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Environmental impact assessment : a guide for application in Egypt

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ENVIRONMENTAL IMPACT ASSESSMENT
A GUIDE FOR APPLICATION
IN EGYPT

BY

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DECLARATION

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the university.

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ABSTRACT

Title of dissertation:

Environmental Impact Assessment
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The dissertation is a study of the Environmental Impact Assessment as a tool to provide information for decision making and how to apply it more efficiently.

A brief look is taken at the industries, which were constructed without any Environmental Impact Assessment procedures, and their adverse impacts on the environment are examined.

The Egyptian Environmental Impact Assessment legislation is investigated and compared with the Danish legislation to find out if is it a need to reform the Egyptian legislation, the results are collated and evaluated.

The cooperation between Denmark and Sweden in the implementation of the environmental impact assessment in the construction of the Öresund fixed link is taken as an example for application in Egypt. The construction of a container terminal in North Gulf of Suez after applying environmental impact assessment is examined.

The concluding chapter discusses the need to apply the environmental impact assessment on the existing polluting industries and before the construction of new ones. A number of recommendations are made concerning the need for regional cooperation and more general public participation in the environmental impact assessment procedures.

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LIST OF ABBREVIATIONS

BOD	Biological Oxygen Demand
B.O.O	Build, Own, Operate
B.O.T	Build, Operate, Transfer
CBA	Cost Benefit Analysis
EEAA	Egyptian Environmental Affairs Agency
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
GDP	Gross Domestic Product
MARPOL	The International Convention for the Prevention of Pollution from ships.
NGS	North Gulf of Suez
ÖSK	Öresundkonsortiet
SUMED	Suez-Mediterranean [pipeline]
U.N	United Nations
VTS	Vessel Traffic Services

Chapter 1

Introduction

1.1 Background to the study:

Egypt as a developing country tries to improve its economic performance and the standard of living of its citizens. For centuries Egypt was depending on the agriculture as the main economic activity as it has the fertile Nile delta and valley, suitable weather and adequate water for irrigation.

Agriculture alone was not enough to satisfy the society's daily requirements and to turn Egypt to a modern country. The planners started to introduce the industries, which depend on the agriculture products such as the textile industry, which depends on the famous Egyptian cotton. Later the decision-makers wanted to turn Egypt completely from an agriculture developing country to a fully industrialized developed country as fast as possible.

A large number of factories and industries were established all over Egypt with the aim to modernize the country through industry to improve the Egyptians standard of living as the industrial rate of growth is higher than the agriculture one.

The cheap labour force and the availability of the raw materials assisted in the spread of the national industrialization plan. The aim was to satisfy the society needs such as food, water and shelter but the society was not aware of the adverse impacts of the Industrial development projects on the environment. The development was the only priority at that time, with environmental cleanup later.

The question is not whether there should be continued economic growth. There must be. Nor is the question whether the impact on the environment must be respected. It has to be. Nor least of all is it a question of whether these two considerations are

interlocked. They are. The solution of the dilemma revolves clearly not about whether, but about how. (Robert McNamara, president of the World Bank, U.N conference on Human Environment, Stockholm, Sweden, 1972, quoted by Carpenter, 1981)

Environmental clean up later approach leaded to the society environmental suffering which did not only denoted the loss of special habitats, but also the adverse environmental impacts directly affected the society and were worse than the problem that the industries sets out to cure.

Also this approach was not cost effective because even if the benefits of the project far out weight the costs, the cleanup may can not be done later or its costs are higher than the mitigating measures included in the project.

Recently Egypt has a number of national development projects such as the development of North Gulf of Suez (NGS) which is an environmentally sensitive area and needs a well prepared development plan.

To mitigate the adverse environmental impacts of the existing polluting industries and to avoid any new adverse impacts from the new developing projects the Environmental Impact Assessment (EIA) approach to development must be implemented properly in two levels in parallel. The first level is to be implemented on the existing polluting industries to identify the sources of pollution and to introduce the suitable mitigating measures. The second level is to be implemented on the new development projects before the initiation of its establishment. Through the EIA implementation Egypt can protect its environment and resources for the present and future generations.

1.2 The aims and objectives of the study:

The environment in Egypt is still suffering from the adverse environmental impacts of the different polluting industries and activities constructed in the past without taking the environmental issue into consideration.

Also recently there are a lot of developing projects, which are in the planning stage and there is a need to implement the EIA efficiently to achieve a sustainable development programme to protect our environment.

Therefore the objectives of this dissertation are:

1. To demonstrate the importance of EIA application before the initiation of works for the projected industries and that the EIA approach to development permits decision making that is based on all the available information.

2. To identify the adverse environmental impacts resulted from the construction of many industries and activities without any EIA application.

3. To examine the present national legislation related to EIA and to compare it with that of the international regime to find out if there is a need to reform the EIA legislation in Egypt.

4. To discuss the experience of Denmark and Sweden in the application of EIA in the successful construction of the environment friend Öresund fixed link between the two countries and how to apply such experience in the development projects in Egypt.

1.3 Research methodology:

The methodology adopted by this dissertation is to assign four chapters to demonstrate the adverse impacts of the polluting industries, the Egyptian EIA legislation, the construction of the Öresund fixed link and a guide for the application of EIA in Egypt.

Chapter two is about the importance of the EIA. It gives a general idea of what is an EIA and its stages and then a demonstration of the polluting development projects which were constructed without EIA application.

Chapter three will be on the EIA legislation in Egypt. In this chapter, discussions will be included on the effectiveness of the Egyptian EIA legislation. The EIA legislation in Denmark will be discussed and compared with the Egyptian EIA legislation to find out if it needs reforms.

Chapter four will demonstrate the application of EIA in the construction of the Öresund fixed link. The chapter then examines how Sweden and Denmark managed to cooperate in the construction of the fixed link with the minimal adverse environmental impacts through the EIA.

Chapter five deals on the new Egyptian national development projects in NGS. The chapter then examines the different plans for developing the area. Then a guide for the application of EIA in the construction of a container terminal in NGS is discussed.

Chapter six will be the conclusion in which the major ideas of the dissertation are reviewed and recommendations are provided for better EIA application in the new Egyptian projects to reserve the environment to the future Egyptian generations.

Chapter 2

The Importance of Environmental Impact Assessment (EIA)

The main objective of an Environmental Impact Assessment (EIA) is to protect the environment against the adverse environmental impact of the existing establishments and the new planned ones.

The EIA is very important because it evaluates the environmental impact of the existing installations and the new projects, which are likely to have significant effects on the environment as early as possible to ensure that the total effects of a project on both the nature and the people are assessed.

EIA is an important tool in the hands of the decision-makers as it compares various alternatives to identify the one, which represents the best combination of economic and environmental costs and benefits.

The EIA benefits the environment as the pollution likely to result from the project is assessed among the other environmental effects of the project. EIA thus provide a good starting point for social development that minimizes the pressure on the environment.

The EIA also benefits the developer as its procedure brings him into a dialogue with the public authorities, this dialogue provides the developer with ideas to change the original project proposal so that it can be improved and be more sensitive to the environment. This can ensure that the developer is better prepared to deal with any later complaints.

2.1 What is an EIA?

The EIA approach was developed to evaluate the impact from activities and industries already established to introduce possible corrective measures.
In the past, project assessment was limited to technical feasibility and cost benefit analysis (CBA). Some major developments such as the Aswan high dam, which was assessed using CBA techniques only, caused considerable number of environmental problems.

The deficiencies in CBA, such as inability to put real monetary values on environmental negative effects leaded to the development of a new evaluation approach which is the Environmental Impact Assessment (EIA). There are attempts to link EIA, CBA and risk assessment to overcome earlier deficiencies.

According to Canter (1996), EIA can be defined as the systematic identification of the potential impacts of the proposed projects, plans, programs, or legislative actions relative to the physical- chemical, biological, cultural and socioeconomic components of the total environment.

The purpose of the EIA is to determine the impact and to ensure that changes to the environment are falling within acceptable predefined limits. EIA procedures are designed to identify environmental, social and health problems which may be caused by a development project and determine the amount of change in the environment. During this process the location, design and operational changes can be made to minimize the negative impacts of the development.

An important aspect of EIA is the inclusion of environmental concerns in the decision making process. As a result, possible project alternatives are compared on a systematic basis. So the EIA is a component of the information upon which the decision-maker makes a choice.

The EIA process should be considered a part of good planning practice, it should not be viewed as an "after thought" implemented to satisfy environmental regulatory concerns following all key decisions related to the proposed project or activity. (Canter, 1996)

The project proponent usually undertakes the assessment process, which is a technical exercise. The results of the assessment are assembled into a document called an Environmental Impact Statement (EIS) which must be prepared such that it describe the environmental consequences of major actions which significantly affect the quality of the human environment (Canter, 1996).

Barrett and Therivel (1991), have suggested that an ideal EIA system would:

- Apply to all projects that are expected to have a significant environmental impact and address all impacts that are expected to be significant,
- Compare alternatives to a proposed project (including the possibility of not developing the site), management techniques, and mitigation measures,
- Result in a clear Environmental Impact Statement (EIS) which conveys the importance of the likely impacts and their specific characteristics to non-experts as well as experts in the field,
- Include broad public participation and stringent administrative review procedures,
- Be timed so as to provide information for decision making,
- Be enforceable, and
- Include monitoring and feed back procedures.

EIA has different classes; one of them is the assessment carried out to monitor the effect of an existing activity such as Helwan cement factories in the south of Cairo. Another class is carried out after an accident with a large oil spill into the sea happened. But the most important EIA is that carried out before the installation of an industry, the construction of an important structure or the approval of an activity which may cause a negative impact on the environment.

In the domestic legislation in many countries it is compulsory to carry out an EIA before the administration approve a certain activity usually listed in the legislation. But according to United Nations (1992), there are some difficulties, which took place in implementing EIA procedures in some countries such as:

a. The public is not adequately aware of the impacts of development projects on the environment,
b. Lack of data and information required for EIA,
c. Decision makers are insufficiently aware of environmental problems,
d. Inadequate arrangements for EIA implementation leads to legal constraints, and
e. Shortage of expertise and experience.

2.2 The stages of the EIA process:

The regulations and guidelines for the application of the EIA may differ from country to country but all have the same philosophy of preventing the approval of activities, which may cause a negative impact on the environment. In some countries EIA is a direct legal requirement while in other countries it is enforced under, for example, the pollution control authorities.

According to Wathern (1988), The stages of the EIA include:

a. Screening:

To decide is the project needs EIA.

b. Scoping:

To define the key issues which should be included in the EIA. It is a priority setting activity, which should improve efficiency and a more focused product for decision-makers. The importance of scoping arises from that EIA is carried out under time and recourses limitations.

c. EIA preparation:

It is the scientific and objective analysis stage in which the importance of impacts identified.

d. Review:

As the project proponent normally produce the EIA, the review shall be undertaken by an independent authority. The function of the review authority may include:

1. If the project to be subjected to a partial or full EIA,
2. General or specific guidelines and advice on methods of EIA,
3. To formulate the terms of reference and initiate a detailed EIA,
4. To ensure that the EIA had been adequately completed within the terms of reference,
5. To submit the EIA with recommendations to the appropriate authorizing agency, and
6. To act as a center for the exchange of information concerning environmental affairs.

The review authority guides the study and then advice's the decision-makers. EIA is not a procedure that is only to be used at the decision-making stages, but it is an adaptive process that continues after the decision.

e. Monitoring:

It is a mechanism to either check that the conditions imposed on the project are being enforced or to check the quality of the effected environment.

f. Auditing:

As a check on environmental management practices and to test the scientific accuracy of impact predictions.

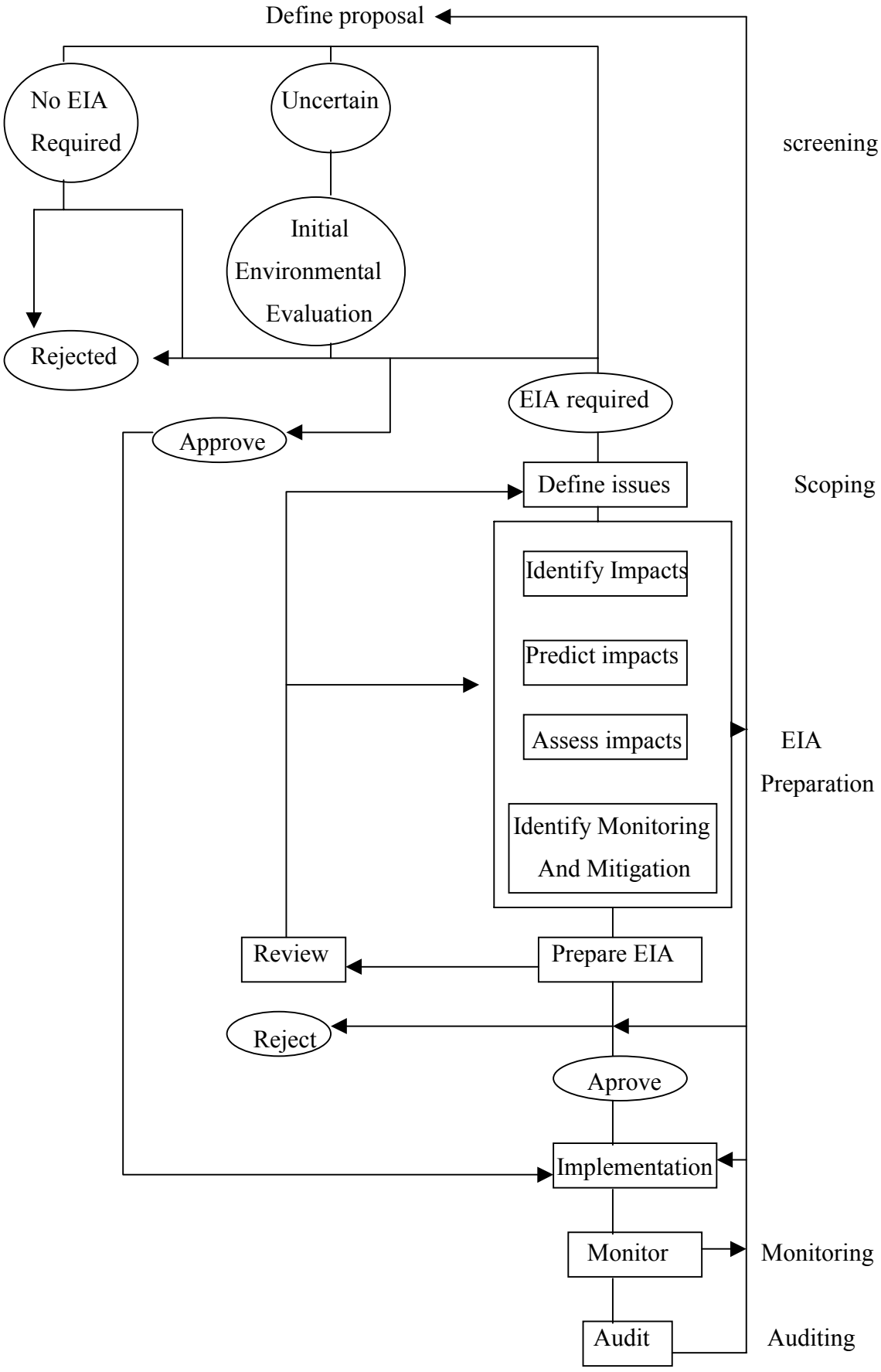

Figure 1 The EIA process (Wathern 1988)

2.3 Development projects constructed without EIA:

A large number of development projects were constructed in Egypt between the 50's and the 80's of the 20th century depending on political decisions. The political leadership at that time wanted to convert Egypt from a poor agricultural country to a rich industrial one in the shortest time possible.

Such political decisions did not take into account the environmental sensitivity of the places in which those projects were constructed. The environmental issue was not considered at all, but the most important thing was the fast production rate and the high profits. But as the years passed, the negative effects of those projects appeared clearly and strongly on the environment in large areas such as the Mediterranean sea coasts, the river Nile, the lakes and in the air of the industrial locations and close to them.

The impacts were in the health of the people working in the factories and the people living in the polluted areas around those factories. Also the damaging of the flora and fauna due to the deteriorating quality of air and water.

The marine pollution is defined as "The introduction by human activities of substances or energy into the marine environment (including estuaries). Resulting in such deleterious effects as harm of living resources, hazards to human health, hindrance to marine activities including fishing, impairment of quality of use of sea water and reduction of amenities" (Preston, 1999). The marine pollution that happened in Egypt is an example.

In Alexandria, the Mediterranean Sea and lake Mariut are used for the disposal of wastes from the different industries as more than 50% of the Egyptian industries are concentrated in the city. Some pollutants are disposed of intentionally as a cheap

manner to get rid of them such as the chemical pollutants and some other pollutants are disposed of accidentally such as the air pollutants.

There are clear signs on the water pollution in the Mediterranean coasts and in lake Mariut in the form of floating wastes, changed color, bad smells and the large amounts of algae covering the lake's surface. The chemical poisonous pollutants are the most dangerous although they are not so apparent.

There are some examples of the different polluting industries and their impact on the marine environment.

2.3.1 The polluting industries in the Mediterranean sea and in lake Mariut:

2.3.1.1 The petroleum industries:

Alexandria petroleum Refinery Company disposes of its liquid wastes directly to the Mediterranean Sea West of Alexandria and El Ameria Petroleum Company disposes of its wastes directly in Lake Mariut. The wastes include different types of pollutants such as:

a. The petroleum refinery companies use the organic solvent (Phenol) in the refining operations to extract the tar from the crude oil in a preparation step to obtain the different products. The Phenol is extracted from the coal and an amount of it will be disposed of with the wastes of the refinery operations in the marine environment and pollute it.

b. Thermal pollution takes place due to the disposal of the hot water used in cooling the refinery in the marine environment.

c. The organic salts which are used to protect the refinery thermal exchange pipes, some times a leakage happen from the pipes causing that an amount of the organic salts take its way to the marine environment

d. Some times an amount of crude oil may leak from cracks in the refinery thermal exchange pipes and mix with the cooling water, which is disposed of in the marine environment.

e. The oil refineries and the industrial wastes cause approximately 12% of the Hydrocarbon pollution in the marine environment in Alexandria.

2.3.1.2 The Chemical industries:

Alexandria cements company (Portland) and Miser Chemicals Company dispose of their industrial wastes directly in the Mediterranean Sea coast West of Alexandria. Some of the chemical pollutants included in the industrial wastes are:

a. Miser Chemicals Company disposes of approximately 150 m^3/day of liquid wastes in the marine environment.

b. This industry was suffering from the leakage of mercury with amounts of approximately 10 T/year

c. The free chlorine disposed of from this industry cause the marine environmental pollution.

2.3.1.3 The Textile industries

Miser Ameria for Textiles Company disposes of its liquid wastes directly in Lake Mariut. Some examples of the pollution caused by this industry are:

a. The most important source of pollution is the thermal pollution due to the disposes of the hot water resulting from the pleatching and washing industrial processes in the marine environment.

b. The leakage of some mazote from the boilers and the leakage of some oils and greases from the company's car service station to the marine environment.

c. The chemical pollution caused by the increased limits of Sulfur, Ammonia and Chlorine used in the different production stages than the maximum allowed limits and the disposal of such chemicals in the marine environment.

d. The pollution caused by the colors used in painting and kerosene used in printing the textiles.

2.3.1.4 The Iron and Steel industries:

Alexandria National Iron and Steel Company disposes of its liquid wastes directly in the Mediterranean Sea. Some examples of the sources of pollution from the Iron and Steel industries are:

a. Some times the flux resulting from the steel production leak with the industrial wastes which contain different metals to the marine environment. Then the leaked metals became more poisonous when reacting with the phosphate and chlorides existing in the seawater.

b. This industry consume a large amount of cooling water, which is disposed of in the marine environment as hot water after the cooling operations causing thermal pollution.

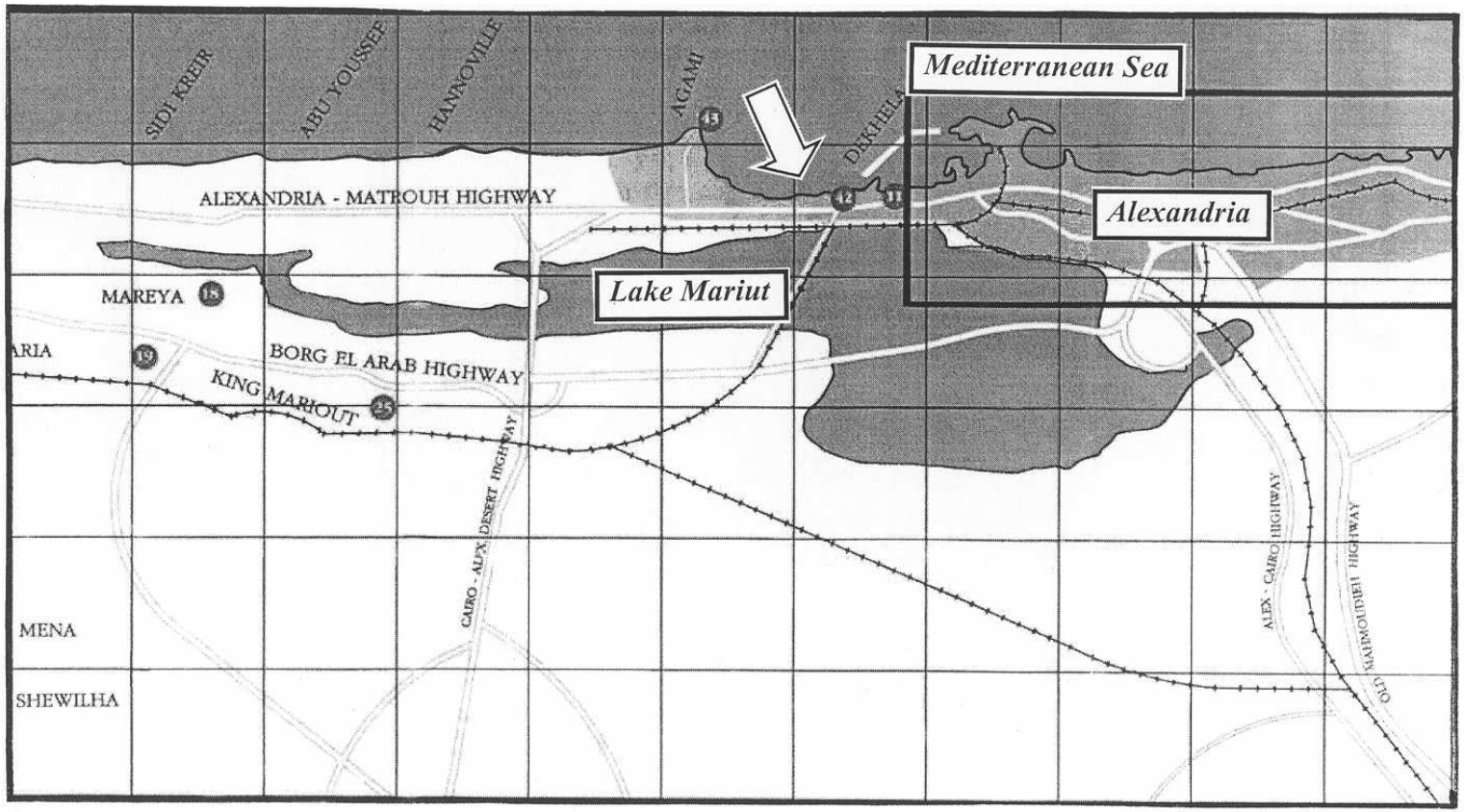

Figure 2 The location of the industries polluting lake Mariut
And the West Coast of Alexandria

2.4 The Environmental and Economical impacts of the polluting projects:

2.4.1 The Environmental impact:

a. The disposal of the Halogenated organic compounds in the marine environment can originate cancer disease. Non organic substances such as heavy metals reach the human beings through the food chain destroying some parts of the body. The impact of such dangerous substances on the marine environment is increased through the slow degradation process.

b. The chemical and organic wastes consume the dissolved oxygen in the water. But if as some times happens, the Biological Oxygen Demand (BOD) is greater than the amount of oxygen available, all the oxygen may be consumed causing the death of plants, animals and marine organisms in large quantities.

c. The organic solvent (Phenol) that is used in the refineries cause the death of the small fish and concentrate in the tissues of the big fish causing Biomagnification by which the concentrations will transfer from the polluted fish to other predators when eating such fish.

d. The lake Mariut is completely polluted because of the large amounts of different pollutants that are disposed of in its waters and the result is the complete destruction of the marine life in the lake.

e. The thermal pollution causes the death of the young organisms and the immigration of the large ones from the thermal polluted areas.

2.4.2 The Economical Impact:

a. The reduction in the Gross Domestic Product (GDP) of the country.

b. Low profits for the investments in the polluted marine environment leads to the withdrawal of the national and international investments from such polluted areas.

c. The reduction in the quality and the quantity of the catched fish causes a strong impact on the fishing sector economy.

d. The destruction of the tourism activities depending on the marine environment.

e. Reduced job opportunities, cause negative effects on the community as a whole.

Chapter 3

The Environmental Protection Framework in Egypt

In order to protect the Egyptian natural resources by using sustainable environmental management system, the Egyptian government issued the law No. 4/1994 concerning the environment.

The role of this law is not only to identify the impacts of the new establishments activity on the environment as early as possible through the EIA procedure, but also to mitigate the negative environmental impacts of the already existing establishments.

The main target of demanding the new establishments to assess the environmental impact of their activities is to improve the development programs and not to hinder it. By using the sustainable development policy the negative impacts of the project shall be avoided or minimized and the positive impacts maximized to reserve our limited resources to the next generations.

3.1 Present Egyptian EIA legislation:

In the law No. 4/1994 concerning the environment, the articles no. 19, 20, 21, 22, 23, 70, 71 and 73 include the EIA procedures for the different projects and establishments. Also articles No. 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 57, 58, 59 and 60 from the executive statutes of law on environment according to the prime minister's decree No. 338/1995 which complete the law articles mentioned above.

By the law, all the new projects and establishments or expansions in already existing installations must be subjected to EIA before licensing the establishment. Also the erection of any establishment on the sea shores of Egypt shall be prohibited to a distance of 200 meters inward from the shoreline, except after getting the approval of

the competent administrative authority in coordination with the Egyptian Environmental Affairs Agency (EEAA).

According to the previous articles of the law, the EIA procedures are as following:

.1 The competent administrative authority granting the license shall assess the environmental impact of the establishment for which the license is requested, according to the elements, designs, specifications, and bases to be issued by the EEAA in agreement with the competent administrative authority. (Article 19 from the law & article 10 from the executive statutes)

.2 The EEAA shall verify the required elements, designs, specifications and basis whenever necessary. (Article 10 from the executive statutes)

.3 The EEAA in agreement with the competent administrative authority prepare the forms, which contain the required data to assess the environmental impact of the establishment.

.4 The EEAA prepare a file containing the mentioned forms, the results of the EIA and any other requirements from the owner of the establishment.

.5 The EEAA may resort to the assistance of any of the specialized people whose names shall be issued in a statement. The statement set by the agency according to the criteria set by the board of the agency, in order to express their view in the EIA of the establishment intended to be established and also for which the license is required. (Article 13 from the executive statutes)

.6 The EEAA issue a list with the specialized people who are selected according to the criteria set by the board of the agency to assist in expressing their view in the EIA of the establishment intended to be established.

.7 The executive board of the agency will nominate three experts to be selected for the membership of the permanent verification committee. (Article 14 of the executive statutes)

.8 The permanent verification committee is formed by virtue of a decree of the minister concerned with environmental affairs, with a counselor of the state council, as it's chairman, and the membership of the following:

.8.1 A delegate from the EEAA to be nominated by the executive head of the agency.

.8.2 The owner of the establishment, or his delegate by virtue of an official power of attorney.

.8.3 A representative of the competent authority granting the license.

.8.4 Three experts to be selected for the membership of the committee upon their nomination by the executive head of the agency, for a period of three years. (Article 14 of the executive statutes)

.9 The license applicant shall attach to his application a statement duly fulfilled about the establishment, comprising the data included in the form prepared by the EEAA in agreement with the competent administrative authority. (Article 12 of the executive statutes)

.10 Licensing the establishment of any installations or stores on or close to the sea shore, which would result in discharging polluting materials and substances in contravention to the provisions of the present law and the decrees to be issued in implementation there of, shall be conditional upon carrying studies on environmental impacts by the licensed applicant. The licensed applicant shall

also provide treatment units for wastes and shall begin operating them upon operating these installations. (Article 70 of the law)

.11 It shall be prohibited to license the establishment of any installations on the sea shores of Egypt to the distance of 200 meters inwards from the shore line except after getting the approval of the Egyptian general authority for protection of beaches, in coordination with the EEAA.

.12 It shall be prohibited to authorize carrying out any work liable to affect the natural shore line or modify it whether by entering toward the sea waters or by retreating from it, except after getting the approval of the Egyptian general authority for protection of beaches, in coordination with the EEAA.

.13 The minister concerned with the environmental affairs after consulting the view of the competent administrative authorities as well as the competent governorates, shall issue the conditions of the license for setting up the establishment within the prohibited zone, or modifying the shoreline.

.14 The competent administrative authorities granting the license shall send a copy of its EIA to the EEAA to announce its opinion and evaluate the proposals required for implementation in the field of preparations and systems required for treating the negative environmental impacts.

The EEAA shall provide the competent administrative authority granting the license with its view concerning this EIA within a period of 60 days at the most from the date of receiving this EIA, otherwise the failure to provide the reply shall be considered as approving the evaluation.

.15 The competent administrative authority shall notify the owner of the establishment with the result of the EIA, by virtue of a registered letter with

acknowledgement of receipt. Such authority undertakes assuring the implementation of the proposals of the EEAA, in the field of preparation and systems required for treating the negative environmental effects.

.16 The owner of the establishment may object to this result in writing within thirty days from the date he is notified of such result.

.17 The objection shall be submitted to the EEAA in writing fulfilling the reasons for the objection and the legal and scientific grounds on which the owner of the project is based. He shall also attach to his objection such documents as regarded by him to be in support of the aspects of the objection.

.18 The permanent verification committee shall be concerned with looking into the objections referred to it, concerning the assessment results or the proposals required to be implemented as considered necessary by the EEAA and shall announce its view with regard to these objections.

.19 The committee may form among its members and others sub-committees to be assigned the study of objections as refereed there to and raise their reports to the committee.

.20 In exercising their tasks, these sub-committees may resort to whoever is considered to be expedient for the purpose.

.21 The decision of the committee shall be issued with the majority votes within 60 days from the date of receipt of the objection papers duly fulfilled. The reasons of the decision must be mentioned.

.22 The permanent verification committee informs its decisions to the EEAA, the object owner and to the competent administrative authority granting the license

within 10 days from its issuance by virtue of a registered letter with acknowledgment of receipt.

.23 According to article 4 of the executive statutes, the board of the agency must approve the bases and procedures of assessing environmental impact of projects.

3.2 The Egyptian EIA system:

According to the law No. 4/1994 the competent administrative authority (depending on the kind of the establishment) granting the license shall assess the environmental impact of the establishment for which the license is requested.

The executive statutes of the law identified the installations subject to the provisions of the EIA according to the following basic controls:

1. Type of the establishment activity

2. Extent of the establishment exhaustion of natural resources specially waters, agricultural lands and mineral wealths.

3. Site of the establishment

4. Kind of energy power used in operating the establishment.

The expected number of projects to be subjected to EIA will be so big according to these controls. So a flexible system is used to organize the EIA procedures for the different establishments.

The system depends on the lists method by which the projects are classified to three categories each of them require different level of EIA according to the strength of the expected environmental impact of each category. The three categories are:

1. White list projects, for the projects with limited environmental impact and they do not need EIA.

2. Gray list projects, for the projects which can cause important environmental impact and they need partial EIA in specific parts of the projects decided according to the assessment of the EEAA after the revision of the list.

3. Black list projects, for the projects which cause dangerous environmental impacts and they need full EIA.

If the project can not be classified according to the three classes, the owner of the project shall consult the EEAA for advice.

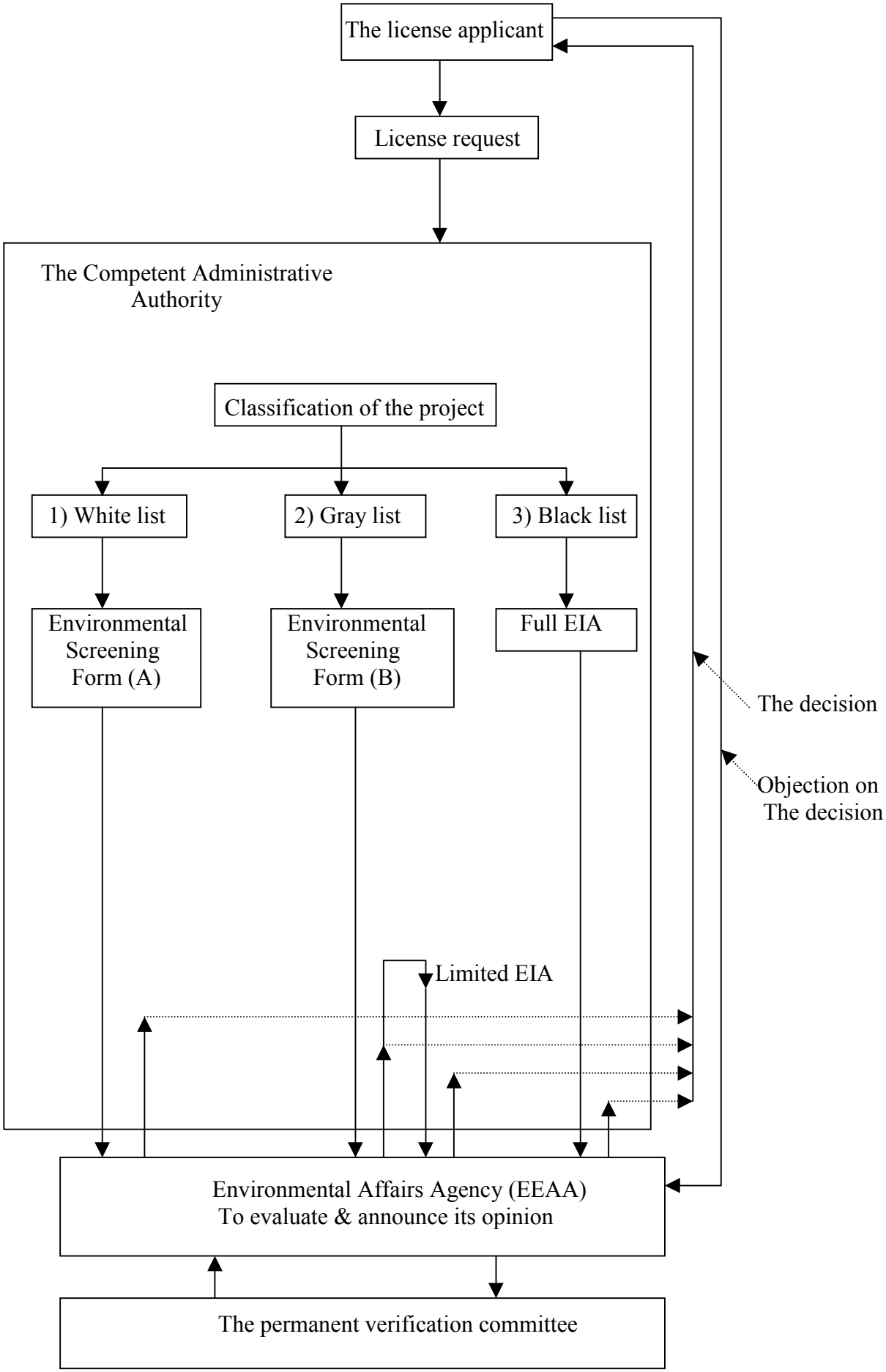

Figure 3 The EIA procedure in Egypt (EEAA, 1999)

3.3 The international EIA legislation:

After the Egyptian EIA legislation was discussed, what about the EIA legislation in the international level?

Taking a developed country like Denmark as an example, Denmark is a member in the European Union and the European Council directive is the basis for Denmark rules on EIA, and all the other members of the European Union therefore have the same rules.

The purpose of the EIA rules in Denmark is to evaluate the projects that seem to have significant effects on the environment before they start. In Denmark, the EIA procedure follows the provisions of the planning act on supplements to regional plans, and the regional planning authorities.

The minister for environment and energy may decide that a project will be carried out through a national planning directive, in the administration of state interest. In such a case the ministry of environment and energy is responsible for EIA procedure. The EIA rules were established by three ministerial orders issued in September 1994.

3.4 The EIA legislation in Denmark:

.1 Any project seems to have significant impacts on the environment is covered by the EIA legislation.

.2 The procedure starts when the developer applies to the regional authority to have a permit for a project and the regional authority decides whether the project is covered by the EIA legislation or not.

.3 The developer shall start the EIA process as early as possible as the EIA process of a typical projects takes approximately one year.

.4 There are two lists, the first list of the projects subject to EIA procedure for new projects and for modifications to existing projects that make them equivalent to the new projects. The second list of projects to be subjected to five criteria if the project fulfills all the criteria, the EIA is not required.

.5 The five criteria are:

.5.1 The project does not require the production of a new local plan because of the desired use of the area,

.5.2 The project is not likely to result in a significant noise nuisance,

.5.3 The project is not likely to result in significant air pollution,

.5.4 The project is not likely to reduce the planned water quality in streams, lakes or coastal areas,

.5.5 The project is not likely to pollute the ground water.

(Ministerial order (Environment and Energy) No. 847 0f 30 September 1994)

.6 The regional planning authority must receive ideas and proposals from the public before the more detailed EIA of the project is initiated, after this is announced Everyone has the opportunity to express his ideas and proposals which will be used in the EIA procedure.

.7 The regional planning authority must prepare a proposed regional plan supplement with an Environmental Impact Statement taking the ideas and proposals submitted into account.

.8 If a pollution control permit is required in accordance to environmental protection act, it must be prepared simultaneously.

.9 When a proposal for a regional plan supplement with an EIA is adopted by the regional planning authority, the relevant state authorities and the municipality in which the project is located must be consulted about the project. The proposal and the pollution control permit must be published.

.10 After this, the public is consulted for at least 8 weeks; every one may submit proposals, comments and objections related to the project.

.11 The minister for environment and energy may submit objections to the adoption of the proposed plan in final form in the administration of state interests.

.12. The regional planning authority processes the objections and proposals arising out of the public consultation.

.13 The developer or the regional planning authority can then amend the project in accordance with the results of the public consultation. The amendments are often made in cooperation between the developer and the authorities.

.14 The project can obtain the necessary permits when the regional planning authority adopts the project in final form. The final adoption and permits must be published together with guidelines on if and how the decision may be appealed and the time limits for doing so and then the developer can start the project

3.5 A comparison between national and international EIA legislation:

The EIA legislation entered into force in Egypt and Denmark in the same year 1994 but with a difference of few months as it entered in Egypt in January and in Denmark in September. It is clear that all over the world in the developed and developing countries there was a need to environmental legislation to organize the establishment of the projects through EIA process.

Denmark as a member in the European Union has the same EIA legislation as the other members. This harmonization and unification of the EIA legislation protect the member's environment and resources. The unified legislation set the same standards to establish any project in the fifteen member countries so the developer can not choose any country with weak EIA legislation to establish the intended project.

Although Egypt is a member in the Arab League since the forties of the 20th century, there is not any cooperation between the member states in harmonizing the EIA legislation. Each member state has its own legislation, which may cause environmental damage to the neighbor State. When the developer get the permission to establish his project in a country according to its EIA legislation, the air pollution caused by this project is accepted in the permitted country. But it may be higher than the standard levels of the neighbor state and will cause pollution to this state when it cross its borders.

According to the Egyptian EIA process there are four controls used to decide if the project needs EIA, partial EIA or does not need it at all. The four controls are the type of activity, extent of exhaustion of natural resources, the site and the kind of energy power used. In Denmark there are five criteria if the project full fill all the criteria, the EIA is not required. The five criteria are that the project will not result in significant noise nuisance, air pollution, reduce the water quality, pollute the ground water and do not require the production of a new local plan.

The criteria are approximately the same in Egypt and Denmark but the difference is that according to the Danish criteria if the project will result in significant noise nuisance it will need a full EIA. But according to the Egyptian controls the noise nuisance is not considered a reason for requiring EIA for the project although it is one of the important controls.

The Danish EIA legislation give the public participation a great importance as the public have the opportunity to influence a project through two periods of public consultation. Ideas and proposals are first discussed at a very early stage in the process. Later the public can assess the specific project, as the proposed regional plan supplement with the environmental impact statement and the proposal for the necessary permits must be published simultaneously. There is then opportunity to discuss the details of the project and the overall environmental impact of the project.

Public authorities and developers can then adjust the project in accordance with the results of this debate. The public is thus involved in influencing the project. The regional planning authority makes the final decision on adopting the regional plan supplement and accompanying environmental impact statement. This decision is made based on the public debate and the published investigations and assessment, which makes the political decision more qualified and more transparent to the public.

In the Egyptian EIA legislation nothing is mentioned about the public participation but the whole mater is referred to the specialized people and the permanent verification committee which is formed from representatives from the state council, EEAA, the owner, the competent authority granting the license and three experts. The committee may form sub-committees to study the objections referred to it and raise their reports to the committee. But in all the procedures there are not any public participation in the EEAA decisions, in the permanent verification committee formation or in its view with regard to any objections referred to it or in the formation of the sub-committees and its reports. So the public is separated from the

projects established and they do not know the exact effects of such projects in the environment and in the area in which they live.

The public participation is only mentioned in the environmental screening form (B) prepared by the EEAA for the gray list projects. As there is a question asking if there are any contact with public authorities or others concerning the project and this question is to be answered by the project owner but without asking about the public proposals or opinions.

The Egyptian EIA legislation is applied to the expansions in already existing projects only and not to the existing projects itself, which pollute the environment. But what are the procedures required to carry out EIA to such projects and how to mitigate their negative environmental effects as some factories were built 30 or 35 years ago and still polluting the air, water and soil in their surrounding areas without any action to prevent such pollution?

The lists system used in the Egyptian EIA process give high flexibility in applying the EIA procedure as some projects do not need any EIA, others need partial EIA in specific parts of the project and some projects require full EIA. But according to the Danish EIA process there are only two lists for the projects which do not need EIA or which need full EIA without any partial EIA to some projects.

The Egyptian EIA legislation is in force since 1994, but the legislation alone is not enough. The more important is the legislation implementation to give the required results. In article 73 of the law, the erection of any establishment on the sea shores of Egypt shall be prohibited to a distance of 200 meters inwards from the shoreline, except after getting the approval. So there are exceptional cases in the law which are required in the case of a vital national project but after getting the approval from the competent administrative authority in coordination with the EEAA.

The implementation of the article 73 of the law must be carried out very strictly and accurately, so nobody can use such exemption to have approval for a prohibited project within the 200 meters from the shore line.

Any project whatever its importance must be subjected to EIA process if it is required and shall not be exempted from such process due to political decision. If an important national project is established by a political decision without any EIA process, the negative environmental impacts, which will appear later, will overcome the positive side of the project. So every project in the gray or black lists must have partial or total EIA process whatever its national importance to protect our resources and environment not only for our use but also for the next generations.

3.6 Is it a need to reform the national EIA legislation?

The comparison between the national and international EIA legislation showed that the Egyptian legislation fulfill its requirements and assist in protecting the Egyptian environment but they need reforms.

There are some articles, which must be added to the existing national EIA legislation to increase its strength and ability to protect, preserve and improve the environment. The articles to be added shall concern the following:

.1 A complete EIA process is required to the existing polluting projects within a specific period of time to find out the mitigation actions required to prevent or to minimize such pollution to the accepted levels.

.2 The public participation in the EIA different procedures by expressing there opinions and ideas in each step of the project. This participation will give new ideas and opinions, wide public acceptance to the project and strong feeling

among the public that the project is established to aid their community and to their economy. The environment friendly projects encourage the public to buy their products although they may be more expensive.

.3 There must be environmental cooperation between the states member in the Arab League by harmonizing the EIA legislation in all the member states which will lead to the protection of the environment in the whole region.

.4 Adding the production of significant noise nuisance to the EIA control factors leading to the requirement of full EIA to the project. So the noise pollution must be considered important as the air and water pollution.

Chapter 4

The Application of EIA in Denmark and Sweden

The construction of the Öresund fixed link between Malmö in Sweden and Copenhagen in Denmark is an example on the cooperation between the two countries in the application of the EIA. The EIA illuminates the impacts of the fixed link across the sound (Öresund), between Malmö and Copenhagen. The impacts include both the short term and long term ones during and after the construction stage.

In 1991 EIAs were done to predict the impacts on biological systems, after the agreement on the construction of the fixed link was signed between the Swedish and the Danish governments. The governments had defined an inner impact zone 500 m either side of the link trajectory where extensive impacts could be expected and an outer impact zone 7 km either side of the link where temporary impacts could be accepted. The criteria of impact for the inner zone was a 25 % reduction in eelgrass cover, blue mussel cover and biomass of other fauna at depths greater than 6 m.

The European council has identified the Öresund fixed link as one of fourteen priority projects in the Trans European network program. The fixed link length is approximately 16 km and has a twin track railway and a four-lane motorway. The link consists of an immersed tube tunnel from Kastrup and under Drogden, an artificial island south of Saltholm island, a low level bridge and a high level bridge over Flintrännan to the Swedish coast at Lernacken in south Malmö. In July 2000 the first trains and motor vehicles crossed the Öresund fixed link between Copenhagen and Malmö.

4.1 The Öresund Fixed Link:

4.1.1 The Drogden immersed tube tunnel:

An artificial peninsula was constructed extending 430 meters from the Danish coast at Kastrup airport. Because of requirements, including those imposed by aviation

using Kastrup airport, the crossing of Drogden must be by means of 4050 meters tunnel. The tunnel consists of 3510 meters of immersed tube tunnel prefabricated and immersed in a trench excavated in the seabed with a portal building at each end.

4.1.2 The Artificial island:

As a transition between the immersed tube tunnel and the bridge, Peberholm artificial island is constructed south of the island of Saltholm. The length of the island along the line of the link is about 4055 meters. On the island, the railway, which is located centrally on the bridge, cross the south bound carriage way of the motor way, which is necessary because of the planned connections on the Danish side.

The artificial island also formed a tip for excavated and dredged masses from foundation works and compensatory dredging. The Danish authorities had decided the way in which the landfill was placed to best fit into its surroundings.

4.1.3 The bridge:

Between Peberholm artificial island and the Swedish coast, the link take the form of a bridge extending a total of approximately 8 km. The bridge is constructed in two levels with the railway located below the motorway. South of Saltholm the West approach bridge is constructed as a low-level bridge with a length of 3014 m and a clearance height of 6 m. The low-level bridge is constructed as a grider bridge on piers with spans of between 35 and 100 m.

Across the Flinte channel, the bridge is built as a cable stayed high level bridge with a length of 1092 m, a clearance height of 55 m and a span of 420 m. The East approach bridge connecting the high level bridge and the Swedish coast at Lernaken is constructed as a grider bridge on piers with spans of between 80 and 140 m, a length of 3739 m and a clearance height of 35 m.

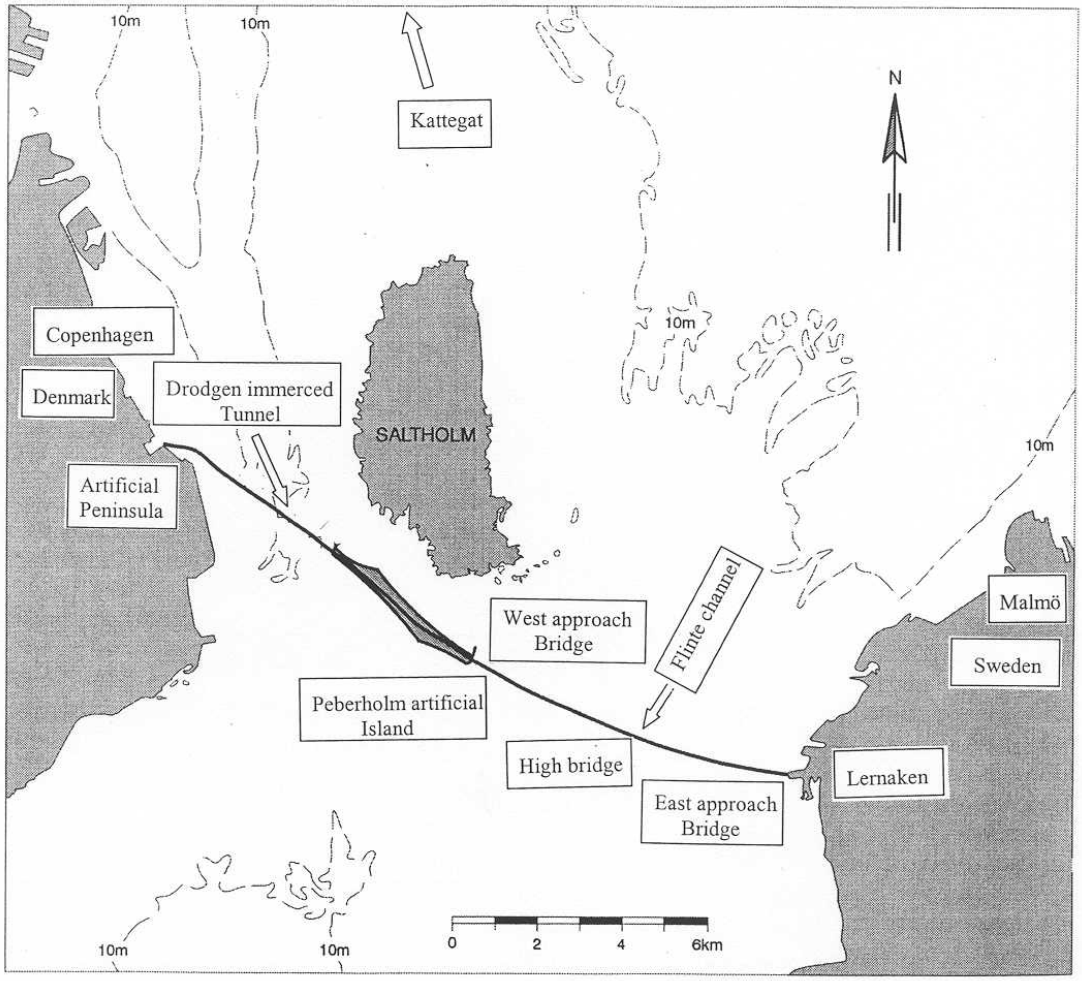

Figure 4 The Öresund fixed link

4.2 Dredging and reclamation:

A primary environmental requirement is that the structure of the fixed link must not block or significantly change the natural water flow in Öresund. This requires the execution of extensive compensation dredging. The completed link is to have no net impact on the water flow and on the movement of dissolved oxygen and salt through Öresund to the Baltic Sea. The link has been designed in a way that the blocking impact has already been reduced from 2.3 % to below 0.5 %, which corresponds to a necessary compensation dredging quantity of 1.8 Million m^3.

4.2.1 The types of dredging works:

4.2.1.1 Temporary works:

a. Work harbours and construction access channels at the artificial peninsula and at the artificial island for other contractors,

b. Access channels outside the Drogden navigational channel to provide sufficient depth for the towing of tunnel elements,

c. Temporary navigation channels for diverting ship traffic.

4.2.1.2 Permanent works:

a. Dredging the trench for immersion of the tunnel,

b. Deepening and realignment of the existing Drogden navigation channel on the Danish side of Öresund,

c. Deepening and realignment of the existing navigation channel on the Swedish side of Öresund,

d. Excavation for placing of foundations for bridge piers,

e. Compensation dredging to achieve zero blocking of the water flow,

f. At the final stage of the project further optional compensation dredging in and around the alignment to secure a zero blocking effect.

4.2.2 The reclamation:

a. The artificial peninsula at Kastrup airport,

b. The artificial island Peberholm south of Soltholm.

All dredging sea bed material is reused in the reclamation areas, which also incorporate sedimentation basins. This method has the following advantages with respect to environmental impact:

1. No need for dumping sites,

2. Minimal sediment spillage,

3. Reduced need for import of sand and gravel from borrow areas.

4.3 The impact of the Öresund fixed link on the traffic development:

4.3.1 Road traffic:

The EIA for the Öresund link has been based on three-traffic volumes v/aad (vehicles per annual average day). These scenarios are based on the calculations of traffic across the sound made by Transek (1991). 10 000, 20 000 and 30 000 v/aad. These scenarios included the testing of different assumptions of toll changes per single trip by car across the bridge. The 10 000 v/aad scenario corresponds to a single trip charge of about 160 Skr/trip. This level of charge was assumed in the treaty between Sweden and Denmark and in earlier Öresund link studies.

The traffic scenario with 30 000 v/aad presupposes a very low bridge toll charge, approximately 30 – 40 Skr/ trip by car. According to Transek (1991) it is estimated that between the years 2000 and 2020, the amount of road traffic using the bridge will increase by between 20 -–30 % depending on the assumption made on the future economic growth.

4.3.2 Railway traffic:

The Öresund link implies an efficient regional train service between Malmö and Copenhagen. The present ferry passengers are expected to use the train service. Trips transferred private cars and newly generated trips as a result of the greatly reduced trip train and / or lower travel cost will also constitute a significant part of the train traffic's estimated volume of passengers.

4.3.3 Ferry traffic:

The completion and operation of the fixed link will affect in the ferry traffic in the southern part of the sound because the traffic will transfer to the link. In the southern

part of the sound a very limited demand for the ferry services between Copenhagen and Malmö would remain.

According to estimates by Transek (1991), the number of cars crossing the north of the sound between Helsingborg in Sweden and Helsingör in Denmark will drop by about 40% when the fixed link entered the service. The calculations apply under the assumption that the ferry traffic remains unchanged and that the toll charge is of about the same amount.

It is expected that the passengers using the ferry traffic across the sound would be greatly reduced as a result of the operation of the bridge. The shipping of the passenger trains between Helsingborg and Helsingör would cease. Other ferry lines between Sweden and the continent are expected to be marginally affected.

4.3.4 Air traffic:

The fixed link across the sound may be expected to imply slower growth of air traffic, especially on short-haul flight. The investments in the fixed link, rail traffic, the proposed city tunnel under Malmö and regional train services will strengthen the competitiveness of train traffic in relation to air traffic.

There are environmental advantages for this development as less emission of combustion gases and fuel remains and a slight reduced equivalent noise level.

4.4 The importance of the sound to the Baltic sea:

The Baltic Sea covers 375 000 km^2 and its volume is 22000 km^3. Its average depth is 58 m and the greatest depth is 459 m. The Baltic water consists of two layers. The salinity of the upper layer, which is supplied with new water from the rivers and precipitation at the water surface, is less than the salinity of the lower layer.

The exchange between the two layers of water is very limited. The supply of oxygen to the lower layer of water does not come from the upper layer, but from oxygen rich water from the Kattegat outside the sound flowing into the Baltic. The high and low air pressures and associated winds will create differences in the water's level between the Baltic water and that of the Kattegat.

The differences in the water level will determine the exchange of water between the Baltic and Kattegat. Winds from the east will transport the water out of the Baltic. Strong west winds result in the movement of water into the Baltic because it creates pressure difference by pressing the water into the Kattegat and away from the western Baltic. These movements of water caused by changes in atmospheric pressure and wind result in an exchange of the water masses that is considerably greater from 7 to 10 times than that the outward transport due to the supply of fresh water from the rivers discharging into the Baltic. Approximately 30 % of the water moving between the Baltic and the Kattegat passes through the sound, the remainder passing through the great and little belts.

The most recent strong influx of salt water was recorded during the winters of 1967 and 1977. Since then only small quantities of salt water of relatively low salinity have forced their way into the Baltic, so the water in the deeps is now less salty. The salt-water inflows also contribute to raising the oxygen concentration of the deep water. (Öresundkosortiet, 1992)

4.5 The Baltic ecological system:

The ecological system in the Baltic is very sensitive to the loss of salt water supply. In addition to a greater risk of oxygen depletion of seabeds caused by greater supply of nutrient salts through primary production and decomposition of dead biomass. The Baltic's oxygen concentration is very low at depths greater than 70 m due to the

small inflow of oxygen rich water and large oxygen consumption. Larger areas of bottom in the central Baltic have been hit by a total lack of oxygen since the 1960's. In recent years oxygen deficiency has also occurred in shallow inshore areas.

If the oxygen concentration, salinity and water exchange drop, this will have a detrimental impact on the various species of animals in the Baltic that live on or near the boundary of their distribution. Small changes can cause changes in the production, the turnover of organic substances and changes in the oxygen and nutrient salt balances.

The cod is a very sensitive fish to the drops in the oxygen and salt concentrations. It is also the most economically species for fishing in the Baltic. In 1991, cod accounted for more than half the total Swedish industrial catch value. The reproduction of cod in the central Baltic is at present being hampered by the difficult oxygen situation and the low salt content. (Öresundkosortiet, 1992)

4.6 The sound geographical description:

The Baltic discharge into the North Sea through the sound, the great belt and the little belt. These outlets also act as inlets at times, when water from the Kattegat moves into the Baltic. The water flow system through the sound is complex and mixtures of different types of water occur. The water depth is generally less than 20 m.

The sound is subjected to the load from organic substances, nutrient salts and toxic substances, land based sources on the Swedish and Danish sides, the supply of water from the Baltic and the Kattegat, emissions from boats and ships, the release of the sediment in the sound. All these sources contribute with other factors to the quality of the water and the prerequisites those animals and plants in the sound have to live under.

The fishing industry in the sound has diminished greatly during the last decades but is still of great importance. The change in catch sizes show that catches of species that are more stationary in the sound have increased from the beginning of the 1980s, while those of cod and herring have clearly diminished. (Öresundkosortiet, 1992)

4.7 The environmental impacts of the Öresund fixed link:

4.7.1 The environmental studies before the construction of the fixed link:

The constructions of the fixed link involve large dredging and reclamation operations. The suspended and deposited sediments resulting from the dredging and reclamation operations adversely affect important key species of ecosystems. It was necessary at an early stage of the fixed link project to have a detailed base line investigation. Baseline studies were carried out to provide the EIA and the monitoring programs design with the relevant information.

According to Lyngby and Valeur (1999), during the years prior to construction of the Öresund fixed link, a number of sedimentological investigations were carried out in the sound. The purpose of these investigations were manifold:

a. To establish baseline conditions regarding suspended sediments and seabed sediments before the construction activities started,

b. To determine relevant sediment parameters for modelling the sediment spreading from dredging and reclamation activities,

c. To establish a modelling set-up, allowing modelling of the sediment spreading (and the environmental impact) for various dredging and reclamation spill scenarios (EIA – or forecast modelling)

d. To be able to model the actual sediment spreading (and the environmental impact) after completion of a sub-activity (where actual sediment spill and the actual current conditions are known).

4.7.2 The blocking effects of the Öresund fixed link:

Fixed links across the great belt and the sound, as a result of bridge piers and ramps, will have a braking effect on the water flow into and out of the Baltic. This effect can be completely or partly eliminated by compensatory dredging.

A fixed link with compensatory measures that provides a complete zero solution for the through flow would result in no changes in the Baltic's ecology in the short or the long terms.

4.7.3 The short term impacts:

According to Öresundkosortiet, (1992), the short term impacts are those of the construction work in the water and are largely the result of spreading fine grained sediment, nutrient salts, oxygen consuming substances and certain decrease on flora and fauna in and around the sites.

a. Sediment:

The dredging methods causing 5 % or less spillage had been used for dredging work. Spillage means material that is carried away from the site. If the silt content of the material is high, sand suction can cause greater spillage.

The spreads of sediment had taken place in the form of partly limited plumes whose appearance depends on the current conditions at the time. No increase in beach erosion is expected. The transport of sediment stopped basically with the completion

of the earth works, but an amount of sediment can continue to spread for a while. This is principally a result of sediment movement from transport bottoms to deposition bottoms.

b. Heavy metals:

According to the studies made, heavy metals spread from excavations are not of any environmental impact.

c. Nutrient salts:

The regional occurrence of nutrient salts is not increasing with the spread of nutrient salts released from sediment in conjunction with excavation.

d. Oxygen concentrations:

The spread of sidement and the sediment's concentration of oxygen consuming substances during the construction stage affected on the oxygen conditions in the saline bottom water in the sound.

The effects are greatest on the Danish side. The maximum reduction in the oxygen concentration in an intensive excavation stage had been calculated for this area at a maximum of 0.5 mg/l. This applies provided that no large quantities of oxygen consuming substances are encountered during the excavation work.

e. Phytoplankton:

The works cause an increase in primary production by about 5% due to the change in the nutrient salt balance in large areas of the southern part of the sound according to the model calculations. The increase is limited to the construction period.

f. Benthic flora:

During the construction stage, a temporary reduction in the amount of eelgrass and eelgal biomass was expected locally arround Lernacken as a result of shadowing.

After the construction stage, the flora is largely re-establishing itself. It is possible to assess the extent of the re-establishment depending on the base line studies carried out before the construction started.

g. Banthic fauna:

A temporary change in the mix of fauna was expected as a result of sedimentation. The density of individuals and the biomass were expected to grow and the composition of species might change.

On the link alignment, the banks of common blue mussels were affected. A temporary drop in the biomass as a result of excavation and diminished recruitment was expected closest to the site. If sedimentation deposits remain they may result in a reduction in the mussel population around the alignment.

h. Fish and fishing:

The performance of fishing tackle reduced as a result of silt and lime particles deposited on the nets and fish flee from sidement plumes. The construction work was a physical obstacle to fishing in the area affected.

Concentrations of suspended material occurred across the sound in the events of intensive excavation and current change situations potentially block the path of migrating fish (especially herring and eel) but migrating fish normally find opportunities for passing the area.

Along the Swedish coast no effect on the eelgrass was expected. Spawning and growth conditions for fish in the eelgrass were not affected.

i. Birds:

A drop in the supply of food for resting and stationary birds happened because of the temporary reduction of eelgrass and mussels.

j. Bathing:

Bathing conditions along the Swedish coast at certain times were affected by the spread of sediment due to greater turbidity of the water.

4.7.4 The Long term impacts:

According to Öresundkosortiet, (1992), the long term impacts are:

a. Area used by fixed link:

The fixed link and compensatory excavations implied areas used for foundations, fill and excavations. A total area of about 1.5 km^2 is affected and on the Danish side the area is considerably larger.

b. Sediment:

During the construction stage fine particles spreaded and will remain in the deposition areas. It is estimated that the thickness is about 1-2 cm. The content of organic substances in the deposited sediment is expected to be lower than that of existing sediments.

Sand deposition between the Peberholm artificial island and Saltholm may in the long-term result from the construction of the artificial island, which may need maintenance dredging.

c. Heavy metals:

Within the relevant deposition bottoms the content of heavy metals in the sedimented material is considerably lower than that in the existing sediment.

d. Nutrient salts:

The nutrient salt balance in the sound will not be affected in general but small changes in the nutrient salt will occur locally and within limited areas.

e. Oxygen concentrations:

The oxygen concentration in the sound will not be affected. Small changes will occur locally and with limited areas as a result of the redistribution of the current.

f. Phytoplankton:

A change in the primary production and biomass of the phytoplankton will be resulted from the change in the nutrient salt balance. The estimated changes in the primary production will be smaller than the natural variations.

g. Benthic flora:

A local reduction in the eelgrass's biomass off Lernacken will be resulted from the excavation operations.

h. Benthic fauna:

Due to the compensatory dredging on the Swedish side, 1.4 km^2 of the mussel banks was removed, which corresponds to about 2% of the mussels around the alignment of the link. After the construction stage was already completed, it is considered that the banks of mussels will largely recolonize.

i. Waste water:

The spread and mixing of waste water from Swedish treatment plants will not be affected.

j. Bathing:

No changes in the quality of water along the shores and at the bathing places are expected.

4.8 Air pollution from the Öresund fixed link:

4.8.1 Local impacts:

The Öresund fixed link will increase the total traffic-mileage in southern Sweden by 0.5 – 2.0 %, in addition to the traffic flow across the bridge. The increase is due to traffic moving over from the Danish to the Swedish side of the sound. Also the bridge will result in regional structural growth in the long term.

Table 1 contains a summary of the annual emissions from traffic on the Öresund link and from the ferry traffic it will replace. The calculations took into account the successive improvement in cleaning taking place in road traffic as a result of catalytic exhaust gas cleaning and other means.

Until now, emissions of air pollutants from ferry traffic have been uncontrolled although it contributes considerable emissions.

The International Maritime Organization recognized the urgent necessity of establishing a policy on prevention of air pollution from ships, considered that the objective might best be achieved by establishing the new Annex VI on prevention of air pollution from ships to the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating there to (MARPOL 73/78).

Annex VI of MARPOL 73/78 will enter into force 12 months after the date on which not less than 15 states, the combined tonnage of which shall be not less than 50% of the gross tonnage of the world's merchant shipping fleet, have come parties to the protocol to MARPOL which contains Annex VI. To date, two countries have become parties to Annex VI: Sweden and Norway.

Year	Flow v/aad	Emissions, tonnes/year					
		NO_x	HC	SO_2	CO_2	CO	Particles
2000	10 000	81,8	18,9	0,7	11 400	150	3,9
	20 000	114,9	32,6	0,8	31 100	303	5,4
	30 000	147,4	46,2	0,9	52 300	456	6,8
	Ferry traffic	955	160	75	111 851	63	10
2010	10 000	64,8	9,0	0,4	11 400	40	2,0
	20 000	88,8	13,4	0,4	30 500	74	2,8
	30 000	112,4	17,6	0,5	51 500	107	3,5
	Ferry traffic	683	160	76	99 908	57	7

Table 1 Annual emissions of air pollutants from traffic on the Öresund link at different traffic flows and from the ferry traffic replaced by the fixed link, at a traffic flow of 30 000 v/aad. (Öresundkonsortiet, 1992)

Table 1 shows that between the year 2000 and 2010 a small reduction (10 %) will be achieved by ferry traffic as regards emissions of carbon dioxide and carbon monoxide. For nitrogen oxides and particles, the reduction will be moderate (30 %), and for the other substances extremely small changes will occur.

In the same period the improved exhaust gas cleaning of road vehicles will result in a considerable reduction (75 %) in the emission of carbon monoxide. No great change in the carbon dioxide emission levels is expected. For the other pollutants the reduction will be 20-50 %.

The emission from traffic will be doubled if the traffic flow will increase from 10 000 v/aad to 30 000 v/aad. The emission from road traffic on the Öresund fixed link

are for the pollutants studied less than corresponding emissions from the ferry traffic it replaces, except carbon monoxide.

Table 2 shows how the total emissions of various pollutants from marine traffic in the sound and from road traffic in southern Sweden will change as a result of the Öresund fixed link, for a traffic load on the link of 30 000 v/aad. The levels are related to the emissions calculated for the year 2000.

	Year 2000		Year 2010	
	without bridge	with bridge	Without bridge	with bridge
Nitrogen oxides	100	97	86	84
Sulfur dioxide	100	96	72	68
Hydrocarbons	100	67	67	69

Table 2 Estimated levels (%) of emissions from road traffic in southern Sweden and maritime traffic in the sound, with and without the bridge. The emissions are related to the level of emission in the year 2000. . (Öresundkonsortiet, 1992)

According to the table, for both nitrogen oxides and sulphur dioxide, the fixed link will reduce the emissions. The emissions of these substances from the part of the ferry traffic that will cease are greater than the emissions from the traffic generated by the bridge. An increase in emissions of hydrocarbons will result from the bridge.

The drop in emissions between the years 2000 and 2010 illustrates that changes in the magnitude of the emissions that result from better cleaning of exhaust emissions from the traffic are larger than the changes result from the bridge and traffic flow across the bridge.

4.8.2 Global impacts:

The global impacts of the Öresund link will come principally from the emission of greenhouse gases, including carbon dioxide, nitrous oxide and methane. The greenhouse gases is a collective name for several gases that affect the world's energy balance and which result in an increase in the temperature.

According to the figure 3 the fixed link will result in the drop in the emission of the greenhouse gases from ferry traffic, but the emission from road traffic will increase slightly. The change is small in relation to the total contribution from road traffic and ferries in southern Sweden.

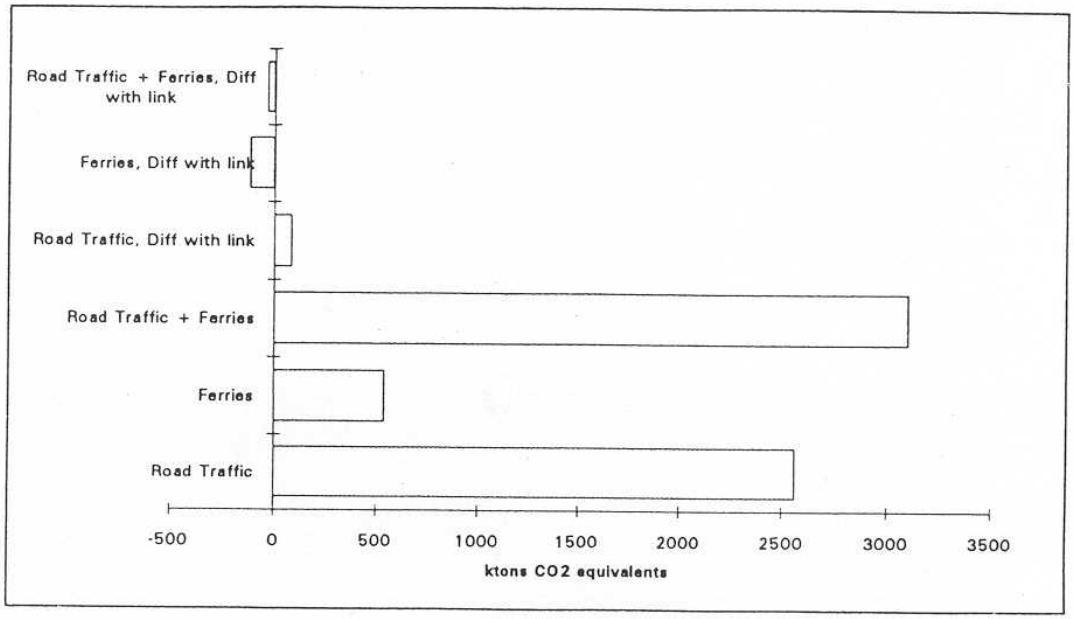

Figure 5 The contribution to the greenhouse effect by emissions of CO_2, N_2O and CH_4 from road and ferry traffic in southern Sweden, for scenarios with and without the bridge in the year 2000 (thousands of tonnes of CO_2 equivalents). (Öresundkonsortiet, 1992)

4.9 Noise and vibration:

During the construction of the bridge, the close buildings were exposed to excessive construction noise value for a short period. Noise barriers were obtained by constructing embankments opposite houses at an early stage.

Due to the operation of the bridge, the road and rail traffic will result in an increase in the noise level on land. The properties along the cost close to the bridge will be exposed to higher noise levels than they are today. The increase in the noise level is still lower than those permitted according to limit values.

According to the weather conditions such as strong wind towards the land, the audiability of traffic on the bridge may increase but such increase will not exceed the limited values.

The expected structure borne sound contributing to increase the noise level is small because a steel bridge is equivalent to concrete bridge in this respect.

Special attention was paid to the design of the bridge to reduce the structure borne sound. A number of measures were taken to reduce the generation of sound from the bridge such as a sound attenuating road surfacing and elastic attachment on rail or road bed insulation.

4.10 The monitoring programme of the Öresund fixed link:

The major environmental problems of constructing the Öresund fixed link were the impact on the Baltic Sea caused by the blocking effect of the construction and the impact on the local environment from compensation dredging activities.

To achieve the zero solution for the Baltic Sea, it means the increase in dredging in the proximity of the link with a disturbance of the local environment as a result. So no change in the water, oxygen and salinity exchange between the Kattegat and the Baltic Sea can happen.

A number of environmental objectives and criteria imposed by the Swedish and Danish environmental authorities satisfied by the construction works in order to obtain the balance between the impact on the Baltic Sea and the local environment.

The Danish public works act for the Öresund fixed link states that the link shall be executed with due consideration of what is ecologically motivated, technically feasible and financially reasonable in order to prevent detrimental effects on the environment. Ecological objectives for the environmental impact should be established together with a control and monitoring programme.

The completed structure and the construction work shall satisfy two overall environmental objectives imposed by the authorities (Ministry of Transport and Ministry of Environment and Energy, 1995)

Far field:

The Öresund link must not affect the Baltic Sea in such a way that chemical/physical and hence biological changes arise.

Near field:

The Öresund fixed link must only transiently cause conditions in the Öresund that are in conflict with the national plans for the coastal areas. More extensive effects can be accepted in an inner impact zone covering the area 500 m. Either side of the link trajectory measured from the north and the south sides of the completed link,

respectively, including areas where compensatory dredging is undertaken. Around the island of Soltholm, however, the zone must not extend closer than to a water depth of 1 m. Temporary effects can be accepted in an outer impact zone lying 7 km either side of the inner impact zone.

The permanent loss of areas as a result of the establishment of the artificial peninsula, artificial island and bridge piles, and permanent effects resulting from local changes in hydrographic conditions can be accepted.

Outside the outer impact zone the effects of the construction work must not hinder fulfillment of the objectives and criteria for coastal waters stipulated in the regional environmental plans. As far as the open parts of the Öresund are concerned, the construction work must not reduce the possibilities for establishing an indigenous natural flora and fauna.

More extensive effects can be accepted in the inner and outer impact zones, and special criteria for fulfillment of the objectives have therefore been drawn up for a number of selected aspects of nature and the environment (Ministry of Transport and Ministry of Environment and Energy, 1995)

According to Karup (1999), the Danish and Swedish environmental authorities and Öresundkonsortiet (ÖSK), which is a client company owned jointly by the Danish and Swedish governments and responsible for the planning and construction of the Öresund fixed link, had developed control and monitoring programmes to ensure that the spillage limits would not be exceeded and the quality objectives not violated.

The control and monitoring programmes were conducted at three different levels:

1. The contractor is contractually obliged to ensure that total spillage limits are not exceeded, and that the requirements to spillage intensity in time and space are

fulfilled. The spillage monitoring, conducted by the contractor, was supervised by (ÖSK) and the environmental authorities in Denmark and Sweden.

2. ÖSK was responsible for a feedback monitoring programme in order to ensure that timely measures were taken to avoid any risk of violation of any of the authority requirements both to the marine environment and the execution of the work.

3. The authorities independently carried out an effect monitoring program, which included sub-programmes on water quality, bottom, fauna, bottom vegetation, coastal morphology, herring migration, birds and bathing water quality.

The result from the constructors spill-monitoring programme had shown that the total dredging had been performed without exceeding the overall spill limit of 5%. This was one of the conditions in the EIA of the construction of the fixed link.

Chapter 5

Guidelines to apply EIA in the new national projects

There are a lot of changes, which are taking place in the methods of international trade as the world entered the twenty-first century. The fast grows in both the international production and trade assisted in converting the whole world to one huge system.

In the new system a geographical network connected by a global transport system organizes the global industrial production. The industrial production is now concentrated in new centers, which are considered as the main trade centers in the world.

Egypt as a developing country try to locate itself in the world map as an international trade center depending on a number of new national projects. These projects will depend on the available national elements in Egypt such as the cheap labour forces and raw materials to become international industrial and trade centers.

5.1 The national project to develop north Gulf of Suez (NGS):

Gulf of Suez as a strategic location connecting the whole world through Suez Canal is an example on the Egyptian new national projects for development. The idea of the project depends on the investment on the Gulf of Suez, as this gulf is not developed as hoped yet. The development will depend on the following Egyptian advantages:

a. Egypt is located in the middle of the world trade movement,

b. It is located in the center of the international oil production regions and surrounded by a huge quantities of oil,

c. It has a good diplomatic, social and historical relations with the different countries in the region and in the whole world,

d. It has the advantages of being relatively close to the international production and consumption centers,

e. It has the biggest population in the region which can be converted with education and training to a high production and cheap labour forces.

Egypt is proceeding now in privatization plan by which the private sectors participation in the national production increase gradually. The government start the national projects by constructing the infrastructure and the private sector invest in the construction of the projects, operation and production.

Egypt is taking into consideration the experience of the new industrial countries in Southeast Asia as they started their development by national development projects and succeeded to achieve one of the highest rates of annual growth in the world.

5.2 Why developing NGS:

North Gulf of Suez has the advantage of the excellent geographical position as one of the most important international maritime transport routes pass through it. It is the maritime transport route connecting the industrial centers in Europe / United States and the sources of raw materials and new industrial areas in Asia. Also connecting the industrial oil production centers in the Persian Gulf with the consumption and refineries in the north. The constructing of new ports in north gulf of Suez will give such ports the advantage of being centers connecting the producers and consumers all over the world.

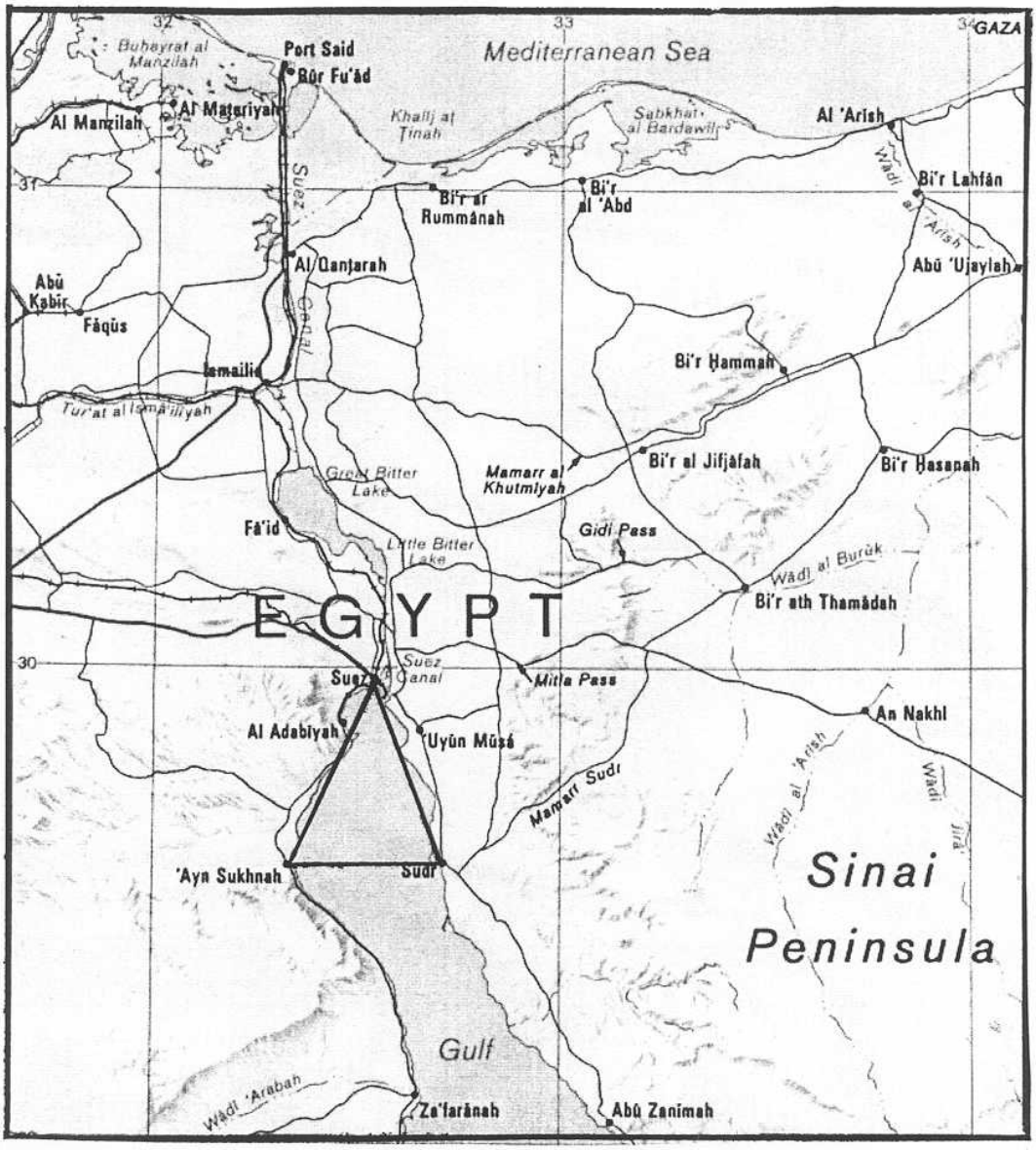

Figure 6 The NGS development region

5.2.1 The location of NGS:

The development project is located in the northern end of the Gulf of Suez. The region takes the shape of a triangle with its head to the north in Suez and Al adabiyah. The eastern side of the triangle extends from Suez in the north to Ras sudr in the south. The western side of the triangle extends from Suez in the north to Ayn sukhnah in the south. The base of the triangle extends from Ras sudr to Ayn sukhna in the south.

There are a number of activities in the region such as:

a. The ports of Suez and Al adabiyah,

b. The oil pipes connecting Suez and Alexandria (SUMED line),

c. The southern entrance of Suez canal,

d. A network of roads connecting the area with the different cities such as Cairo and Ismailia,

e. Oil refineries, factories for producing glass, textiles, cement and fertilizers,

f. Fresh water is available from a canal coming from the river Nile.

5.2.2 The resources in NGS:

5.2.2.1 The raw materials:

There are a lot of raw materials such as phosphate, manganese, limestone, copper and marble in the area which are used in the different industries all around Egypt.

It is more economical if the production is close to the raw materials supply. The raw materials in the area are essential for different industries such as iron and steel, petrochemicals, oil refinery and fertilizers.

The development in the area will depend on Ayn sukhnah in the west cost of the Red sea as one of the two development centers in the south of the development triangle. The other center is Ras sudr in the east cost of the Red Sea.

Ayn sukhnah as a new city will have a port and industrial area depending on the local raw materials. These activities will encourage the private sector to participate in the development of the city.

5.2.2.2 The NGS background area:

The NGS background area includes Cairo, the new industrial cities such as Tenth of Ramadan City, Upper Egypt and south Sinai. To encourage the growth of population and industry in NGS, some industries must be transferred from Cairo to NGS.

As Cairo has a lot of restrictions such as the high land prices and heavy traffic, the transfer of the industries will improve the environment in Cairo by reducing the pollution caused by the different industries. Priority must be given to the high-density labour forces to increase the population in the NGS and to reduce the population pressure in Cairo.

5.2.2.3 Servicing the transit ships:

The vessels transiting Suez Canal are sailing in two convoys, one from the Mediterranean Sea to the Gulf of Suez (South convoy) which proceed directly through the Gulf of Suez after clearing Suez canal. The other convoy from the Gulf

of Suez to the Mediterranean Sea (North convoy) in which the vessels wait in the anchorage area in NGS till the south convoy clear the area.

The large number of vessels in the north convoy waiting in NGS can be served by offering the unplanned repairs, which can be carried out in Ayn sukhnah port. Also provisions and fresh water can be supplied to such vessels with competitive prices.

5.3 How to develop NGS:

Ayn sukhnah area is the center of development in NGS development project. As the economic activities will be concentrated around the port and then will develop in the different directions, so the development will not need any support to continue but will depend on the self development and growth.

5.3.1 The main plan of NGS development project:

The aims of the NGS development plan are to attract the foreign investments to participate in the development of the industrial and free zones in the area. Also to maximize the use of the local raw materials in the industrial projects to increase the jobs opportunities for better standard of living for the Egyptian labour forces.

According to the development plan there are five zones for the strategic development:

a. New Suez zone:

A dwelling area and for light industry.

b. Al adabiyah zone:

An industrial free zone specialized in the export industries.

c. North of Ayn sukhnah:

Dwelling area, industrial zone with a big port and a coastal resort with yacht marina connected by navigational lines with Safaga in the south and the Mediterranean Sea in the north.

d. Ras sudr:

Tourist area by 2005 with international yachts harbour which has the capacity of 850 yachts and 2 berths with the depth of 6.5 meters. The industrial zone will be constructed after 2005.

e. North of Uyun musa:

An industrial zone.

The main plan depend on developing Ayn sukhnah area by constructing an industrial port which has an iron and steel factory, oil refinery and petrochemical industries.

The port will have berths for six general cargo ships and ten coastal vessels to transport the raw materials and the industrial production. A new city will be constructed with the capacity of quarter a million inhabitants. The industrial compounds, free zones and the tourist resorts will start operation by 2005.

5.3.2 Short range development plan:

There is also a short-range plan for developing Al adabiyah area as the density of the vessels using the port increased recently. The plan includes new industrial zone for local market and exporting production.

Al adabiyah port will be developed by adding two multipurpose berths for serving the self sustaining container vessels. Also constructing a berth for grain cargo and two berths for bulk cargo.

5.4 The future of NGS development project:

.1 The NGS development project will attract approximately 450 thousand people to the region in addition to the same number that will be attracted without planning with the availability of 234 thousand jobs. The NGS development project will contribute in the Gross Domestic Product (GDP) with 1.7% approximately.

.2 The adjacent regions will be affected as following:

a. Suez canal region:

The population reached 2.8 Million people in the year 2000 and the activity of Port Said, Ismailia and Suez cities will be integrated. So Port Said City will be specialized in the port activities and free trade, Ismailia City will be specialized in the administrative and culture activities, Suez City will specialize in industrial and port activities and Ayn sukhnah as a development region.

b. Red Sea region:

The population will increase in the major cities to 100 thousand people with the availability of 24000 jobs in the industrial sector and 10000 jobs in the tourism and fishery sectors.

c. Sinai region:

East of Suez region will have the petrochemical industries which will be connected to the other industries in the Suez Canal region.

5.5 The construction of a container terminal in the NGS region:

To develop NGS region a container terminal must be constructed as the region connect the raw materials extracting centers with the industrial center and the consumers with the producers. The international maritime trade depends

increasingly on the container transportation, which need suitable terminals to handle the huge number of container movements.

There is an idea to construct a container terminal to serve the Egyptian and the international trade according to the international system prevailing now known as "B.O.T" (Build, Operate, Transfer) or "B.O.O" (Build, Own, Operate). According to those systems the investor will build and own the container terminal for the period of time agreed upon in the contract. During the agreed period the owner will operate the container terminal and at the end of these period the ownership will be transferred to the authority granting the license. The authority granting the license of constructing the container terminal in the NGS region is the general authority for Red Sea ports.

5.6 The environmental impacts of port and harbour development:

It is noticed that one of the main elements in the NGS development project is the construction of different ports in Ayn sukhna, Ras sudr and the developing of Al adabiyah port by adding new berths to the existing port. But ports, harbours and similar maritime developments can have serious adverse impacts on many aspects of the environment.

A wide range of different environmental activities will be affected because of the nature of maritime works. Port and harbour developments normally create local environmental problems such as: accelerated erosion or accretion, the contamination of fishery through waste disposal and the loss of animal, plant, marine species and the natural habitats on which they depend.

According to the United Nations, (1992), There are various environmental aspects of port and harbour development that could result in an impact on the environment and they are:

5.6.1 Location of the port impacts:

.1 Probable impacts on water quality:

The construction of breakwaters may change the current pattern in the area causing the stagnation of water behind the breakwaters. Stagnant water may deteriorate through the increase of phytoplankton and the decrease of dissolved oxygen due to the eutrophication of water if municipal or industrial effluents containing nutrient salts flow into the port. Anaerobic water generates hydrogen sulphide, which has danger impacts on organisms and can be identified by its odour.

¤ Mitigating measures:

Select the site and design the port carefully to prevent water stagnation. Regulations on provision of sanitary treatment facilities and on discharges of effluents are essential to reduce the pollution.

.2 Probable impacts on coastal hydrology:

Changes in current patterns and coastal drifts may be caused from the location of a port. Small ships maneuvering near structures may be endangered by altered currents or reflected waves. The change of coastal drift may lead to erosion or accretion in shore zones.

¤ Mitigating measures:

Changes in current patterns and other coastal hydrology could be minimized by careful site selection and port design. Construction of seawalls, offshore breakwaters and periodical beach nourishment are typical measures against beach erosion.

.3 Probable impacts on bottom contamination:

Contamination of the sea bottom may be caused by the location of a port, which may accelerate sediment deposition in stagnant water behind structures. Pile structures shade the bottom and affect habitat. Eutrophication of water induces sedimentation of dead plankton, which generates an increase in Biological Oxygen Demand (BOD) which may cause fish deaths and problems with unpleasant foams and scums washing ashore.

¤ Mitigating measures:

Removal of contaminated sediments in addition to the measures mentioned in subsection 5.6.1.1 that could be effective measures.

.4 Probable impacts on marine/coastal ecology:

Aquatic fauna and flora are affected by the location of a port through changes of water quality, coastal hydrology and bottom contamination. The location of the port may also alter the coastal fauna and flora.

Reduction of fishery resources and the increase of undesirable species are usually linked to the decrease of bottom biota. The decrease in the number of species and the increase in the quantity of one or two specific species always related to the deterioration of water quality. Further deterioration may lead to the destruction of all kinds of aquatic biota.

¤ Mitigating measures:

Careful survey of the ecological characteristics of a project through EIA are essential for the welfare of endangered and fragile species and to minimize the disruption of their spawning seasons, areas and migration.

Adverse effects on marine and coastal ecology usually result from: deterioration of water and air quality, current pattern changes, bottom contamination, physical loss of water area and changes in natural land habitat. Mitigating measures mentioned in subsection 5.6.1.1 and 5.6.1.3 are effective for mitigating changes in aquatic and terrestrial habitat.

.5 Probable impacts on visual quality:

The creation of a port, port facilities, lighting and the optical disturbances affect on the visual quality of a project area. Some port facilities may give unpleasant impression to people.

¤ Mitigating measures:

The careful design of port should blend it with its surroundings. To improve port scenery, special attention should be given to the colors of port facilities and landmarks. A green belt zone around a port may block an unpleasant view of the port.

.6 Socio-cultural impacts:

Relocation of local community is often required when building or expanding a port. Such relocation sometimes causes religious, ethnic, tribal or cultural conflicts with local people. Industrialization and modernization may change the cultural traditions of the local community.

¤ Mitigating measures:

Survey of archaeological heritage sites should be undertaken well in advance and a preservation plan included in any port development plan. The disturbance to the

local community could be minimized by an appropriate resettlement plan. According to the United Nations, (1992), the following information should be provided during the evaluation stage of a development project:

a. Distribution of population around the project area:
   Initial population distribution, age composition, households, slums, social solidarity, public peace and order, infrastructure

b. Race composition:
   Majority and minority groups, cultural gaps, basic resources for life, racial conflicts

c. Removal and resettlement of local people:
   Removal population, conservation of community, condition of resettlement, opinions on removal and resettlement

d. Cultural heritage:
   Location of heritage, importance of heritage, legislation on preservation, possibility of removal

5.6.2 Construction impacts:

.1 Probable impacts on water quality:

Resuspention of sediments and turbid water are caused from dredging, deposition of rubble, pile driving, sand compaction and other construction work in water. Resuspension of sidements in water reduces sunlight penetration and leads to an increase in the level of suspended solids to toxic or harmful levels. Oil spills, leakage of other substances and garbage discharge in the water may be caused by the working vessels.

¤ Mitigating measures:

Appropriate selection of equipment in dredging, proper use of silt curtains and suitable transport of construction and dredged materials could minimize the adverse impacts of construction work. Proper disposal of dredged material is essential for the preserving of the environment.

.2 Probable impacts on coastal hydrology:

Changes in current patterns and flows, salt wedge intrusion into a river mouth or coastal drifts in the shore zone may be caused by dredging. Changes in coastal drifts cause beach erosion or accretion.

Leakage of harmful substances into ground water may be caused by disposal of dredged material or land.

¤ Mitigating measures:

Current flow is not seriously affected by dredging. Beach erosion could be avoided by carefully planning the steepness of the dredging slope and the deviation from the shoreline.

.3 Probable impacts on bottom contamination:

Dredging and construction works disturb bottom sediments and remove bottom habitat and may cause a loss of fishery resources. The direct dumping of dredged material alters bottom configuration and biota.

¤ Mitigating measures:

A survey of contamination of bottom sediments should be undertaken before dredging. During the survey, if substances or materials listed in the annexes of the London Dumping Convention are found, the dredged material should be treated

according to the provisions of the convention. Contracting parties to the convention had adopted specific guidelines for the disposal of dredged material at sea.

.4 Probable impacts on marine/coastal ecology:

Construction activities disturbance may cause displacement of mobile bottom biota and fishery resources. Fishery resources may be reduced due to dredging which removes bottom biota and dumping of dredged material, which covers bottom habitat.

Settlement of resuspended sediments on fragile marine fauna and flora damages the ecosystem particularly coral reefs. Contamination of fishery and shellfishery resources may be caused from resuspention of toxic substances through dredging or dumping.

¤ Mitigating measures:

Construction work needs appropriate planning which depends on careful survey of a fragile marine and coastal ecology. Selection of port site is the key to minimize adverse impacts, which are usually result from bottom contamination and deterioration of water quality.

.5 Probable impacts on air quality:

Dust from construction activities, emissions from construction equipments, trucks and other vehicles used in construction work and work vessels are possible sources of air pollution.

¤ Mitigating measures:

Use of proper transport methods such as conveyor belt, and water scattering in the construction site are methods for controlling dust emission. Temporary pavement of

roads in construction site and a green belt zone between the construction site and the local community could reduce the dust emission.

.6 Noise and vibration:

Construction equipment, truck traffic and work vessels may create a problem of noise and vibration.

¤ Mitigating measures:

Installation of sound insulation fences, adoption of low noise equipment and limitation of working hours could considerably reduce the noise.

.7 Waste management:

Spoils generated by dredging are the main wastes from construction activities. Destruction of plants, loss of vegetation and leakage of contaminated materials and salt may be caused from the disposal of dredged material on land.

¤ Mitigating measures:

Including the contaminated dredged material or other wastes from construction activities in land reclamation could offset their adverse impacts. Dumping of dredged materials should be treated according to the provisions of London Dumping Convention and relevant domestic legislation.

5.6.3 Ships traffic and discharges impacts:

.1 Probable impacts on water quality:

Ballast water, bilge water, sewage, garbage and oily wastes are possible discharges from ships that could be sources of water pollution. Other sources of water pollution

may be spills of fuels, lubricants and oils. Repair docks may be a possible source of toxic or harmful materials such as antifoulants and paints.

¤ Mitigating measures:

For proper control of effluent from ships there must be appropriate domestic legislation on ship discharges and provision of reception and treatment facilities. Recovery vessels, treatment chemicals, booms and skimers should be prepared for combating accidental spills. Proper contingency plans and a prompt reporting system are essential to oil dispersal prevention.

.2 Probable impacts on marine/coastal ecology:

Fishery resources and coastal habitat may be damaged by oily wastes and leakage of oils. Biodegradation of oil generates polymerized oil particles and toxic substances, which cause damage to bottom biota and spoil fishery resources including shellfish.

¤ Mitigating measures:

The same as subsection 5.6.3.1

.3 Probable impacts on air quality:

NO_2, SO_2, smoke, soot and fumes are pollutants generated by ships and may affect air pollution in the hinterland.

¤ Mitigating measures:

Effective means to reduce discharge of pollutants from ships are the proper detection of emissions from ships and the domestic legislation. A possible means to reduce pollutants could be the prohibition of the use of heavy diesel oil as fuel. (See MARPOL 73/78, Annex VI, in subsection 4.8.1).

.4 Waste management:

There are a number of wastes, which are generated from ships such as oily wastes, sewage, garbage and cargo wastes. The wastes cause oil pollution, floating garbage, odour and other degradation of water quality.

¤ Mitigating measures:

According to the international convention for the prevention of pollution from ships, 1973 (MARPOL 1973), as amended by the 1978 protocol (MARPOL, 1973/78), ports are requested to provide sufficient reception and treatment facilities to receive oily mixtures and residues generated from ship operations. Calling ships also need reception facilities for receiving their garbage.

Successful control of ship discharge depends on domestic legislation on discharge of oily residues, provision of reception and treatment facilities and proper detection.

.5 Socio-cultural impacts:

Serious damage to tourism may be caused by oil and oily wastes discharged from ships and reach nearby beaches. Fishery boat operations and pleasure boat cruising may be disturbed by ship traffic. The increase in the ship traffic may cause accidents, which have adverse impacts on the environment.

¤ Mitigating measures:

Regulating ships traffic by using vessel traffic services (VTS), regulating discharge from ships and an appropriate contingency plan for ships accidents could mitigate the problem.

Chapter 6

Conclusions and Recommendations

6.1 Conclusions:

There were a lot of activities and industries, which were established depending on technical feasibility and coast benefit only. The major deficiency in that manner was that it did not take the environmental adverse impacts, which may be caused by the industry into consideration. Also it was not able to put real monetary values on such adverse impacts.

The result was the development of a new evaluation approach, which is EIA. In the beginning the EIA evaluation approach was developed to evaluate the impact from activities and industries already established to introduce mitigating measures. But the most important EIA is that carried out before the construction of an industry or the approval of an activity which may cause adverse environmental impacts.

There are some difficulties in implementing EIA procedures in some developing countries due to several factors such as the lack of data and information required for EIA.

During the period between the 50'S and 80'S of the 20th century, a number of environmental polluting activities and industries were established in Egypt according to political decisions. As the environmental issue was not considered at all, those activities and industries caused negative impacts on the people and the environment. The negative impacts range from he death of plants, animals and another marine organisms to the reduction in the Egyptian GDP.

In order to protect the Egyptian natural resources, the government issued the law No. 4/1994 concerning the environment. According to the law, all the new activities and industries must be subjected to EIA before licensing the establishment.
The law identified the activities and industries subject to the EIA according to basic controls such as the type of the activity and the site of the establishment.

In order to compare the EIA legislation in Egypt as a developing country and the EIA legislation in a developed country, Denmark was taken as an example. Denmark is a member in the European Union and the European Council Directive is the basis for Denmark rules on EIA.

Egypt and Denmark issued their EIA legislation in 1994, which means that the importance of the EIA procedure was felt all over the world and for both the developing and developed countries.

According to the Danish EIA legislation the new project does not need EIA if it fulfills a number of criteria such as, the project is not likely to result in a significant noise nuisance and is not likely to reduce the planned water quality in streams, lakes or coastal areas.

In Denmark every citizen has the opportunity to express his ideas and proposals concerning the new project which will be used in the EIA procedures as the public participation can serve as a mechanism for exchange information.

The construction of the Öresund fixed link between Malmö in Sweden and Copenhagen in Denmark is a good example on the cooperation between the countries in the implementation of the EIA. The fixed link consists of an immersed tube tunnel, an artificial island and a bridge with a total length of 16 km.

The EIA done before the construction of the fixed link included the dredging work and reclamation, the impact on the traffic development, the blocking effect of the fixed link, the air pollution from the fixed link and the noise and vibration.

The construction of the Öresund fixed link according to the EIA procedures is a guide for application in Egypt as it is trying to develop it's economy by constructing a number of new national projects. One of the most important development projects in Egypt is the development of North Gulf of Suez. Such development will require the construction of different industrial free zones and ports to import raw materials and to export the products.

The area needs EIA to the intended projects and activities before their construction to protect the sensitive environment from any adverse impacts. The development of the North Gulf of Suez through the EIA procedures will give the area a promising future and will reserve it to our next generations.

6.2 Recommendations:

For better implementation of the EIA legislation, the author wishes to make the following recommendations:

§ Although the Egyptian EIA legislation was issued in 1994 it is implemented in the new projects and the extension of the existing ones only. What about the existing activities and industries which are polluting the environment for years?

  The EIA must be implemented on the existing industries and activities by evaluating their adverse impacts on the environment and to introduce mitigating measures such as supply the factories chimneys with filters to prevent the air

pollution or by transferring the different industries from inside the cities where they are now to specialized industrial zones outside the cities.

§ The EEAA in cooperation with the ministry of industry shall determine a transaction period for all the industries which are polluting the environment to carry out the EIA and to mitigate their environmental adverse impacts.

§ There must be a regional cooperation in carrying out the EIA as the pollution may be caused from a transboundary industry. Egypt as a leading member state in the Arab League must propose that all the member states must unify and harmonize their EIA legislation as the unification and harmonization of the EIA legislation protect the members environment and resources. In addition to the harmonization of the EIA legislation there must be cooperation in their implementation.

§ To facilitate the implementation of the EIA procedures the general public must be aware of the impacts of the development projects on their environment. There must be an active public participation in the EIA procedures and in each new development project there must be a chance to receive the ideas and proposals of the general public as the public participation may provide a source of information on local values and it can aid in establishing the creditability of the planning and assessment process.

§ The Egyptian government with its municipalities and different state agencies shall cooperate to make any data and information required for the EIA available.

§ The planners must be sufficiently aware of the environmental problems such awareness can be improved through cooperation programs with the more advanced countries in the environmental issues to exchange the experiences.

§ The implementation of the EIA procedures must be properly arranged so it can be carried out smoothly without any legal constraints.

§ The EEAA must prepare and train a sufficient number of experts whom are properly qualified with the required experience to implement the EIA all over Egypt.

§ The implementation of the EIA in the construction of the Öresund fixed link between Denmark and Sweden and the cooperation between the two countries in constructing the fixed link according to the results of the EIA which leaded to the minimum adverse environmental impacts can be considered as a guide for Egypt in its development projects and in how to cooperate with the other countries in the implementation of the EIA.

§ To have a good EIA system the EEAA must have a strong monitoring and feed back procedure to ensure that the EIA requirements are enforced.

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