sometimes the only feasible solution.

In designing the sea outfall prime consideration should be given to the selection of the discharge site and point which will ensure that the discharged effluents from the sewerage system will have a maximally reduced impact on the environment. The selection of the discharge site and point should specifically take into account: the volume and nature of the effluents; the hydrodynamic characteristics of the discharge site and point which could ensure the desired dispersal of the effluents; and the targets which would have to be protected (e.g. ecosystems, recreational areas, etc.). The combined effect of the most critical pollution situation on the most sensitive target should be the limiting factor in determining the suitable site for the outfall and for its discharge point.

The main direct environmental consequence of a sewerage outfall is the contamination of the recipient waters with raw faecal material (in case of untreated or inadequately treated sewage), intestinal microorganisms (including pathogens), nutrients and other oxygen consuming substances. Secondary consequences may include: reduced quality of recreational coastal waters and waters used for aquaculture; oxygen depletion and eutrophication of recipient waters, including excessive algal blooms and fish kills in extreme situations; alterations of the marine and coastal ecosystems in the vicinity of the discharge site; spread of pathogens by wind. Sewage is frequently contaminated with industrial waste water which may contain various non-biodegradable and toxic contaminants. Depending on their nature and concentration these contaminants may have specific effects on the ecosystems of the recipient waters.



The construction and operation of a sea outfall should be authorized only if it can strictly comply with the national standards and internationally accepted environmental quality criteria, taking into account the recipient environment and the biological targets which may be affected, specifically man.

Elements specifically recommended for inclusion in the follow-up monitoring and re-evaluation programme are: compliance with methods approved for the operation and maintenance of the outfall; microbiological indicators of faecal pollution, nutrient levels, biological oxygen demand (BOD) and dissolved oxygen levels in recipient waters; microbiological indicators of faecal contamination in the recreational areas and areas used for aquaculture which may be affected by the discharges from the outfall. A comprehensive monitoring programme could further cover some biological parameters, such as phytoplankton counts in surface waters and diversity of benthofauna.

### **Description of the proposed project**

The proposed outfall should be described, including the following:

#### **(a) The outfall**

- Length of pipe of outfall, diameter, depth, pipe material.
- Pipe laying method: on seabed, buried in seabed.
- Method to control corrosion.
- Method to protect from trawls and anchoring.
- Diffuser length, orifices, configuration and diameter.
- Discharge velocity.
- Primary dilution, final dilution.
- Expected surface field: discolouration, direction of the plume.
- Programme for operation and maintenance of the outfall

#### **(b) The effluents**

- Effluent characteristics, e.g. quantity, degree of treatment, physical, chemical and bacteriological composition, seasonal variations;
- T90 measurements.

### **Reasons for selecting the proposed site and the technologies**

The reasons for selecting the proposed site and the technology proposed to be applied, including the short description of alternatives which have been considered, should be provided in this section.

### **Description of the environment**

A description of the environment of the site of the proposed outfall should include the following:

#### **(a) Physical site characteristics**

- An onshore topographic and offshore bathymetric map of the site and its surroundings, preferably at a scale of 1:5000 covering at least 2 kilometers of the coast and appropriate distance from waterline offshore and 200 meters from the waterline inland.

- Geological and geophysical conditions at outfall site including rock outcrops on and offshore, sedimentological conditions and cliff stability.

(b) **Hydrographic and meteorological Information**

- Surface and subsurface currents under various tidal, density and weather conditions.
- Current at depth of effluent disposal.
- Turbulence.
- Existence and characteristics of thermocline.
- Seawater temperature and salinity and their variation with depth.
- Wind velocities and intensity.
- Waves.
- Oxygen and nutrients concentration.
- Water colour and turbidity.

(c) **Biological conditions**

- Status of benthic communities on various bottom substrates.
- Microbial pollution.
- Plankton (including plankton bloom).

(d) **Present and future uses of sea and beach**

- Tourism, recreation, fishing, aquaculture.
- Shellfish breeding.

(e) **Ambient quality standards**

**Identification of possible impacts**

An assessment of anticipated or forecasted positive or negative impacts, using accepted standards whenever possible, should be given, including the following:

(a) **Impacts of construction from:**

- Earthworks.
- Road access.
- Noise of equipment.

(b) **Impacts of operation on:**

- Flora and fauna;
- Seawater temperature.

- Bacteria concentration.
  - Oxygen and nutrients concentration.
  - Water turbidity and colour.
- (c) **Impacts on other present and potential land uses on and offshore**
- Recreation activities, including bathing waters and sand beaches.
  - Fishing grounds, especially in relation to shellfish.
- (d) **Expected impacts on the reduction of enteric diseases**
- (e) **Anticipated or foreseeable impacts on the areas outside of national jurisdiction**

**Proposed measures to prevent, reduce or mitigate the negative effects of the proposed submarine sewer outfall**

This section should describe all measures - whether technical, legal, social, economic or other - to prevent, reduce or mitigate the negative effects of the proposed submarine sewer outfall.

**Proposed programme for monitoring the environmental impact of the project**

Measures to be used to monitor the effects on a long term basis, including the collection of data, the analysis of data, and the enforcement procedures which are available to ensure implementation of the measures.

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### Suggested further reading

- RRV: Council Directive of 27 June 1985 on the Assessment of the effects of certain public and private projects on the environment. Official Journal of the European Communities. No. L 175/40, 1985.

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## ANNEX I

### MAJOR PROVISIONS RELATED TO ENVIRONMENTAL IMPACT ASSESSMENT IN SELECTED INTERNATIONAL AGREEMENTS DEALING WITH THE PROTECTION OF THE MARINE ENVIRONMENT

#### UNITED NATIONS CONVENTION OF THE LAW OF THE SEA (Montego Bay, 1982)

##### *Article 204: Monitoring of the risk or effects of pollution*

1. States shall, consistent with the rights of other States, endeavour, as far as practicable, directly or through the competent international organizations, to observe, measure, evaluate and analyze, by recognized scientific methods, the risks or effects of pollution of the marine environment.
2. In particular, States shall keep under surveillance the effects of any activities which they permit or in which they engage in order to determine whether these activities are likely to pollute the marine environment.

##### *Article 206: Assessment of potential effects of activities*

When States have reasonable grounds for believing that planned activities under their jurisdiction or control may cause substantial pollution of or significant and harmful changes to the marine environment, they shall, as far as practicable, assess the potential effects of such activities on the marine environment and shall communicate reports of the results of such assessments in the manner provided in article 205.

#### CONVENTION FOR THE PROTECTION OF THE MEDITERRANEAN SEA AGAINST POLLUTION (Barcelona, 1976)

##### *Article 6 of the Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources*

Discharges shall be strictly subject to the issue, by the competent national authorities, of an authorization taking due account of the provisions of annex III to this Protocol.

##### *Annex III of the Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources*

With a view to the issue of an authorization ..... particular account will be taken, as the case may be of ..... potential impairment of marine ecosystems and sea-water uses.

##### *Paragraph 89 of the Report of the fourth meeting of Contracting Parties (Genoa, September 1985)*

The meeting stressed interest to develop suitable methodologies for environmental impact assessment.

##### *Declaration on the Second Mediterranean Decade adopted by the fourth meeting of Contracting Parties*

The following .... targets to be achieved as a matter of priority ....:

- applying environmental impact assessment as an important tool to ensure proper development authorities.

**CONVENTION FOR CO-OPERATION IN THE PROTECTION AND DEVELOPMENT OF THE  
MARINE AND COASTAL ENVIRONMENT OF THE WEST AND CENTRAL AFRICAN REGION  
(Abidjan, 1981)**

*Article 13: Environmental impact assessment*

1. As part of their environmental management policies, the Contracting Parties shall develop technical and other guidelines to assist the planning of their development projects in such a way as to minimize their harmful impact on the Convention area.
2. Each Contracting Party shall endeavour to include an assessment of the potential environmental effects in any planning activity entailing projects within its territory, particularly in the coastal areas, that may cause substantial pollution of, or significant and harmful changes to, the Convention area.
3. The Contracting Parties shall, in consultation with the Organization, develop procedures for the dissemination of information concerning the assessment of the activities referred to in paragraph 2 of this article.

**KUWAIT REGIONAL CONVENTION FOR CO-OPERATION IN THE PROTECTION OF  
THE MARINE ENVIRONMENT FROM POLLUTION  
(Kuwait, 1978)**

*Article XI: Environmental assessment*

- (a) Each Contracting State shall endeavour to include an assessment of the potential environmental effects in any planning activity entailing projects within its territory, particularly in the coastal areas, which may cause significant risks of pollution in the Sea Area.
- (b) The Contracting States may, in consultation with the secretariat, develop procedures for dissemination of information on the assessment of the activities referred to in paragraph (a) above.
- (c) The Contracting States undertake to develop, individually or jointly, technical and other guidelines in accordance with standard scientific practice to assist the planning of their development projects in such a way as to minimize their harmful impact on the marine environment. In this regard international standards may be used where appropriate.

**CONVENTION FOR THE PROTECTION AND DEVELOPMENT OF THE MARINE  
ENVIRONMENT OF THE WIDER CARIBBEAN REGION  
(Cartagena de Indias, 1983)**

*Article 12: Environmental impact assessment*

1. As part of their environmental management policies, the Contracting Parties undertake to develop technical and other guidelines to assist the planning of their major development projects in such a way as to prevent or minimize harmful impacts on the Convention area.
2. Each Contracting Party shall assess within its capabilities, or ensure the assessment of, the potential effects of such projects on the marine environment, particularly in coastal areas, so that appropriate measures may be taken to prevent any substantial pollution of, or significant and harmful changes to, the Convention area.
3. With respect to the assessments referred to in paragraph 2, each Contracting Party shall, with the assistance of the Organization when requested, develop procedures for the dissemination of information and may, where appropriate, invite other Contracting Parties which may be affected to consult with it and to submit comments.

**CONVENTION FOR THE PROTECTION OF THE MARINE ENVIRONMENT AND COASTAL  
AREA OF THE SOUTH-EAST PACIFIC  
(Lima, 1981)**

*Article 8: Environmental impact assessment*

1. As part of their environmental management policies, the High Contracting Parties shall develop technical and other guidelines to assist the planning of their development projects in such a way as to minimize their harmful impact in the sphere of application of the Convention.
2. Each High Contracting Party shall endeavour to include an assessment of the potential environmental effects in any planning activity entailing projects within its territory, particularly in the coastal areas, that may cause substantial pollution of, or significant and harmful changes to, the area of application of the Convention.
3. The High Contracting Parties shall, in co-operation with the Executive Secretariat, develop procedures for the dissemination of information concerning the assessment of the activities referred to in paragraph 2 of this article.

**REGIONAL CONVENTION FOR THE CONSERVATION OF THE RED SEA AND  
GULF OF ADEN ENVIRONMENT  
(Jeddah, 1982)**

*Article XI: Assessment and management of the environment*

1. Each Contracting Party shall give due consideration to marine environmental effects when planning or executing projects, including an assessment of potential environment effects, particularly in the coastal areas.
2. The Contracting Parties may, in consultation with the General Secretariat, develop procedures for dissemination of information on the assessment of the activities referred to in paragraph 1 of this article.
3. The Contracting Parties undertake to develop, individually or jointly, environmental standards, technical and other guidelines in accordance with standard scientific practice to assist the planning and execution of their projects in such a way as to minimize their harmful impact on the marine environment. In this regard international standards may be used where appropriate.

**CONVENTION FOR THE PROTECTION, MANAGEMENT AND DEVELOPMENT OF THE  
MARINE AND COASTAL ENVIRONMENT OF THE EASTERN AFRICAN REGION  
(Nairobi, 1985)**

*Article 13: Environmental impact assessment*

1. As part of their environmental management policies, the Contracting Parties shall, in co-operation with competent regional and international organizations if necessary, develop technical and other guidelines to assist the planning of their major development projects in such a way as to prevent or minimize harmful impacts on the Convention area.
2. Each Contracting Party shall assess, within its capabilities, the potential environmental effects of major projects which it has reasonable grounds to expect may cause substantial pollution of, or significant and harmful changes to, the Convention area.
3. With respect to the Assessments referred to in paragraph 2, the Contracting Parties shall, if appropriate in consultation with the Organization, develop procedures for the dissemination of information and, if necessary, for consultations among the Contracting Parties concerned.



**CONVENTION FOR THE PROTECTION OF THE NATURAL RESOURCES AND  
ENVIRONMENT OF THE SOUTH-PACIFIC REGION  
(Noumea, 1986)**

*Article 16: Environmental impact assessment*

1. The Parties agree to develop and maintain, with the assistance of competent global, regional and sub-regional organisations as requested, technical guidelines and legislation giving adequate emphasis to environmental and social factors to facilitate balanced development of their natural resources and planning of their major projects which might affect the marine environment in such a way as to prevent or minimize harmful impacts on the Convention Area.

2. Each Party shall, within its capabilities, assess the potential effects of such projects on the marine environment, so that appropriate measures can be taken to prevent any substantial pollution of, or significant and harmful changes within, the Convention Area.

3. With respect to the assessment referred to in paragraph 2, each Party shall, where appropriate, invite:

- (a) public comment according to its national procedures
- (b) other Parties that may be affected to consult with it and submit comments.

The results of these assessments shall be communicated to the Organisation, which shall make them available to interested Parties.

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