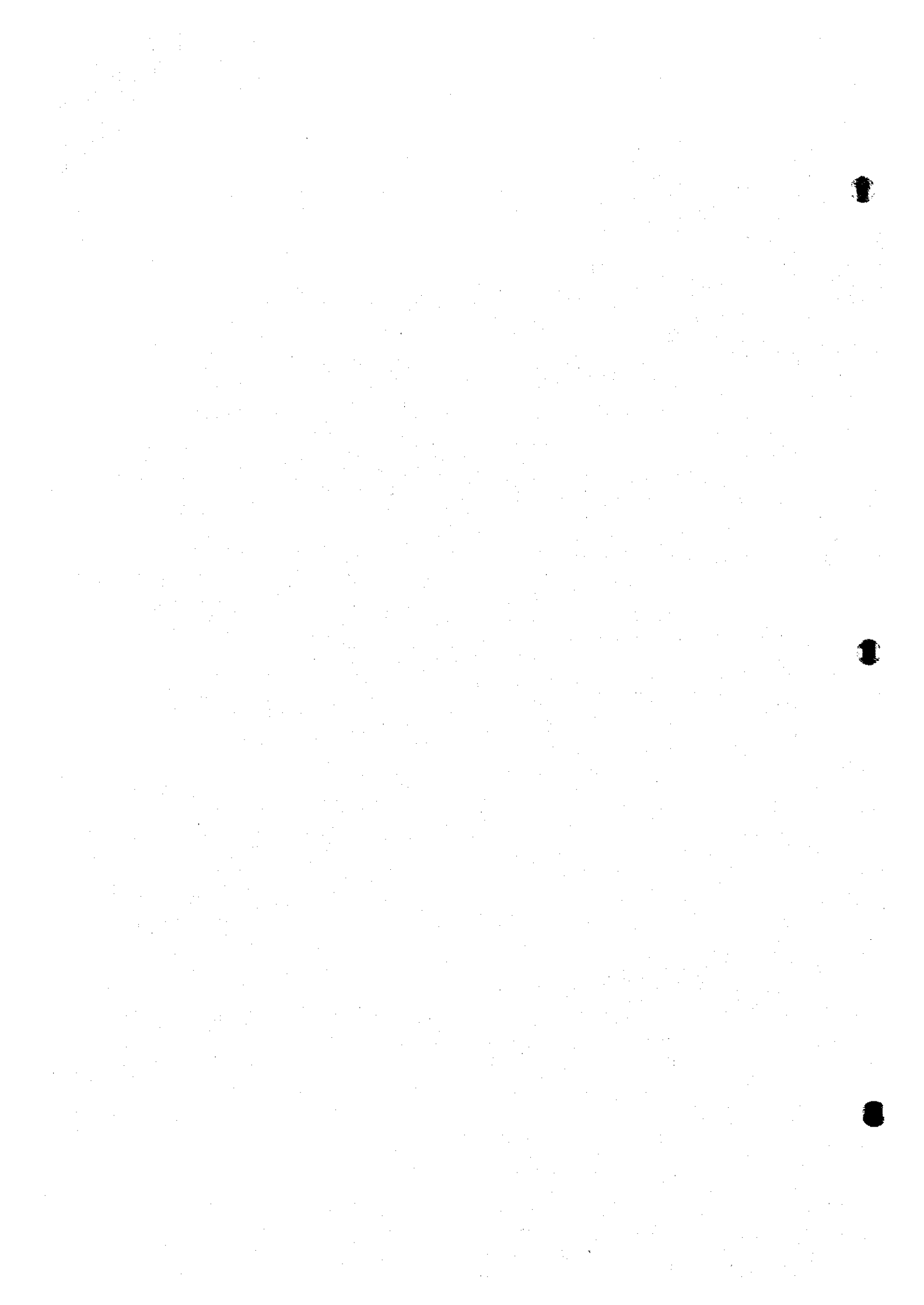


# FIGURES



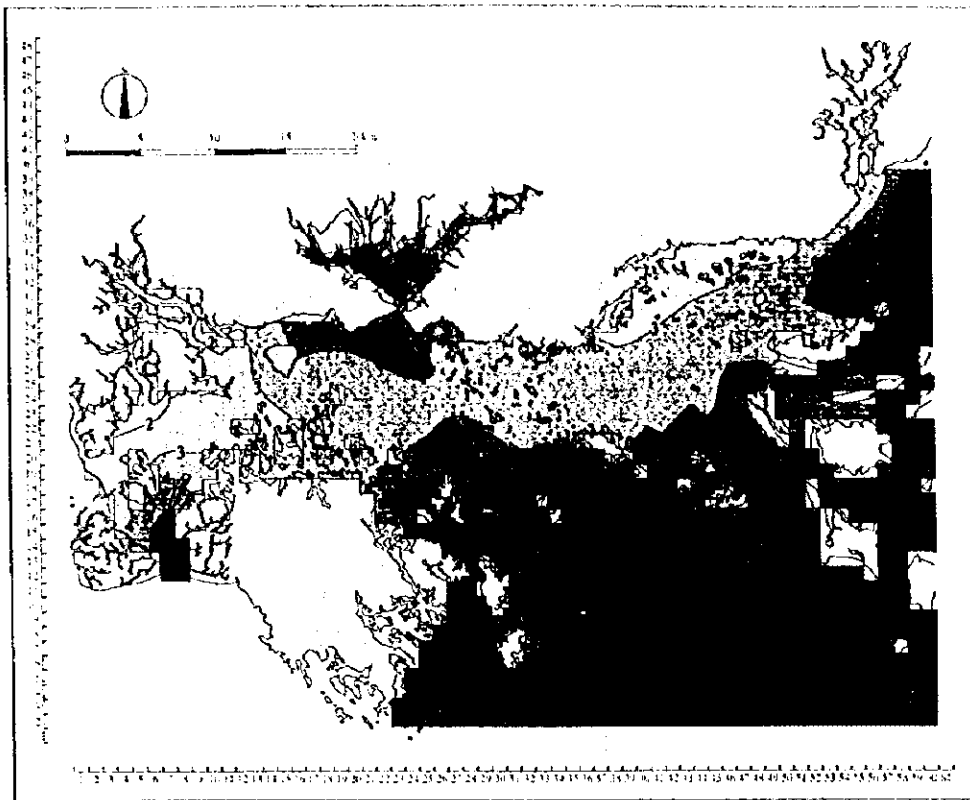


Figure 5.5.1 (1) Projected Future Water Quality "Without Environmental Management Plan"  
(COB, Upper Layer)

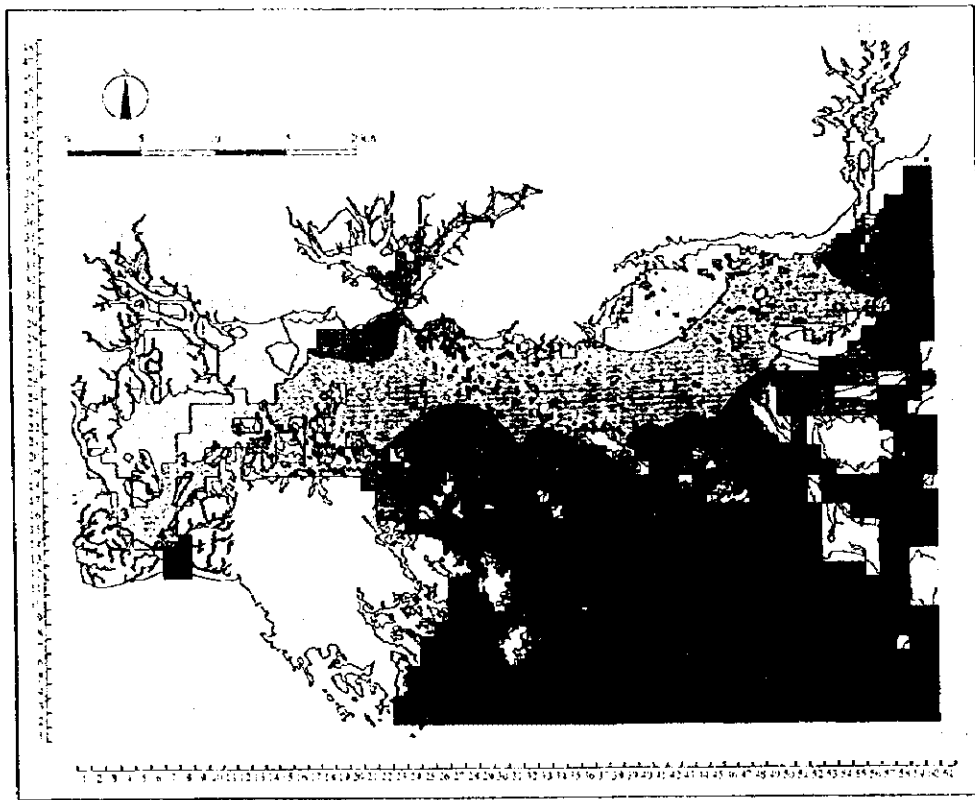


Figure 5.5.1 (2) Projected Future Water Quality "Without Environmental Management Plan"  
(COD, Lower Layer)

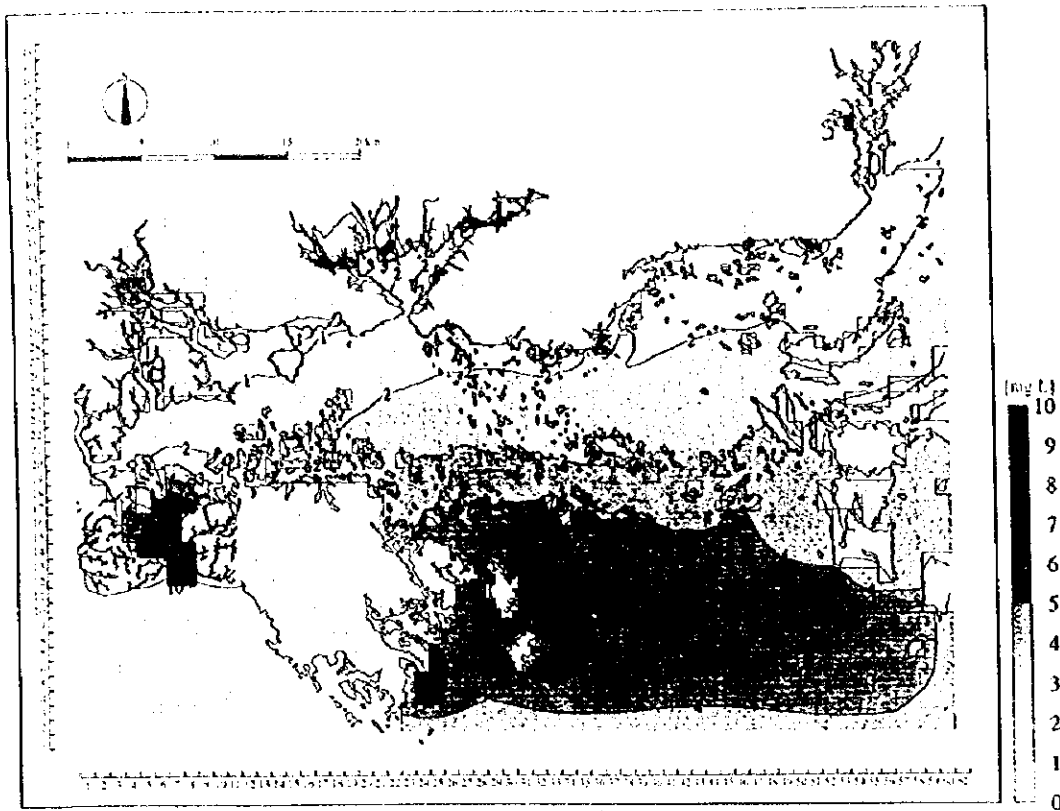


Figure 5.5.2 (1) Projected Future Water Quality "Without Environmental Management Plan"  
(SS, Upper Layer)

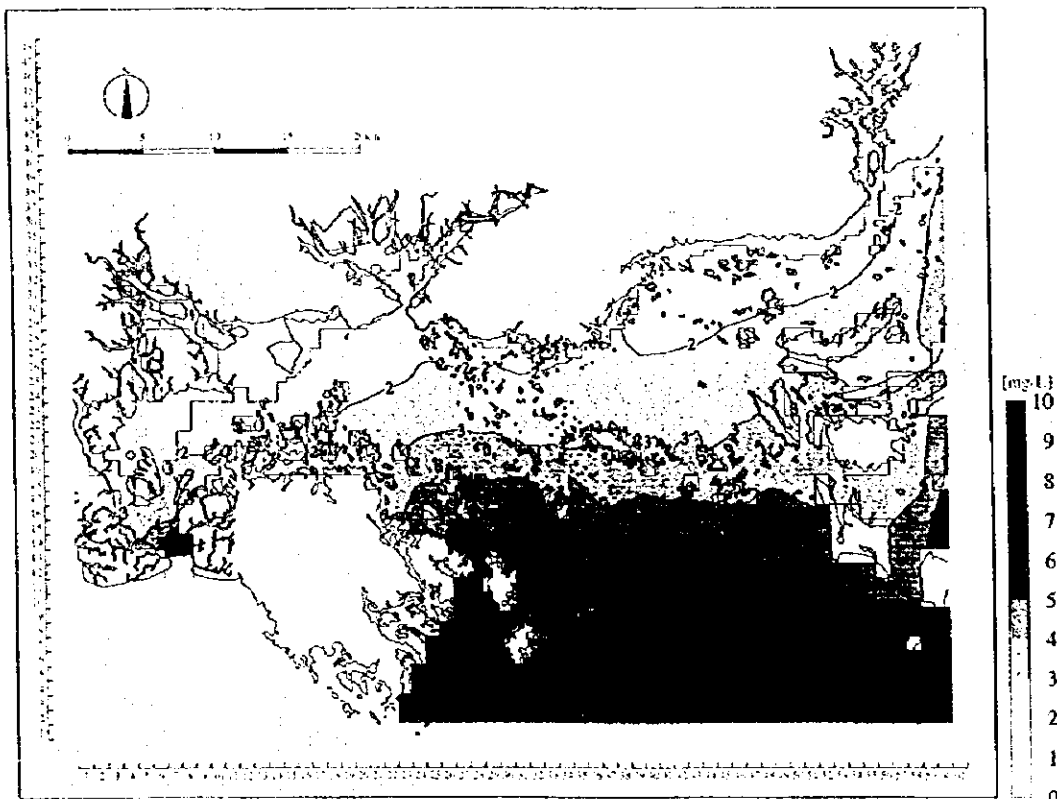


Figure 5.5.2 (2) Projected Future Water Quality "Without Environmental Management Plan"  
(SS, Lower Layer)

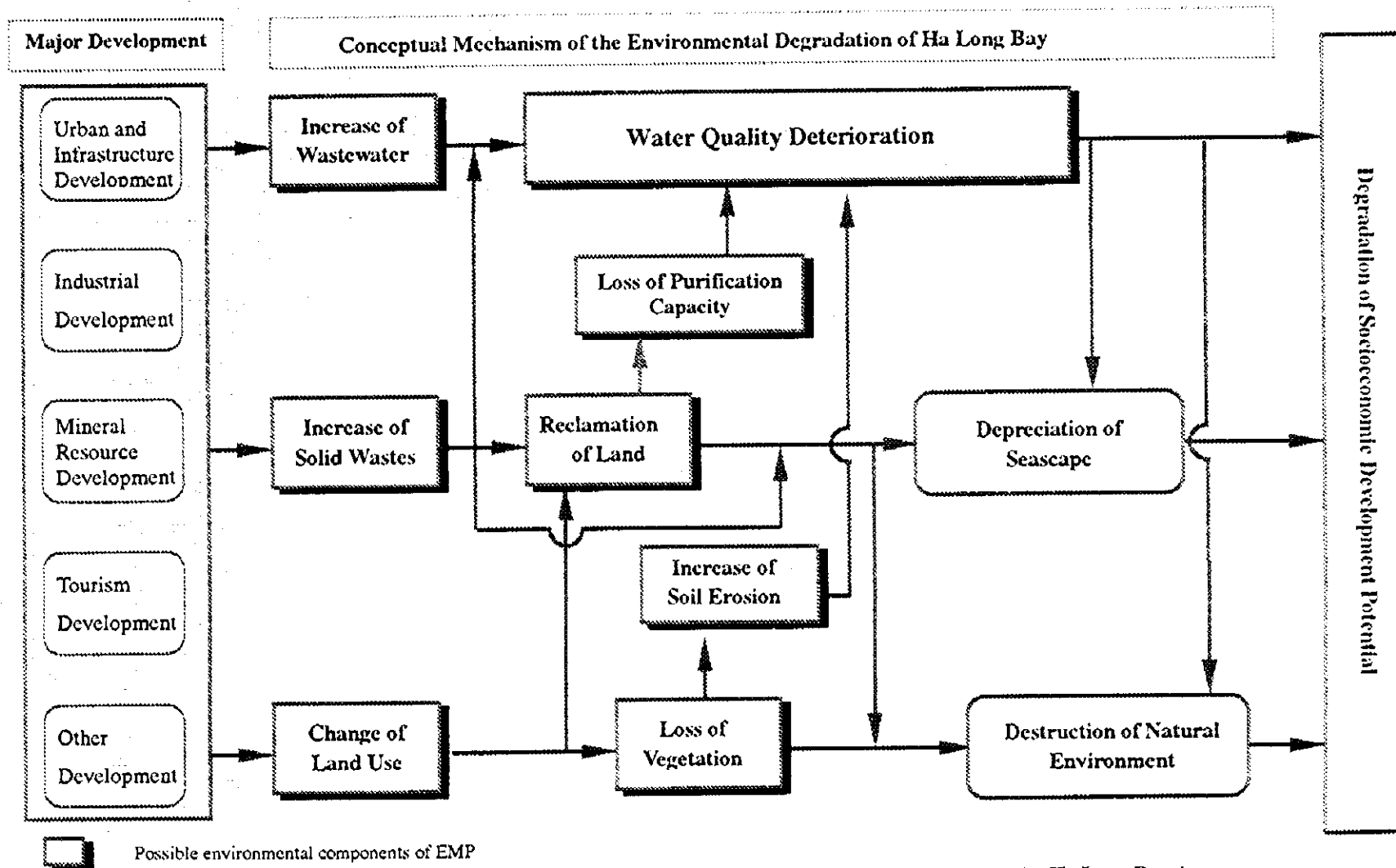
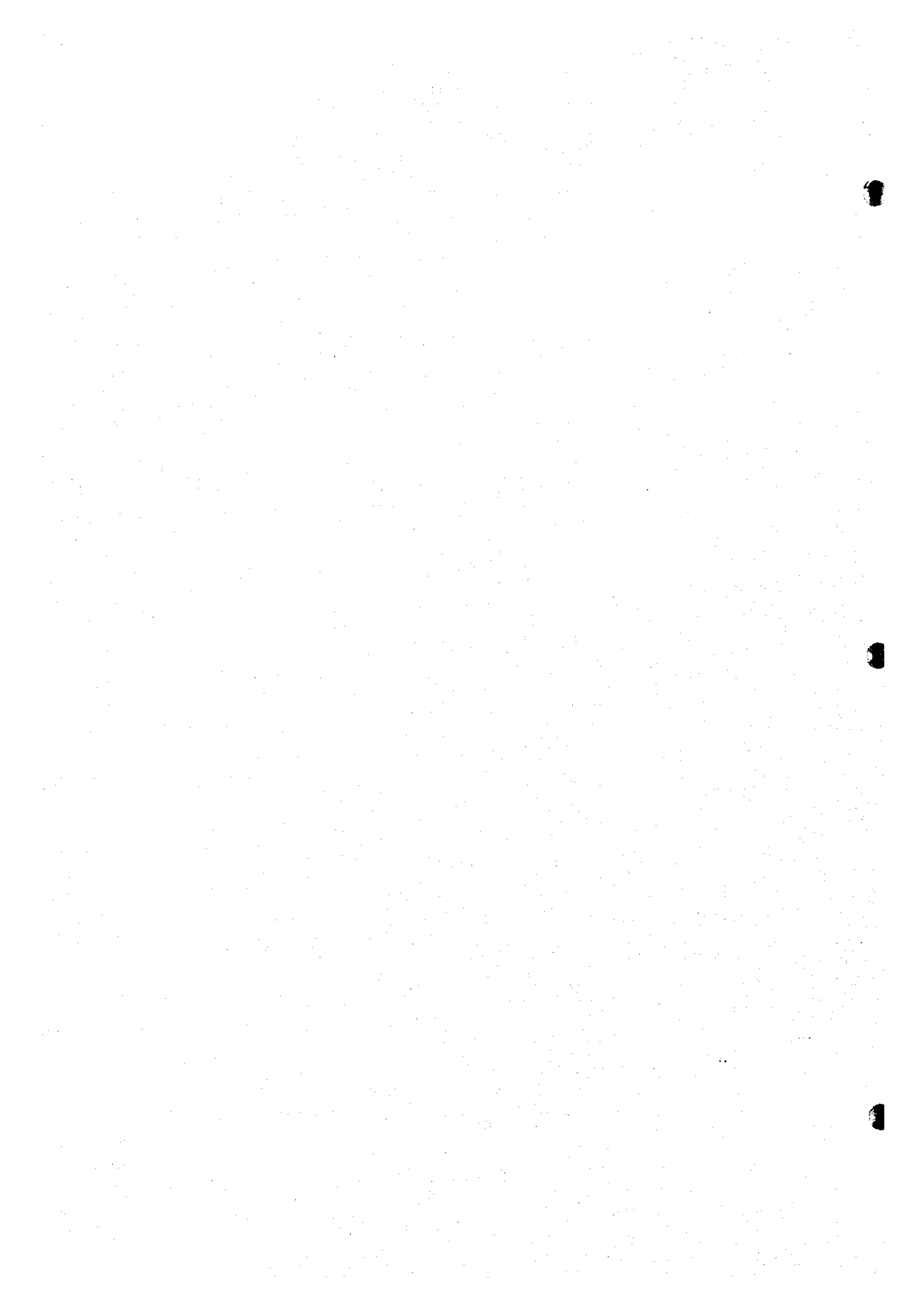


Figure 5.5.3 Environmental Degradation by Future Socioeconomic Development in the Ha Long Bay Area

**PART III**

**ENVIRONMENTAL  
MANAGEMENT PLAN  
FOR  
HA LONG BAY**

# CHAPTER 6





## PART III ENVIRONMENTAL MANAGEMENT PLAN FOR HA LONG BAY

### CHAPTER 6 BASIC FRAMEWORK OF THE ENVIRONMENTAL MANAGEMENT PLAN (EMP)

#### 6.1 General

##### 6.1.1 Policy of the EMP

Ha Long bay is famous for the numerous islands and islets with spectacular geological characteristics. For the aesthetic landscape of these islands and islets, it is a major sightseeing spot in Vietnam, and was inscribed on the World Heritage List of UNESCO in 1994. Together with Hanoi and Hai Phong cities, the Ha Long bay area forms the North Focal Economic Triangle which is defined as one of the three priority economic and industrial development regions in the country. The socioeconomic development potentials of the bay area are: i) close access to coal mines and high energy potential, ii) deep seaport of Cai Lan developed to become a major port for export, and iii) favorable and attractive natural resources in Ha Long bay for tourism. The bay area is, thus, precious in terms of both natural environment and economic development with anticipated growth of industry and tourism, and accompanying increase in urban area in the hinterland of Ha Long bay.

The national policy on environmental management has been set out in the "National Plan for Sustainable Development and the Environment (the National Plan)" approved by the Council of Ministers, which came into force on 12 June 1991, and the "Law on Environmental Protection (LEP)" approved by the National Assembly, which came into effect on 10 January 1994. The essence of the national policy on environmental management is: a) harmonizing socioeconomic development with protection of natural resources and the environment, and b) establishing and enforcing policies, action plans and institutional frameworks to ensure the sustainable use of natural resources in the process of socioeconomic development.

Based on this national policy, the Quang Ninh People's Committee (QNPC) has set the provincial environmental management principles and regulations especially

focusing on the environmental protection of Ha Long bay. The major principles are: a) promotion of cleaner technologies and pollution prevention facilities, b) introduction of "Polluter Pay's Principle (PPP)" and environmental fund, c) enforcement of public awareness related to environmental protection, and d) establishment of legal and institutional capability. The QNPC's environmental policy was summarized in the "Environmental Protection -Public Obligation-" in February 1998.

### 6.1.2 Current Environmental Problems in the Study Area

As the results of basic study, issues and focal points in the study area such as polluters, pollutants, and environmental resources to be conserved were identified. The issues and focal points are largely classified into three groups such as problems related to the World Heritage, caused by socioeconomic activities, and on environmental management. Identified problems are summarized below:

#### (1) Environmental Problems Concerned with the World Heritage

The water quality in the World Heritage area is not degraded on the whole at present, but the aesthetic value of the World Heritage area is degraded by the following problems:

##### 1) Low transparency

Transparency in and around the World Heritage area is low. This condition turned out to be brought by the existence of organic and inorganic pollutants, and phytoplankton in the water. The Field Survey revealed that the water in the bays is rather stagnant, so that the bays' assimilative capacity is small. In addition, the internal production of organic substances is active. It is necessary to pay attention to nutrients inflow to the bays as well as organic pollutant for conservation of the water quality.

##### 2) Possibility of water quality degradation by land based pollution

Total organic pollution load runoff in 2010 compared with the present will be 1.8 times of BOD, 1.4 times of COD. Nutrients runoff in 2010 will be 1.3 times in T-N and 1.1 times in T-P. The water quality simulation for 2010 without

countermeasures predicted increase of the COD level between Tuan Chau and Hong Gai areas covering a part of the buffer and core areas of the World Heritage. Preventive measures to water quality deterioration will be required.

3) Possibility of pollutants from offshore

The existence of water body with lower salinity was found in the offshore area. This condition is supported by the satellite image analysis of water temperature. The water quality, such as COD, SS, and nutrients of this water shows higher values than that in the center of Ha Long bay. It is necessary to pay special attention on the water quality in the southern outskirts of the World Heritage area.

4) Pollution load and garbage dumping from tourists

There are a number of tourists sailing to the World Heritage area. But most of the tourist boats do not have toilets installed, so consequently the wastewater is discharged directly to the bays. In addition, garbage generated by the tourists is dumped into the bays. The pressures on the World Heritage's environment will become larger with the increase of tourists in the future, requiring adequate countermeasures against this.

5) Oil pollution

The oil level observed in all the bays of the study area is high compared with its environmental standard. The oil in the bays comes from the shipping activities such as discharge of bilge water and oil spill from the floating gas stations. Oil slicks can be seen near these activities and facilities. This problem is caused mainly by lack of treatment facility and use of old ships or port facilities. Countermeasures against oil pollution should be implemented by the port and harbor sector.

6) Landscape interference by shipping activities

The sea lines such as Mieu, Ghenh Cam, Hang Trong, Buom cross the World Heritage area. In addition, some large cargoes anchor there for reloading. These shipping activities would partially affect the naturalness of the landscape.

## (2) Environmental Problems Caused by Socioeconomic Activities

Current socioeconomic activities in the study area consist of urbanization, agriculture, industry, mining, and tourism, and land use change. Environmental problems caused by these activities are as follows:

### 1) Water quality deterioration nearshore

As the results of Field Survey, relatively high values of concentration of BOD/COD and SS in the water were observed nearshore of Bai Chay, Hong Gai, Cam Pha areas. This indicates that these areas are influenced by land-based pollution loads. Bai Chay and Hong Gai areas show high values of organic parameters due to domestic wastewater. Cam Pha area has a high SS concentration mainly brought by coal mining activities.

In view of land based organic pollutants, domestic wastewater is the biggest contributor of BOD with share of 42% of the total runoff. About 22% of COD is discharged from domestic wastewater. Thus, countermeasures on domestic wastewater should be given a high priority. Non-specific pollution source is the biggest producer of SS. It occupies 80% of SS runoff. Among the SS runoff from non-specific pollution source, around 30% is from coal mining areas. Thus, countermeasures against the coal mining area are required urgently.

### 2) Lack of countermeasures for wastewater and solid wastes

The present sanitation conditions are unsatisfactory with respect to both sewage and solid wastes. In many cases, onsite sanitation facilities are poorly constructed and septage is often disposed of by unhygienic and unacceptable methods. The sanitary drainage channels discharge untreated wastewater either directly to the sea or to watercourses which drain to the sea. The coverage of solid wastes collection services is only about 50% by population and household garbage is often dumped at the roadside or in drainage channels. The landfill sites used for disposal of the collected solid wastes have neither been well controlled nor constructed as sanitary landfills.

### 3) Deforestation and sediment runoff

Forests have been logged for intensive agriculture, urbanization, limestone or cement exploitation, and coal mining activities, which is a significant change in land use. In the study area, about 2,000 km<sup>2</sup> of forested land in 1988 decreased to 1,800 km<sup>2</sup> in 1997, with a deforestation ratio of about 10% for the past 10 years. Deforestation had led to soil erosion. Forests will be continuously decreased by future development, consequently soil erosion in the study area will increase. Active control and management of deforestation and afforestation is required.

### 4) Decrease of tidal flat and mangrove swamp

Relatively rich biomass were observed in the tidal flats and mangrove swamps in the study area. They have the functions of purifying the water and providing nursery ground for fishery resources. But because the coastal zone is relatively narrow, there has been extensive land reclamation for urban development as well as dike construction for aqua-cultural ponds on tidal land and mangrove swamps. There are significant changes in land use within Bai Chay bay and along Ha Long bay. Tidal flat has decreased by 50%, and the dense mangrove areas are at present limited to the Hoang Tai island area, the estuary of Mong Duong river, the inlet of Quang Hanh area, and the seashore area of Bai Chay bay.

### (3) Problems on Environmental Management

The legal framework in general is well developed, but it doesn't work enough to lead an appropriate environmental management. Lack of trained staff, skills, and equipment are serious. Problems on environment management are as follows:

#### 1) Unclear demarcation of responsibilities

Responsibilities of environmental management are not clear between MOSTE and other ministries. Moreover, each of these national ministries must set policies and delegate responsibility to the provincial authorities including QNPC. At the provincial level, there is also a need to clarify the responsibilities between DOSTE and the departments of other ministries.

2) No introduction of economic instruments

Economic instruments are least used within the Vietnamese regulations to prevent pollution and environmental damage partially due to its transition economy stage, although there is a legal mandate for such programs. A number of problems can be anticipated in obtaining agreement on new introduction of economic programs from industrial facilities and other polluters. Likewise, there are as yet no pollution charges programs in Quang Ninh province.

3) Poor environmental monitoring

For implementing environmental management, scientific and technical information is needed. But existing monitoring in the study area is poor. No periodic monitoring station or systematic monitoring program exist, mainly due to budget constraints of the province. The shortage of technology, equipment, and skilled personnel needs to be improved to execute sufficient environmental monitoring. For example, quality assurance and control procedures are often inappropriately applied in the steps of the monitoring program, and experience in designing of monitoring programs is limited. It is necessary to prepare an urgent scheme as well as an advanced program to work in accordance with the national and international level of environmental monitoring.

4) Lack of trained staff for environmental management

More environmental staff is needed in most branches of the government. New and existing staff require considerable training and retraining. DOSTE has 5 divisions, but it does not have sufficient staff with adequate training to fulfill management responsibilities. The Port Authority does not have an environmental management division, and few of its staff had environmental training. Other provincial organizations such as the Department of Transportation and Fisheries also have very poor numbers of staff for environmental conservation activity. Environmental research and development to find new solutions and technologies must complement technical training and institutional capacity building.

5) Poor techniques and equipment

Capacity building is needed to put an environmental management system as well as monitoring and laboratory systems in place. These systems are necessary to

provide decision-makers with reliable information about the changes occurring in the environment as a result of human activities. It is also a problem that systematic linkage between environmental degradation monitoring and management strategy is hardly highlighted.

6) Limited financial resources and budget shortage of local agency

Most ministries do not have sufficient financial resources to fulfill their environmental responsibilities and to conduct the necessary research. Considerable effort and funding are required to increase the financial capacity of the existing agencies.

7) Poor public awareness

The general level of environmental awareness of the local people is relatively low. The pressure from socioeconomic development by those people lacking in environmental awareness, can decline the environmental quality. HLMB is facing a major difficulty of lack of public awareness of laws and regulations related to management of Ha Long bay

(4) Emergency Response against Environmental Accidents

Environmental accidents are another issue related to the port and harbor development in and around Ha Long bay. Different types of ports and harbors are under operation or preparation for a number of vessels including coal handling ships, car ferries, oil tankers and fishermen or tourists boats sailing in and around the bays. In addition, there are many floating gas stations in the bays. Thus, there is always a possibility that environmental accidents such as fire, oil spill and vessels collision could occur, and consequently damage natural and social assets including human lives especially at the World Heritage area.

Therefore, reinforcement of capability for emergency response against environmental accidents should be recognized as most necessary in the EMP area. The enterprises of the development projects and owners of ships should take emergency remedial measures to deal with such accidents, and should report cause and effect of the measures to QNPC. It is also recommended that detailed emergency response methods should be examined in the course of EIA of individual development projects.

### 6.1.3 Justification of the EMP

The development of a comprehensive Environmental Management Plan (EMP) for Ha Long bay is acutely needed, and it is justified by the specific background of Ha Long bay and the strong intention of Vietnamese people concerned.

The EMP for Ha Long bay is prepared basically subject to the socioeconomic development framework of the Development Master Plan of Ha Long City for 1994-2010 (HLMP). However, the EMP should propose various measures of environmental considerations which are specifically designed to be incorporated into the amenable elements of the city's master plan to attain the vision and goals mentioned below. The amendable elements should be specific processes or details of development projects in terms of land use, priorities, extent of development, schedule, phasing, and so forth. It means that the EMP for Ha Long bay shows the action plan of environmental consideration of the Ha Long bay area.

The EMP indicates the implementation program, the relation with the local development plans, and the environmental benefit of the local society as much as possible. Thus, the EMP should lead the people concerned to contribute and participate in environmental protection, and should guide the direction of environmental consideration in regional development plans by giving common environmental goals and targets of Ha Long bay.

## 6.2 Vision and Goals

### 6.2.1 Vision

The fundamental vision of the EMP for Ha Long bay is to be set as follows:

**“Environmentally Sound and Sustainable Development  
of the Ha Long Bay Area”.**

### 6.2.2 Goals

The goals to attain this vision are to be set as follows:



**(1) Absolute Protection of the World Heritage (Goal I)**

Ha Long bay is designated a World Heritage because of its unique aesthetic seascape of islands and islets, and it is invaluable for all people both in Vietnam and the world. Thus absolute protection of the World Heritage should be made a top priority of the EMP.

**(2) Achievement of Environmental Protection for Sustainable Economic Growth (Goal II)**

The Ha Long bay area forms the North Focal Economic Triangle due to its high development potential, and QNPC has prepared the development master plan of Ha Long city. The officially promised development of the hinterland area will cause environmental impacts to Ha Long bay, so environmental protection is required to achieve sustainable economic growth.

**(3) Establishment of Enforcement Capability of Environmental Management (Goal III)**

Realization of the environmentally sound and sustainable development fully depends on the enforcement capability of responsible agencies. Thus, the legal and institutional enforcement capability and capacity building must be strengthened.

The general concept of vision and goals is shown in Figure 6.2.1.

**6.3 Target Area of the EMP**

Considering the invaluableness of the World Heritage area in Ha Long bay, the target area for the EMP is principally defined as i) the bays in the area designated for the World Heritage and its buffer area, and ii) the hinterland areas which may affect the environment of the bay.

The hinterland areas which directly affect environment of the bays are selected by watershed of the rivers flowing into Bai Chay bay, Ha Long bay, and Bai Tu Long bay. It includes the entire area of Ha Long city, and part of Cam Pha town, Hoanh

Bo district, Yen Hung district, and Cat Ba island. Key points for setting the area of the EMP are as follows:

- a) The World Heritage area extends to Ha Long bay and Bai Tu Long bay. Thus, these two bays need to be included in the area of the EMP taking environmental impacts from the hinterland into account.
- b) The information related to socioeconomic development is basically provided through the "Master Plan of Ha Long City for 1994-2010, the Ministry of Construction, 1994 (HLMP)". Since HLMP envisages the following development stages to expand the area of Ha Long city, the area of the EMP needs to include these expansions.
  - 1st Stage (1993-2000): consolidation of Viet Hung and Dai Yen communes in Hoanh Bo district.
  - 2nd Stage (2000-2010): consolidation of a part of Troi, Le Loi, Thong Nhat, Vu Oai, and Son Duong communes under Hoanh Bo district, and Minh Thanh commune in Yen Hung district.
  - 3rd Stage (after 2010): consolidation of a part of Cam Pha town and several communes in Hoanh Bo district.
- c) Coal mining activities could be the most significant environmental impact on Ha Long and Bai Tu Long bays. Thus, the area of the EMP should cover the major coal mining areas in Ha Long city and Cam Pha town.
- d) Discharge of the Mip river clearly influences the environment of Ha Long bay and its river mouth area is considered an important ecological zone. So, the Mip river watershed and the Binh Huong estuary should be included in the area of the EMP.
- e) The satellite image analysis implies that the Hong river would have little influence to the water quality of Ha Long bay, though some influence could be considered from the Thai Binh river and the Bach Dang river. To establish the EMP, however, it is reasonable that such impacts from offshore area be set as boundary conditions.

Thus, the area of the EMP can be delineated as the watershed of the Mip, Troi, Man, Dien, and Mong Duong rivers in the north, the river mouth area of the Mong

Duong river in the east, the Binh Huong estuary in the west, and the World Heritage area in the south as shown in Figure 6.3.1. The total area of the EMP is about 2,500 km<sup>2</sup> including 1,300 km<sup>2</sup> of sea area.

#### **6.4 Target Year**

The EMP is prepared basically subject to the socioeconomic development framework of HLMP prepared by QNPC. Thus, the target year of the EMP is set as 2010, same as that of HLMP.

#### **6.5 Targets Management Items**

The target management items for Goals I and II can be categorized into 2 groups namely, water quality and environmental resources, while the target management items for Goal III consist of technical and institutional capacities. Considering the approaches and strategies of the EMP, the following target items were selected for formulating the EMP.

##### **6.5.1 Water Quality**

Although there are many kinds of environmental factors in the EMP area, the water quality is considered a key integrated factor from an environmental management viewpoint in the EMP area considering the mechanism of environmental degradation of Ha Long bay. Therefore, the EMP was developed putting high priority on water quality management.

##### **6.5.2 Environmental Resources**

###### **(1) Natural Environment**

Normally, forests and fishes are defined as renewable natural resources. As well, tidal flats, mangrove swamps, and coral reefs can be considered to be environmental resources in the EMP area, because they are playing important

roles in maintaining good environment as well as ecosystem. Thus, target items were selected also from the components of natural environment.

## (2) Landscape

To keep a beautiful and attractive landscape of the World Heritage area is the essential element of the EMP. Landscape in the EMP area is composed of shape and conditions of islands, water conditions surrounding islands, and their combination. For keeping the landscape of the islands in good condition, conservation of natural impression is very important. Thus, the elements of landscape in the World Heritage area were selected as target items of the EMP.

### 6.5.3 Technical and Institutional Capacities

To implement the EMP certainly and steadily, it is essential to strengthen the technical and institutional capacities responsible and executing agencies. Although it is hard to set rigid numerical indexes, it is required to select clear target items and set their desirable levels for capacity building. Thus, the target items were selected for each component of capacity building.

## 6.6 Approach and Strategy

In order to attain the vision and goals of the EMP for Ha Long bay, it is necessary to set an administrative approach and strategy which will guide actual environmental components and projects of the EMP.

Since the goals of the EMP are set as (1) Absolute Protection of the World Heritage (Goal I), (2) Achievement of Environmental Protection for Sustainable Economic Growth (Goal II), and (3) Establishment of Enforcing Capability (Goal III); the approach and strategy should be taken from the factors which have close relation with the goals, and should lead quantitative indexes for evaluation of progress and effect of the EMP.

Although there are many kinds of environmental factors in the EMP area, water quality is considered a key integrated factor from an environmental management viewpoint in this area considering the mechanism of environmental degradation of

Ila Long bay. Therefore, the EMP will be developed putting high priority on water quality management.

#### 6.6.1 Absolute Protection of the World Heritage (Goal 1)

For this goal, the following approach and strategy will be taken for the EMP.

##### (1) Keeping Clean and Clear Water Quality of the World Heritage Area

Clean and clear seawater quality is no doubt the base of attractive seascape and landscape of the World Heritage area. It also enables conserving the habitat of the valuable ecosystem and marine resources. Thus, the strategies taken in the EMP are as follows:

##### 1) To control pollution load of both the World Heritage area and its hinterland

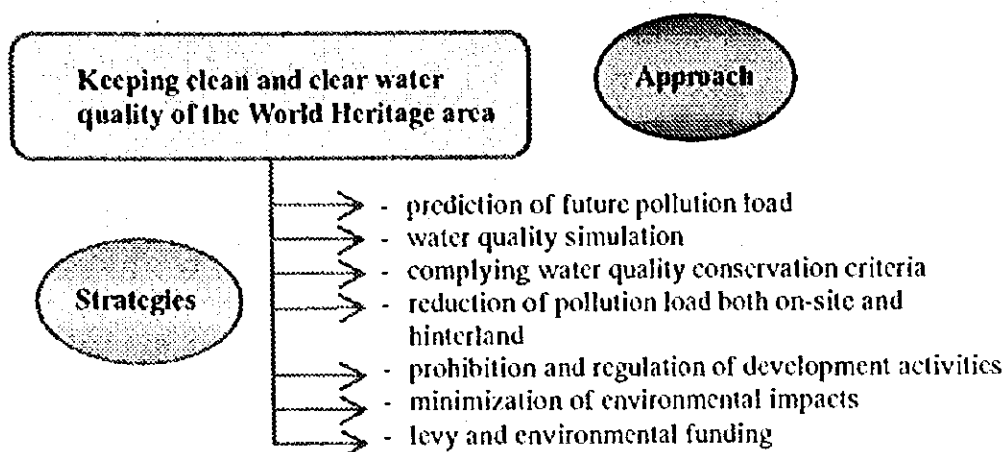
This is the most practical and effective prevention way to be tackled in the EMP. It requires clarification of water quality factors such as transparency, BOD, COD, SS, T-N, T-P, and allowable load volume. The quantitative figures should be proposed in the EMP based on the analysis results of water quality pollution mechanism, future pollution loads subject to economic development frame, and water quality simulation.

The water quality conservation criteria is to be set to show an actual management goal and to evaluate effectiveness of countermeasures. Although GOV has their own environmental standard of water quality, it could not be applied directly to the area due to a lack of SS and higher values compared with the current water quality conditions in the area. Therefore, an appropriate water quality conservation criteria is to be newly applied for the World Heritage area.

##### 2) To prohibit development activities in the core area, and to minimize environmental impacts in the buffer area of the World Heritage area

Any development activities in the core area are prohibited by the regulation of GOV. It is necessary to protect the environment in the World Heritage area. However, several development activities such as the Tuan Chau tourism resort project, the Hung Tang reclamation project, the Hon Net floating port project, are planned in the buffer area. The specific impacts caused by these projects should be

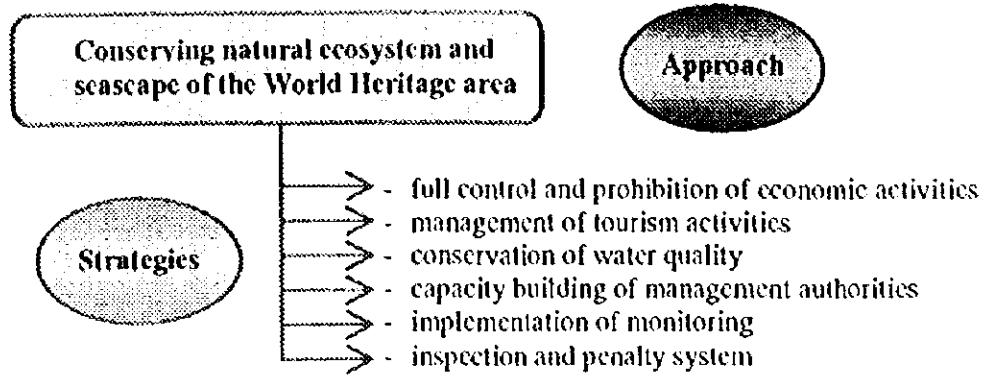
controlled in accordance with the Environmental Impact Assessment (EIA) procedure introduced in Vietnam. There could be accumulative impacts in future even though each project complies with the national discharge standard, and this might cause indirect impacts to the core area. Therefore, the EMP needs to clarify this impact as quantitatively as possible, and to propose countermeasures to be taken by the responsible organizations.



## (2) Conserving Natural Ecosystem and Seascape of the World Heritage Area

The World Heritage area has valuable natural ecosystems such as coral reef area and fishing ground. Its natural beauty of harmonized islands, sea, and sky is invaluable for tourism attraction. Since a quantitative approach is not directly applicable for natural ecosystem and seascape, its conservation criteria is to given in terms of water quality considering suitable habitat conditions for the natural ecosystem and the current beautiful seascape.

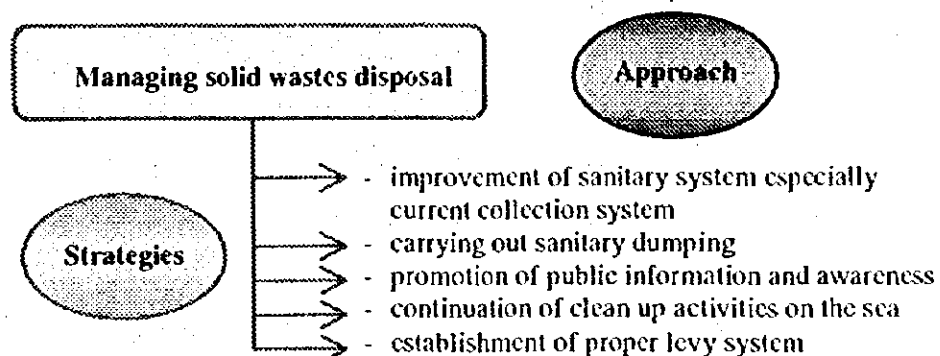
The present Vietnamese regulations strictly prohibit any economic activities that could damage the natural ecosystem of the area. This means that the conservation of natural ecosystem fairly depends on the enforcement capability of the Vietnamese management authority of the World Heritage area. Thus, the EMP focuses on the capacity building of the organization to monitor and inspect economic activities and penalize those that damage the environment.



### (3) Managing Solid Wastes Disposal

This component has a clear cause and effect relationship. Poor solid wastes collection service (less than 50% is collected) and improper waste dumping in the Ha Long bay area is considered a main problem to be tackled in the EMP. Thus, the establishment of a complete solid wastes management system should be a strategy of this matter.

Although there is no doubt about the importance of the public awareness and public education of wastes disposal, these measures could not ensure the effects. Therefore, a rigid numerical index is not set but it is the strategy of continuous administrative efforts in the EMP.

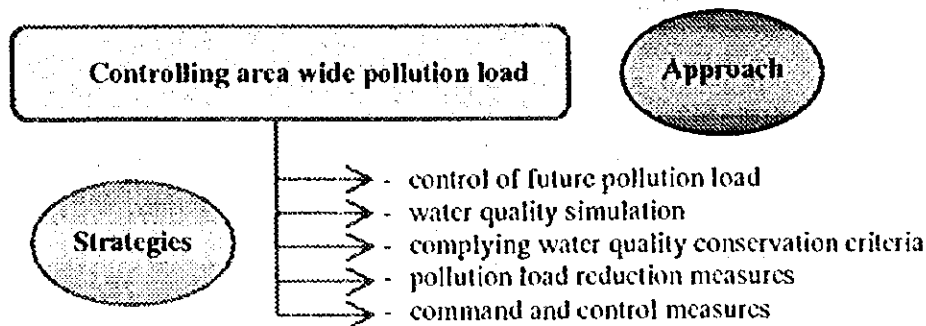


### 6.6.2 Achievement of Environmental Protection for Sustainable Economic Growth (Goal II)

For this goal, the following approach and strategy is taken for the EMP.

### (1) Controlling Area Wide Pollution Load

It is broadly understood in the world that the deterioration of the environment degrades economic development potential. Based on the zoning results described in the section of "Environmental Zoning", an allowable pollution load of water quality items such as BOD, COD, SS, T-N, T-P, is set by each zone for protection of the environment of Ha Long bay in accordance with the national discharge standard. The quantitative figures should be shown in the EMP based on the analysis results of water quality pollution mechanism, future pollution loads, and water quality simulation. Considering the conditions of pollution sources, necessary countermeasures should be proposed to control and reduce pollution loads in the EMP.

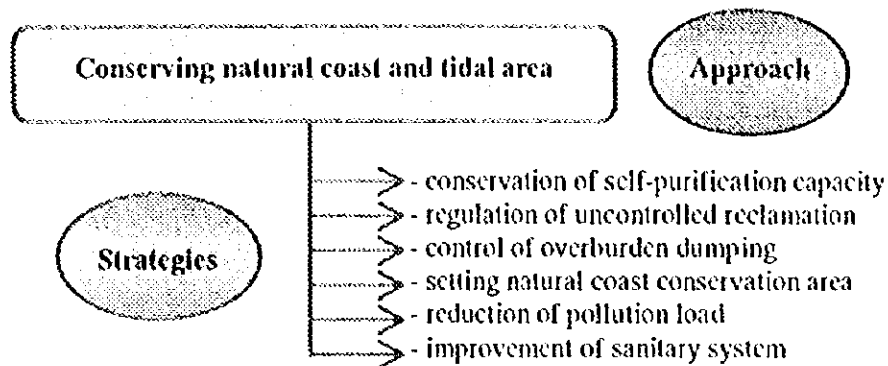


### (2) Conserving Natural Coast and Tidal Area

About 200 km<sup>2</sup> of natural coast and tidal area can be found in the EMP area, and it has very important functions such as self-purification capacity of water quality, habitat and hatchery ground of coastal fauna, and existence of mangrove forests. However, it is now threatened by reclamation, coal overburden dumping, and bridge construction. Moreover, further destruction and degradation could be considered by the actual progress of urban, industry, and tourism development in HLMP in future.

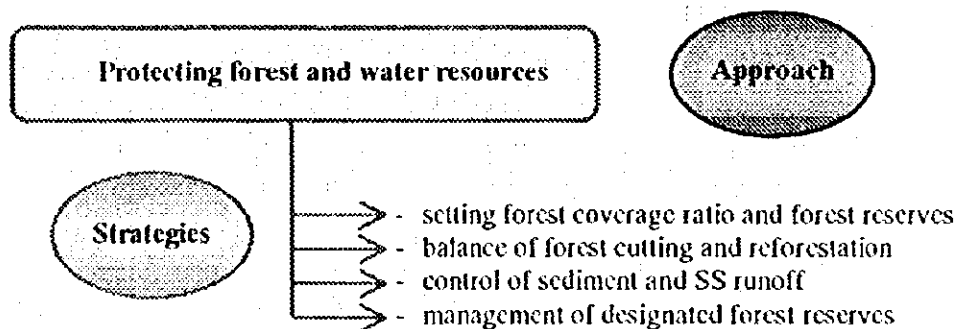
Due consideration of the importance of the natural coast and tidal area, the indexes of acreage and self-purification capacity are applied for the conservation strategy in the EMP. Moreover, an alternative land use plan is also proposed for conservation of the natural coast and tidal area especially focusing on mangrove forests.





### (3) Protecting Forest and Water Resources

The amount of forest coverage is closely linked with the amount of sediment runoff of the watershed which impacts on water quality of the downstream rivers and bays. This impact can be measured by the pollution load of SS as a non-specific pollution source. At present, the designated forest area is more than 60% of the total EMP area, but its actual forest coverage ratio is actually only 32%. QNPC has an aggressive reforestation plan to meet the target of 40% and to be well balanced by cutting and reforestation activities in accordance with the provincial forest sector development policy. Therefore, the target forest coverage ratio of 40% could be an index for protection of forest and water resources. The Mip river forest reserve, Don Ho lake forest reserve, Hoa Binh forest reserve, Don Song Ky Thung forest reserve, Quan Hanh Stone Mountain forest reserve, about 400 km<sup>2</sup> in total, are designated as the forest reserves by the provincial government. Thus, the protection of these forests are made a high priority.



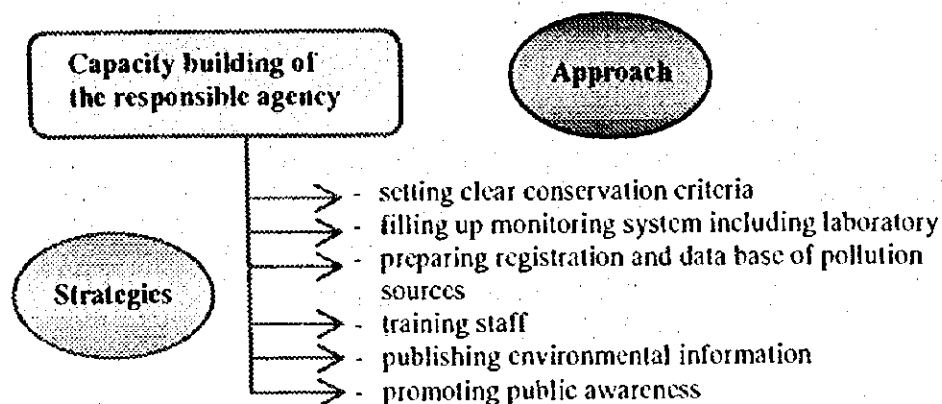
### 6.6.3 Establishment of Enforcement Capability of Environmental Management (Goal III)

Despite the great efforts of Vietnamese agencies responsible for environmental management in the Ha Long bay area, a lot of difficulties still remain in terms of enforcement capability. Reviewing the current situation, several key issues can be pointed out, for example 1) strengthen enforcement capability and decision support systems, 2) utilize economic and regulatory instruments, 3) increase public and stakeholder participation.

Although the goal of the establishment of enforcement capability is highly intangible and it is hard to set rigid numerical indexes, it requires more efforts with step by step approach envisaging a locally oriented appropriate system. There is no doubt that the environmental conservation mostly depends on the enforcement capability of the Vietnamese management authority of the Ha Long bay area. Therefore, the following two approaches are proposed, (1) Capacity building of the responsible agency and (2) Institutional set up for enforcement of the EMP.

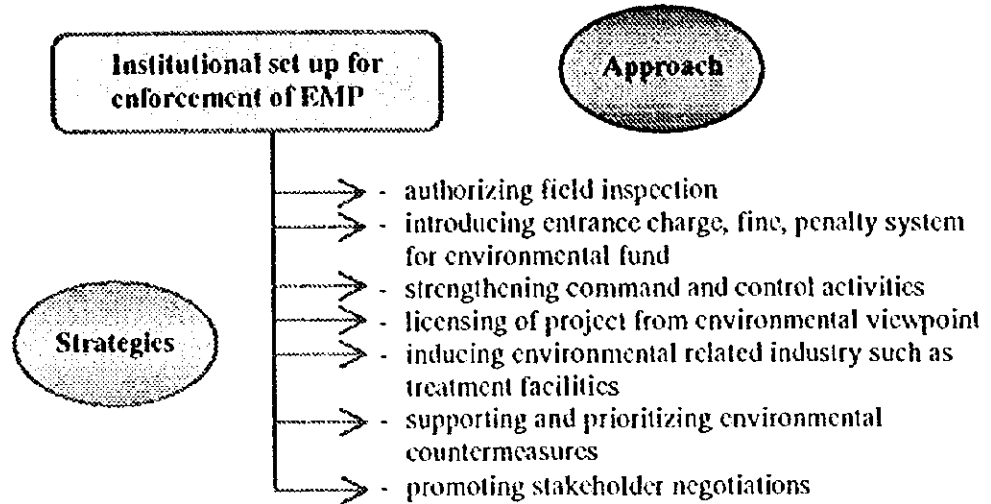
#### (1) Capacity Building of the Responsible Agency

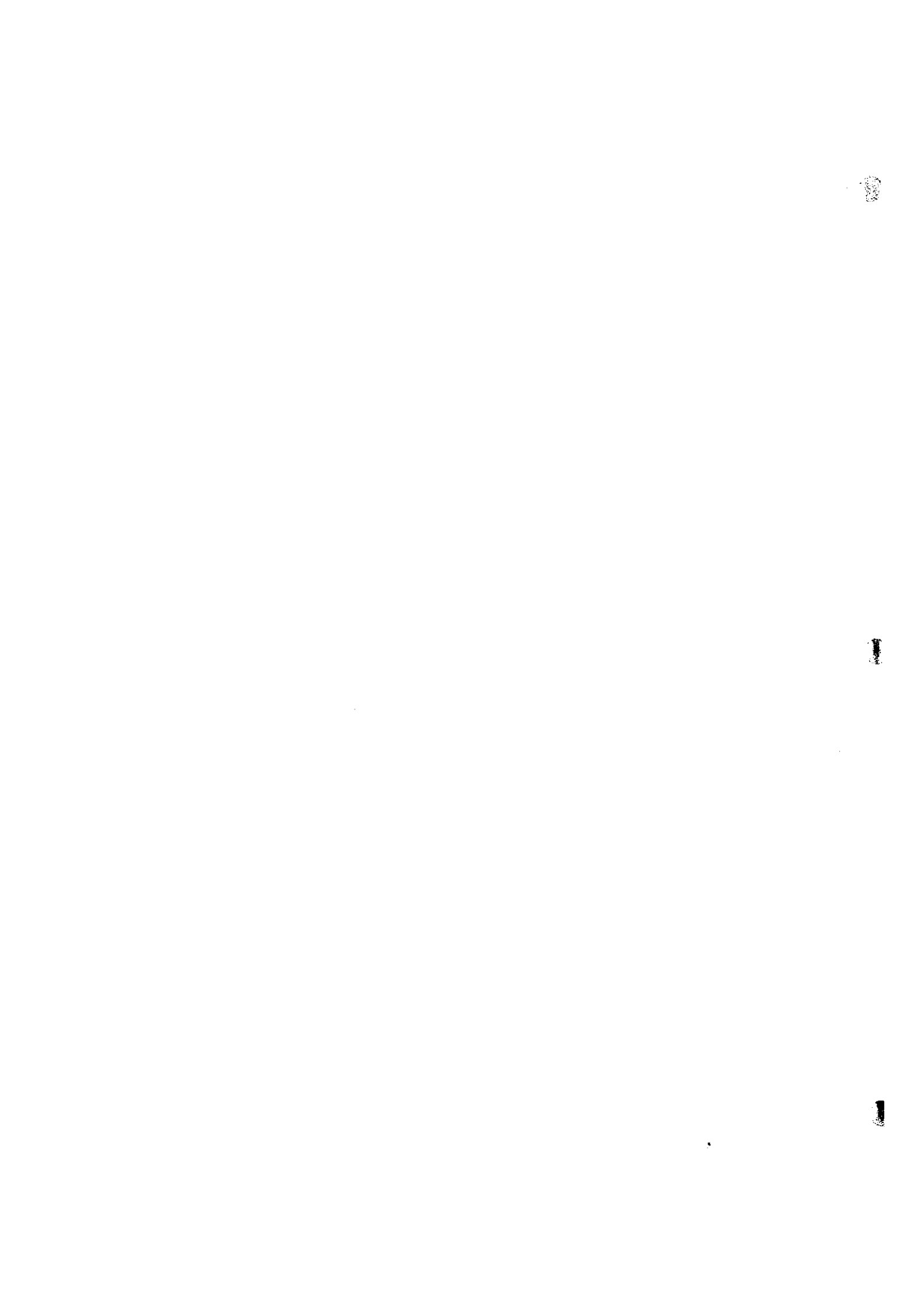
Environmental monitoring is the essential element for this approach. It requires technical skills, installation and maintenance of equipment, and financial back support. This means that the environmental monitoring needs to be an integrated system having clear conservation target. Therefore, the following strategies will be taken in the EMP.



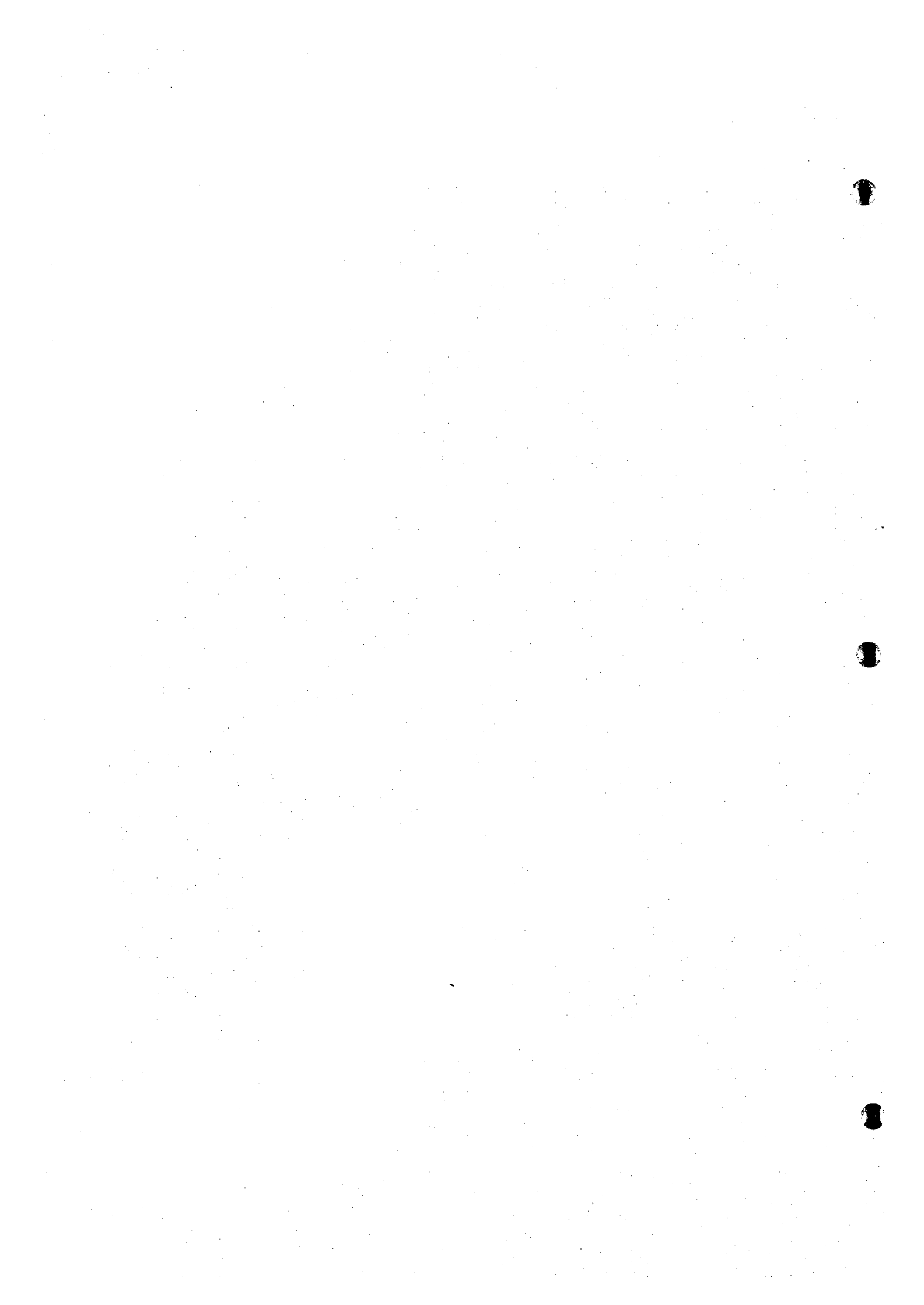
## (2) Institutional Set Up for Enforcement of the EMP

The enforcement capability should be supported by a strong commitment of the national and provincial policy and by the enough regulatory and institutional authorization. Thus, the institutional set up is one of the focal points of the goal of Establishment of Enforcing Capability of Environmental Management. The following strategies are taken in the EMP.





# FIGURES



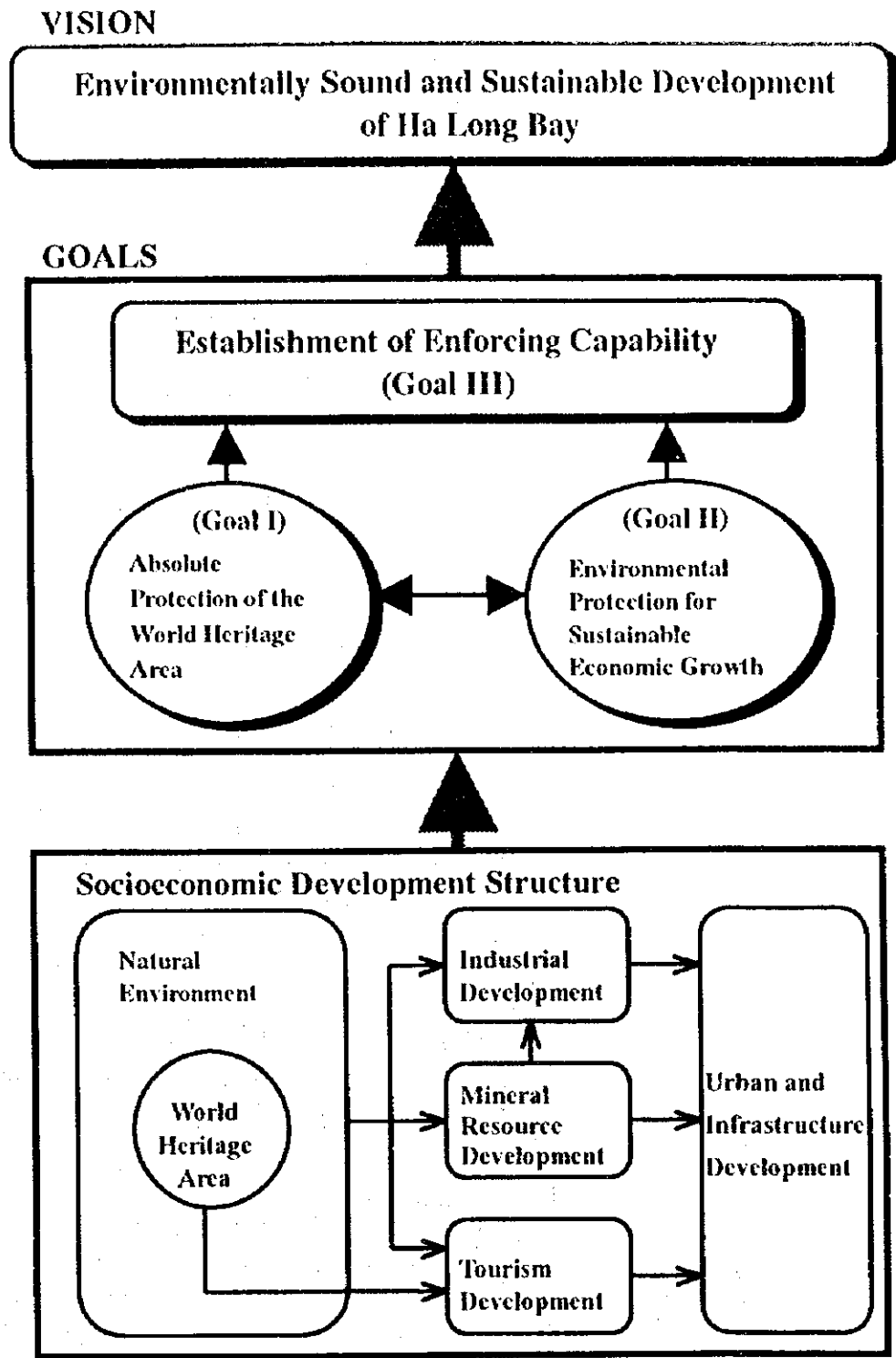
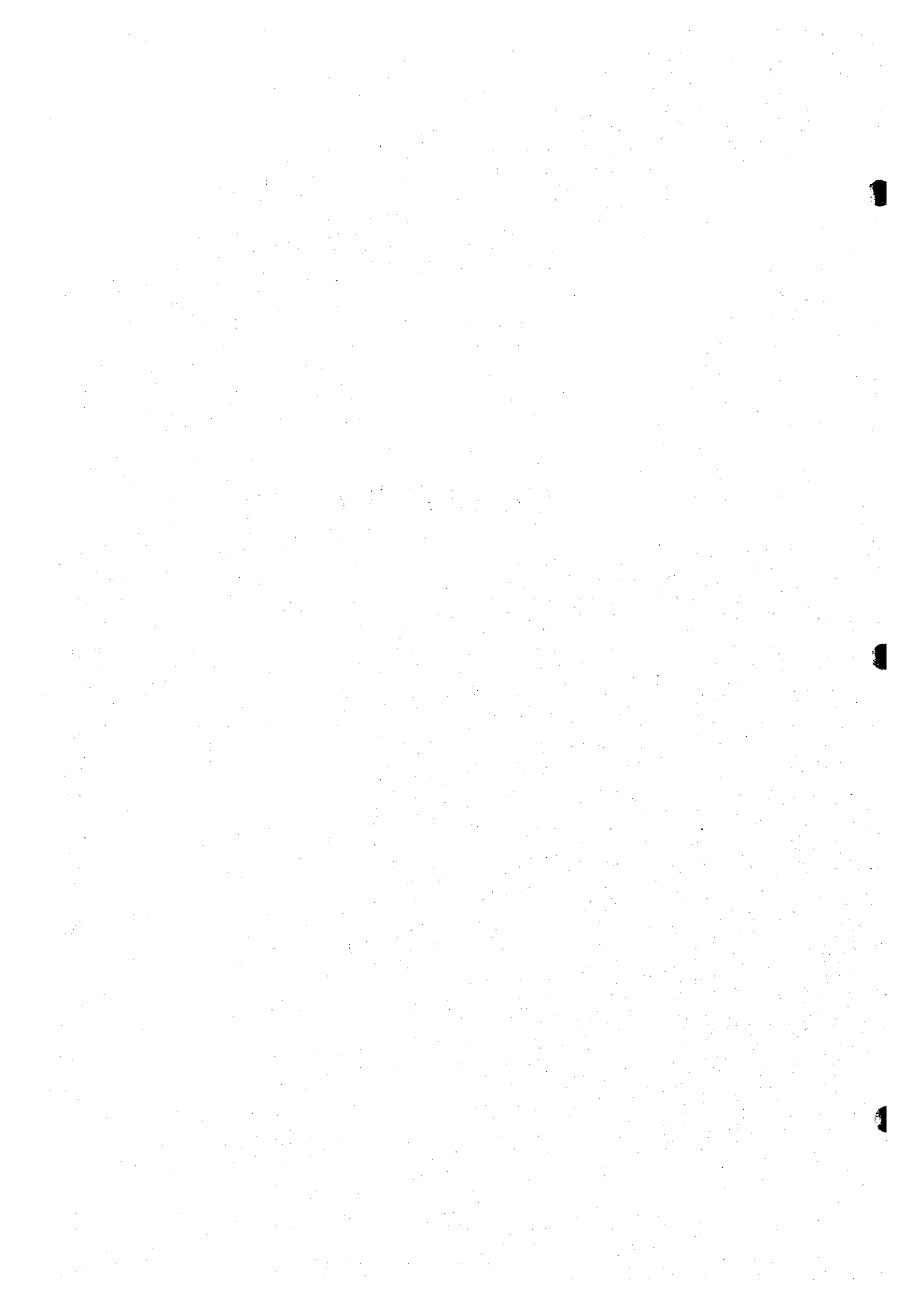


Figure 6.2.1 Concept of Vision and Goals of the Environmental Management Plan for Ha Long Bay





# CHAPTER 7



## CHAPTER 7 ENVIRONMENTAL ZONING

### 7.1 Categorization and Location of Environmental Zones

The target area of the EMP has notable characteristics from a viewpoint of environmental zoning which will guide a land use plan for sustainable development of the area. The most important characteristic is the World Heritage area including its buffer area. Besides that, the target area contains ecologically important areas such as a tidal area including mangrove forests, a national park, coral reef areas, forest and water reserves, and fishing grounds. Considering the current situation, the EMP area can be categorized into four environmental zones: 1) Special Conservation Zone (SCZ), 2) Conservation Zone (CZ), 3) Active Management Zone (AMZ), and 4) Development Zone (DZ).

SCZ is defined as most important environmental areas which are officially authorized by the national and local government. Thus, this zone should be put at higher priority for conservation, and be conserved and managed in accordance with the existing regulations for protection. In principle, the World Heritage buffer area is included in SCZ, but some of it is in AMZ due to existence of development activities.

Although most of the important environmental areas is covered by SCZ, other important environmental areas remain mostly in the upper reach of sub-catchment areas and the bay area surrounding the World Heritage buffer area. From the environmental viewpoint, these areas are providing habitat of fauna and flora and natural resources which have economic and scientific values. Therefore, the JICA study team proposed to set CZ as the other important environmental areas based on the analysis result of current and future environmental conditions.

DZ consists of those currently developed, those planned which are principally defined by the Development Master Plan of Ha Long City for 1994-2010 (HLMP), and the potential areas for further development beyond 2010. While, the areas confronting environment and development can be found where intensive countermeasures will be required in the EMP area.

The environmental zones are summarized below. The location of each zone is shown in Figure 7.1.1.

Zone	Total area (km <sup>2</sup> )	%	Principal distribution
1) Special Conservation Zone	1,080	43	- World Heritage core and buffer areas- national park and forest reserves
2) Conservation Zone	720	29	- sub-catchment area- around the World Heritage buffer area
3) Active Management Zone	250	10	- tidal flat along the coastal line- Bai Chay bay
4) Development Zone	450	18	- around the planned development area- existing urban and mining area
Total EMP area	2,500	100	-

### 7.1.1 Special Conservation Zone (SCZ)

#### (1) World Heritage Area

Ha Long bay, which has an area of about 1,300 km<sup>2</sup> comprising 1,969 islands and inlets according to the Department of Culture and Information in QNPC, is a remarkable landscape in Vietnam. The system of grottos in multiform islands in the bay is described as "a real heavenly palace in the world". Three prehistory cultures, namely the Soi Nhu, Cai Beo, and Ha Long cultures, continuously developed in this landscape from the late Paleolithic age to early metal age. The bay is not only a great landscape but also a sacred and long-standing symbol for Vietnamese people. Moreover, almost all living coral reef areas and several fishing grounds are located in the World Heritage area. In 1994, Ha Long bay was inscribed in the World Heritage List by UNESCO recognizing its exceptional and universal value. The Government of Vietnam (GOV) has promulgated several regulations and guidelines related to protection of Ha Long bay.

The absolute protection area (core area) was designated by UNESCO and GOV including Cong Tay island, Cau Go island, and Ba Ham lake. The buffer area is the strip surrounding the core area extending in the west to northwest direction. It is defined by the bay's coastal line along the National Road No. 18 from the B12 oil storage facility to Km 11th in Cam Pha town. The width of the buffer area is 5-7 km from the core area. The neighboring area is defined as the area surrounding

the buffer area including the border area near Cat Ba island, but it is not clearly described in the regulation.

In the buffer area and neighboring area, almost all human activities are to be prohibited without any official permission. Thus, the developers and project executing agencies are required to submit an environmental impact assessment report and an environmental protection plan to the approval authorities in advance.

### (2) Cat Ba National Park

Due to its great diversity of landscape and ecosystem, GOV designated about 152 km<sup>2</sup> comprising about 98 km<sup>2</sup> of the main land of Cat Ba island as a national park. Thus, the Cat Ba national park area should be included in SCZ.

### (3) Forest and Nature Reserve Area

In the EMP area, there are six forest and nature reserve areas, namely the Mip river and the Hoa Binh forest reserves for water resources preservation, the Dong Son Ky Thung forest reserve for biodiversity preservation, the Bai Chay special use forest reserve for cultural, historical, and environmental preservation, and the Quan Hanh stone mountain special use forest reserve, and the Dien Vong reservoir conservation area for water supply. These reserves should be included in SCZ.

## 7.1.2 Conservation Zone (CZ)

The Conservation Zone (CZ) is defined as the important environmental areas which do not have authorized protection background at present. These are tidal flats along the coastal line including mangrove forests, upper reach of sub-catchment areas, and surrounding sea areas of the World Heritage buffer area including fishing grounds. Because of no protection background, these areas have been used and planned to be used for economic development activities, though it is desirable to conserve the same as the area of SCZ. As a matter of fact, many projects are planned to be located in these areas by HLMP. Thus, the larger part of the area is categorized in the AMZ, especially tidal flats.

Therefore, the major components of CZ are the upper reach watershed areas of the Troi, Man, Dien Vong, and Mong Duong rivers, and the surrounding areas of the World Heritage buffer area including fishing grounds outside of SCZ.

### 7.1.3 Active Management Zone (AMZ)

Many kinds of development activities are planned in HIMP, and some are on going conditions. At present, no project is located in the World Heritage core area except for a navigation channel, so little direct impacts would be caused by the development activities. However, several projects are planned in the buffer area and environmentally important areas such as tidal flats, mangrove areas, and fishing grounds. This means that there could be hot areas confronting environment and development issues to be protected through an active environmental management.

Based on the overlaying figure of SCZ, CZ, and DZ, the possible AMZ is defined, and it consists of the following five major zoning areas.

#### (1) Bai Chay Coastal Area

The Bai Chay coastal area is located in the World Heritage buffer area, and extends along the shoreline from the Cua Luc strait to a causeway to the Tuan Chau island with area of about 25 km<sup>2</sup>. This area is to be primarily used for tourism development by tidal flat reclamation, so that an increase of pollution load and decrease of self-purification capacity would be expected. Moreover, the water quality of this area could bring about a direct impact to the World Heritage core area because of its adjacent location.

#### (2) Hong Gai Coastal Area

The Hong Gai coastal area is also located in the World Heritage buffer area, and extends along the shoreline from the Cua Luc strait to the Nam Cau Trang coal port. It covers an area of about 20 km<sup>2</sup>. This area is currently threatened by pollution loads and solid wastes from commercial and residential areas, and it is to be developed as a commercial center of Ha Long city in future. Therefore, its

environmental conservation could be an acute issue because of the possibility of a direct impact to the World Heritage core area as well as the Bai Chay coastal area.

### (3) Cam Pha and Cua Ong Coastal Area

The Cam Pha and Cua Ong coastal area is about 45 km<sup>2</sup> which includes the coastal area of Quang Hanh, Cam Pha, and Cua Ong including the Vung Duc and Cua Ong coal ports, and the Mong Duong river mouth area. This area is characterized by the existence of active coal mines, and it will be developed mainly for coal shipping and urban development for employees of mine companies. The current water quality is fairly degraded by the pollution load from the coal mining area, and it sometimes exceeds the Vietnam environmental standards for coastal water quality.

### (4) Bai Chay Bay Area

The Bai Chay bay area is a semi-closed inland sea area of about 50 km<sup>2</sup>. Various kinds of development projects are to be implemented in this area, so the environment of the bay will be severely threatened by the impacts of pollution load increase and purification capacity decrease. The current water quality of the bay is rather good, but it is degraded easily due to its semi-closed geographic condition. Moreover, the water quality of the bay has close link with that of in the Bai Chay and Hong Gai coastal areas by moving pollution load through the Cua Luc strait.

### (5) Binh Huong Estuary Area

The Binh Huong estuary has an area of about 80 km<sup>2</sup> which includes the Mip river mouth area, Minh Thanh, Hoang Tan, and the western part of the Tuan Chau island. This area keeps rather good ecological conditions at present. Not so many development projects are planned in this area; however, a reclamation of tidal area for expansion of agricultural land could have major environmental impacts in the future. Therefore, the conservation criteria should be set to protect the precious ecosystem through rigid land use planning.

#### 7.1.4 Development Zone (DZ)

The Development Zone (DZ) includes the existing and planned development areas to be a part of the growth poles in the Northern Growth Triangle. It mainly consists of the areas for a) urban and infrastructure development, b) mining and industry development, c) tourism development, and d) agriculture and aquaculture development.

The existing and planned development areas can be delineated by the current land use map and the land use plan up to 2010 described in HLMP. While, the Ha Long bay area should be continuously developed even after 2010 to achieve the national economic target. Therefore, it is considered practical to include the potential development area for further expansion of development activities to DZ.

#### 7.2 Key Regulative Issues

The proposed environmental zones have close implication with the regulative issues related to environmental conservation, and each zone must provide an appropriate direction for setting conservation criteria, for preparing environmental measures, for planning future land use, and for strengthening enforcement capability. The principal regulative issues from the legal, conservation and protection, and institutional viewpoints are summarized below.

Since SCZ is the currently regulated area, observance of the existing regulations, compliance of the proposed conservation criteria, and the regular monitoring and inspection are to be focused on the actual environmental management. In addition, public awareness is important because of the existence of the invaluable World Heritage. Although CZ does not have clear authorized background for its protection, it is very important for overall environmental conservation of the EMP area especially for protection of SCZ. Thus, it should be focused on compliance of the proposed conservation criteria by monitoring and inspection.

The AMZ is the focal point in the EMP area to attain the vision of "Environmentally Sound and Sustainable Development of the Ha Long Bay Area". A strong and aggressive commitment on environmental conservation of the



officers and the local people concerned is fully required for a positive change of AMZ through the investment to command and control measures, legal and institutional frame, and human and financial resources. The environmental condition of AMZ could be the direct result of the EMP.

The DZ is to be a center for socioeconomic development at present and in the future. In order to ensure the sustainable development conditions, it should be focused on command and control measures through EIA, monitoring, and inspection.

Regulation item / Environmental zone	SCZ	CZ	AMZ	DZ
<b>A. Legal frame</b>				
(1) Observance of the current regulations in each designated area	⊙	○	⊙	○
(2) Compliance of the proposed conservation criteria	⊙	⊙	⊙	○
(3) Compliance of discharge standards	-	○	○	⊙
(4) Administrative enforcement including penalty and fine system	○	○	⊙	○
<b>B. Conservation and protection measures</b>				
(1) Pollution control measures	-	○	⊙	⊙
(2) Nature conservation measures including landscape	○	○	⊙	○
(3) EIA and countermeasures	-	○	⊙	⊙
<b>C. Institutional frame</b>				
(1) Approval and licensing economic activities	-	○	⊙	○
(2) Coordination with relevant agencies and stakeholders	-	○	⊙	⊙
(3) Regular monitoring and inspection	⊙	⊙	⊙	⊙
(4) Regulation of land use and reclamation	-	○	⊙	○
(5) Public awareness	⊙	○	○	-

Note:

- 1) SCZ: Special conservation zone, CZ: Conservation zone, AMZ: Active management zone, DZ: Development zone
- 2) ⊙: most important linkage is expected, ○: important linkage is expected, -: some linkage is expected

### 7.3 Guidelines for Future Land Use Plan

#### 7.3.1 General Direction for Future Land Use Plan in the Study Area

Before the Land Law was issued in 1993, land use planning at the national level aimed only at agriculture and forestry development, not at land for special use or residential areas. Therefore, it did not provide integrated instructions and strategies for the use of land resources due to lack of cooperation among the different sectors. There were, generally in many cases, overlap and conflict

between different land use plans prepared by different sectors. However, the Land Law issued in 1993 stipulates that land use planning should include:

- Identification of agricultural land, forestry land, urban and rural residential land, specialized use land, land not yet used, of each locality and of the whole country.
- Adjustment of this identification of individual lands has to be done consistent with each period of socioeconomic development of each locality and of the whole country.

Furthermore, the Land Law describes that the role of land use plan is to identify appropriate utilization options for different land categories in each period of development. The General Cadastral Department is responsible for building up overall land use plans and strategies and submitting them to the Government for approval. In 1994, the department sent an official letter concerning land use planning activities to the People's Committees of provinces and major cities which are directly under the central management. It should be noted that the letter sets out the general guidelines of land use planning and explicitly states the protection of natural resources and the environment as follows. These general guidelines should be taken into account for the revision of the current and future land use plan in the EMP area.

- Protecting the peoples' land possession under the State management and encouraging socioeconomic developments, and
- Protecting natural resources and the environment.

The environmental zoning defined in the EMP provides the general instructions of future land use in the area. Each zone has an environmental conservation criteria which cover the following items: water quality, environmental resources such as forest, tidal flat, mangrove swamp, coral reef, fish, shellfish, landscape, and seascape. Therefore, all development activities in the area should be consistent with the environmental zoning and comply with the conservation criteria.

The feedback discussed in the previous section indicates a general advisable direction of actions to protect the environment of each environmental zone on a case by case basis. However, each feedback action should be integrated into the

general land use guidelines and be comprehensively reflected in the revision of the land use plan for the whole EMP area. For that purpose the review and revision of the present HLMP will be necessary primarily.

Although the EMP provides the groundwork for the revision, some additional surveys and basic information on the environment and the socioeconomic conditions in the area will be necessary. In particular, AMZ and DZ should be put emphasis on the most for further investigation, because a lot of major development projects will be concentrated there and their environmental impacts will be most influential in the whole area. The following items must be investigated and identified clearly prior to revising the master plan and the land use plan:

- (1) Structure and capacity of natural environment in the districts where major development projects planned in AMZ and DZ

The overall structure of natural environment in the Ha Long bay area has already been investigated and identified in the Study. Here the target areas for the investigation should be narrowed down to the development districts in AMZ and DZ. The detailed surveys on the following items need to be undertaken such as topography, geology, soil, hydrology, plants and vegetation, animals, and landscape. The notable and considerable environmental resources and their values should be clearly identified first in terms of environmental conservation through synthesizing the results of surveys. The results should be summarized in the form of maps and/or inventory of environmental resources. Furthermore, the interactive relationship among the surveyed items should be concretely clarified and also the environmental capacities of the districts should be comprehended.

Furthermore, important ecosystems and inhabitants for fauna and flora should be identified in the districts. Not only precious rare species but also locally common species should be included here in the inventory. Their distribution patterns and situations need to be investigated. Based on the results, the species for protection and those for utilization can be selected.

### Major Items for the Detailed Survey of the District

Item	Contents
Topography	Drawing a topographical map classified by inclination, contour, and comprehending a detailed topographical structure of the district
Geology	Drawing a geological map with the information on vertical section
Soil	Drawing a soil map, investigation of physical and chemical characteristics of soil, and surface soil conditions for vegetation
Hydrology	Drawing a hydrological map of surface and groundwater, and comprehending a local watershed structure
Plants and vegetation	Drawing a map of local vegetation, and making an inventory of precious and valuable species for conservation and utilization
Animals	Comprehending a present situation and living conditions of local inhabitants; birds, mammals, insects, amphibians, reptiles, and fish, and making an inventory of precious and valuable species for conservation and utilization
Land- and seascape	Drawing a map of scenic spots and zones, and comprehending their characteristics and structure of local land- and seascape

In addition, it is necessary to identify the historical and cultural relationship between human activities and the natural environment of the districts. The local community has maintained the natural environment of the area consistently together with the local agriculture, forestry and fishery. The community forest, paddy fields, irrigation channels, and ponds are regarded as environmental resources which have been fostered by this stated relationship. Their distribution and present situation also indicates a basic direction of environmental utilization and conservation consistent with the local socioeconomic conditions.

- (2) Allowable alternation of the present environmental conditions by the future development activities

The possibility of future environmental deterioration which would be brought about by alternation of environmental conditions should be investigated carefully. In particular, the responsible local agencies should comprehend allowable and controllable sizes of development activities and also allowable alternation of environmental conditions such as topography, surface conditions, and vegetation, judging from the environmental conservation criteria.

- (3) Development scheme of the districts consistent with the local ecological system

Based on additional detailed surveys and information on the districts, the basic development scheme of the districts should be presented. The scheme needs to be

consistent with not only the environmental capacities of the districts and their environmental conditions but also the entire scheme of the environmental zoning.

The aptitude for land use of each district should be determined through careful evaluation of its environmental conditions and spatial structure. A map of each district compiled and classified based on the local water system, topographical and geological conditions, vegetation and soil conditions, and landscape, may provide useful information for comprehending the local ecological system and its evaluation.

#### (4) Long-term trends of both population and urban area growths

Although the present master plan describes forecasted population, its supporting data and assumptions are weak and not clear. The master plan does not describe explicitly the basis of land use demands. In particular, the causal relationship between future industrial growth and migration should be stated much clearer. Not only the natural population growth, but also migration from the suburbs and other regions need to be explicitly taken into account. Otherwise, the accurate future demands for urban land in the area could not be forecasted.

After stated items are clearly identified, the development master plan and the land use plan can be revised meaningfully. As for the land use plan, the basic land use zoning should be delineated in each environmental zone, in particular, in AMZ and DZ. The land use categories for the two zones may consist of the following: residential, business and commercial, industrial, educational and cultural facilities, transportation, public utilities, recreational park and/or open space, and conservation areas. Needless to say, the zoning is determined based on this stated development scheme and the forecasts of population sizes and of future demands for services by each category of users in different districts of the Ha Long bay area.

The well-organized framework of the land use plan needs to be designed for phased improvement and development of i) public utilities, including water supply, sewage, and solid waste disposal and ii) housing. This is very important to provide the necessary public utilities timely responding to the progress of development activities. In other words, there should be provision for interaction between the

development master plan and the relevant complementary sectoral plans, which can best be facilitated through proper sequencing and allowing for flexibility and adjustment. Intensive coordination among the relevant agencies is needed to do this.

### 7.3.2 Land Use Planning for the Major Development Districts in the HLMP Area

The major development districts in the HLMP area are included in the proposed DZ. Therefore, a detailed land use planning with environmental consideration is essential for sustainable development of these development districts based on a general land use plan prepared by QNPC. This section provides a guideline for preparation of the detailed land use plan considering environmental protection.

Based on the economic development frame by the year of 2010 and the general land use plan prepared by QNPC, 18 major development districts can be designated in the development zone of the HLMP area as shown in Figure 7.3.1. These districts are classified into 7 categories: A) urban core, B) tourism, C) residential, D) industry, E) mining, F) transportation, and G) agriculture. In those districts careful consideration of environmental impacts will be crucial to the sustainability of the area. The designated districts are listed below and their locations are shown in Figure 7.3.1.

### Major Development District

Category	No.	Development District	Major Land Use	Necessary Actions
A. Urban Core	A1	Hong Gai urban core district	Business, Commercial, Transportation, Residential	<ul style="list-style-type: none"> <li>- Upgrading and expansion of the sewage treatment system and solid waste management system</li> <li>- Urban renewal including the central market, Hong Gai coal port and removal of the relating facilities, efficient urban road network not only for automobiles but also pedestrians</li> <li>- Preventive measures for land erosion from the steep slopes, in particular, for the future access road to Bai Chay Bridge</li> <li>- Appropriate layout and vegetation of public open space and/or park</li> </ul>
	A2	Hung Than urban core district	Tourism, Business, Commercial, Residential	<ul style="list-style-type: none"> <li>- Confirmation of reclamation line along the coast not to exceed the boundary of DZ</li> <li>- Least environmental impacts on the surrounding tidal flats</li> </ul>
	A3	Cam Pha urban core district	Commercial, Residential, Industry, Transportation	<ul style="list-style-type: none"> <li>- Confirmation of reclamation line along the coast not to exceed the boundary of DZ</li> <li>- Integration of small coal ports to a few main ports</li> </ul>
	A4	Cua On urban sub-core district	Industry, Residential, Transportation, Commercial	<ul style="list-style-type: none"> <li>- Preventive measures for land erosion from the steep slopes and the dumping sites</li> <li>- Improvement of urban roads and their network to prevent the dust caused by the coal transport trucks and for efficient traffic flow</li> <li>- Appropriate layout and vegetation of public open space and/or park, in particular as a buffer zone between the urban district and the mining district</li> <li>- Upgrading and expansion of the sewage treatment system and solid waste management system</li> </ul>
	A5	Troi urban sub-core district	Commercial, Residential	<ul style="list-style-type: none"> <li>- Development of the sewage treatment system and solid waste management system</li> <li>- Improvement of urban roads connecting the neighboring districts</li> </ul>
B. Tourism	B1	Bai Chay tourism district	Tourism, Commercial, Residential	<ul style="list-style-type: none"> <li>- Confirmation of reclamation line along the coast not to exceed the boundary of DZ</li> <li>- Appropriate layout and vegetation of public open space and/or park</li> <li>- Appropriate development control of mini hotels</li> <li>- Upgrading and expansion of the sewage treatment system and solid waste management system</li> </ul>
	B2	Tuan Chau tourism district	Tourism, Residential	
C. Residential	C1	Hong Gai North residential district	Residential, Commercial	<ul style="list-style-type: none"> <li>- Upgrading and expansion of the sewage treatment system and solid waste management system and prevention of increase of domestic pollutant inflow</li> <li>- Preventive measures for land erosion from the steep slopes</li> </ul>

Category	No.	Development District	Major Land Use	Necessary Actions
D. Industry	D1	Cai Lan industrial district	Industry, Transportation, Residential	<ul style="list-style-type: none"> <li>- Confirmation of reclamation line along the coast not to exceed the boundary of DZ</li> <li>- Improvement of transportation network consisting of the ports, urban roads, and railways</li> <li>- Appropriate layout and vegetation of public open space and/or park as a buffer area between the factories and the residential districts</li> </ul>
	D2	Hong Gai North industrial district	Industry, Transportation	
	D3	Gieng Day industrial district	Industry, Residential	
	D4	Hoanh Bo North industrial district	Industry, Residential	
B. Mining	E1	Hoanh Bo North mining district	Mining, Industry	<ul style="list-style-type: none"> <li>- Preventive measures for land erosion</li> <li>- Reforestation</li> <li>- Least environmental impacts on the watershed structure in the district</li> </ul>
	E2	Cam Pha mining district	Mining	
	E3	Hong Gai mining district	Mining	
F. Transportation	F1	Bieu Nghi airport district	Transportation	<ul style="list-style-type: none"> <li>- Careful selection of the location for the airport to minimize environmental impacts on the surrounding tidal flats</li> <li>- Confirmation of reclamation line along the coast not to exceed the boundary of DZ</li> </ul>
G. Agriculture	G1	Yen Hung East reclamation district	Agriculture	<ul style="list-style-type: none"> <li>- Confirmation of reclamation line along the coast not to exceed the boundary of DZ</li> </ul>
	G2	Hoang Tan agricultural district	Agriculture	

To guide the development activities properly, i.e., consistently with the EMP, the detailed land use plan for each development district must be established by the relevant agencies and announced broadly to the public and stakeholders such as the other governmental agencies, investors, and developers. Necessary actions, which should be taken into consideration and reflected in the detailed land use plan, are described above. Among the actions, confirmation of reclamation line and preventive measures for land erosion are generally regarded as more important than the others for the entire EMP area.

#### 7.4 Conservation Guideline for the World Natural Heritage Area

Below are the summaries of the proposed guidelines. The specific guidelines are available in Chapter 16 of the Supporting Report.



#### (1) Direction of Tourism Development

Tourism development should be designed by considering the tourism demand and the capacity of the environment to accommodate tourism. Boating and visits to caves will continue to be the major forms of attractions, and development of caves will be necessary. However, it is better to direct the tourists to a few major, well-controlled caves, for environmental and safety reasons. Beach development in the World Heritage is also not particularly encouraged, as the area does not offer suitable spaces for development. The World Heritage will be better utilized for environmental education and eco-tourism.

#### (2) Access Control

The Government should clearly define the island/areas where tourists can visit (tourism island/area) and the island/areas where tourists are discouraged to go (non-tourism island/area). The access of tourists can be effectively controlled by controlling the number of tourism boats and by selectively constructing wharves on tourism islands.

#### (3) Tourism Facilities

All tourism facilities constructed/installed in the World Heritage area shall be approved by the Government, and have appropriate design/facilities to ensure safe, environmentally-sound tourism activities.

#### (4) Transportation

All ships/boats should be registered, and satisfy pertinent regulations on safety and sanitation. It is the responsibility of tourism boat operators to manage garbage, wastewater, and used oil. Tourism operators are also responsible for keeping the tourists in safe, designated tourism areas.

(5) Activity Control

Any activities that have the potential to damage the environment of the World Heritage area should be prohibited.

(6) Environmental Education

The area offers ideal settings for environmental education. Diverse environmental education programs should be offered by trained experts. Signboards/pamphlet will help educate general tourists.

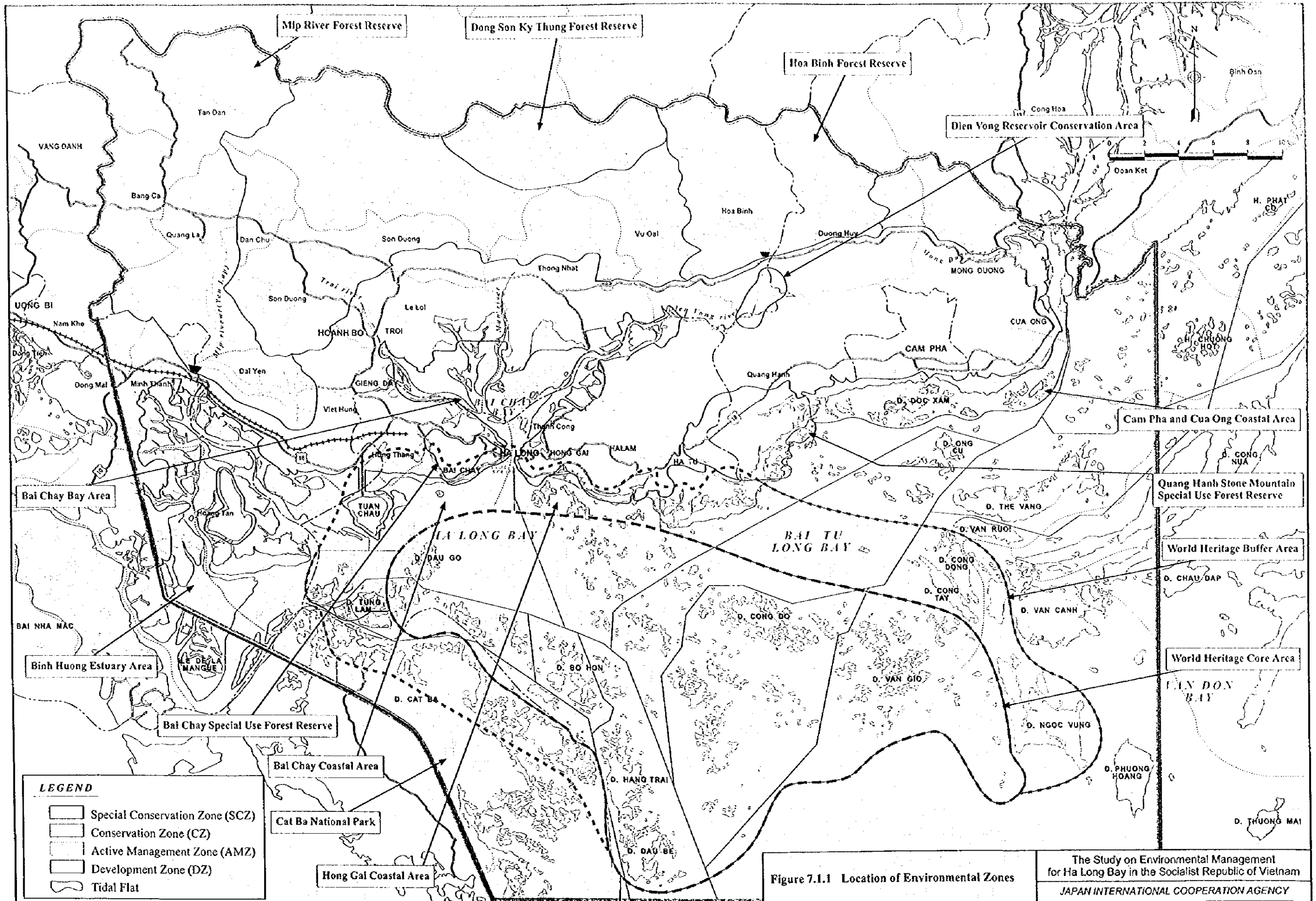
(7) Buffer Area

The main part of the World Heritage Buffer Area is designated as the "Special Conservation Zone". Any activities that have large environmental impacts, such as construction, civil work, mining and deforestation, should be prohibited, unless permitted by the Government.

(8) Monitoring

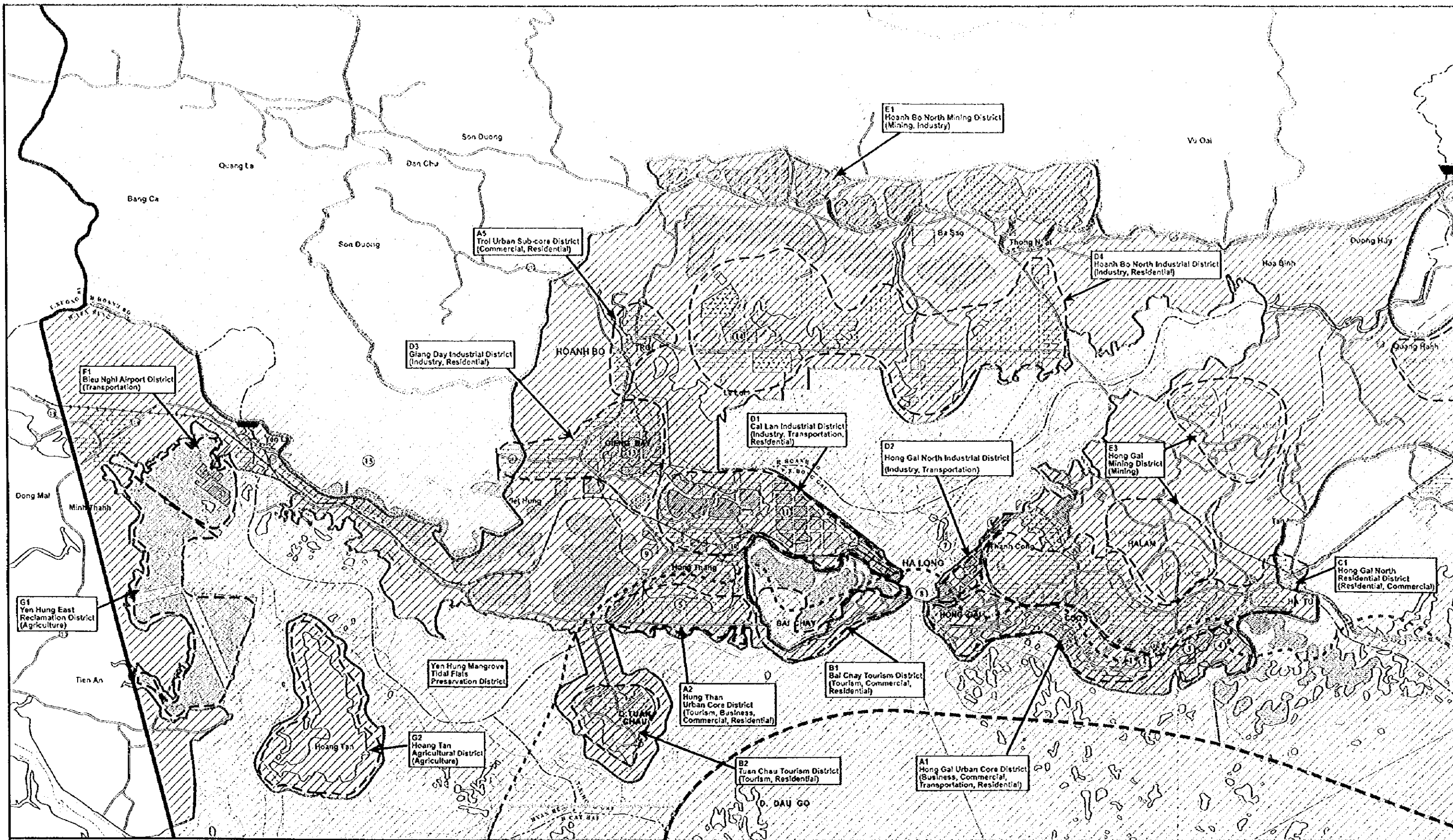
Water quality, landscape element, ecological condition, tourist numbers, tourist satisfaction, and other items shall be monitored at all major tourism sites. The results shall be reflected in the important environmental management decisions.

# FIGURES



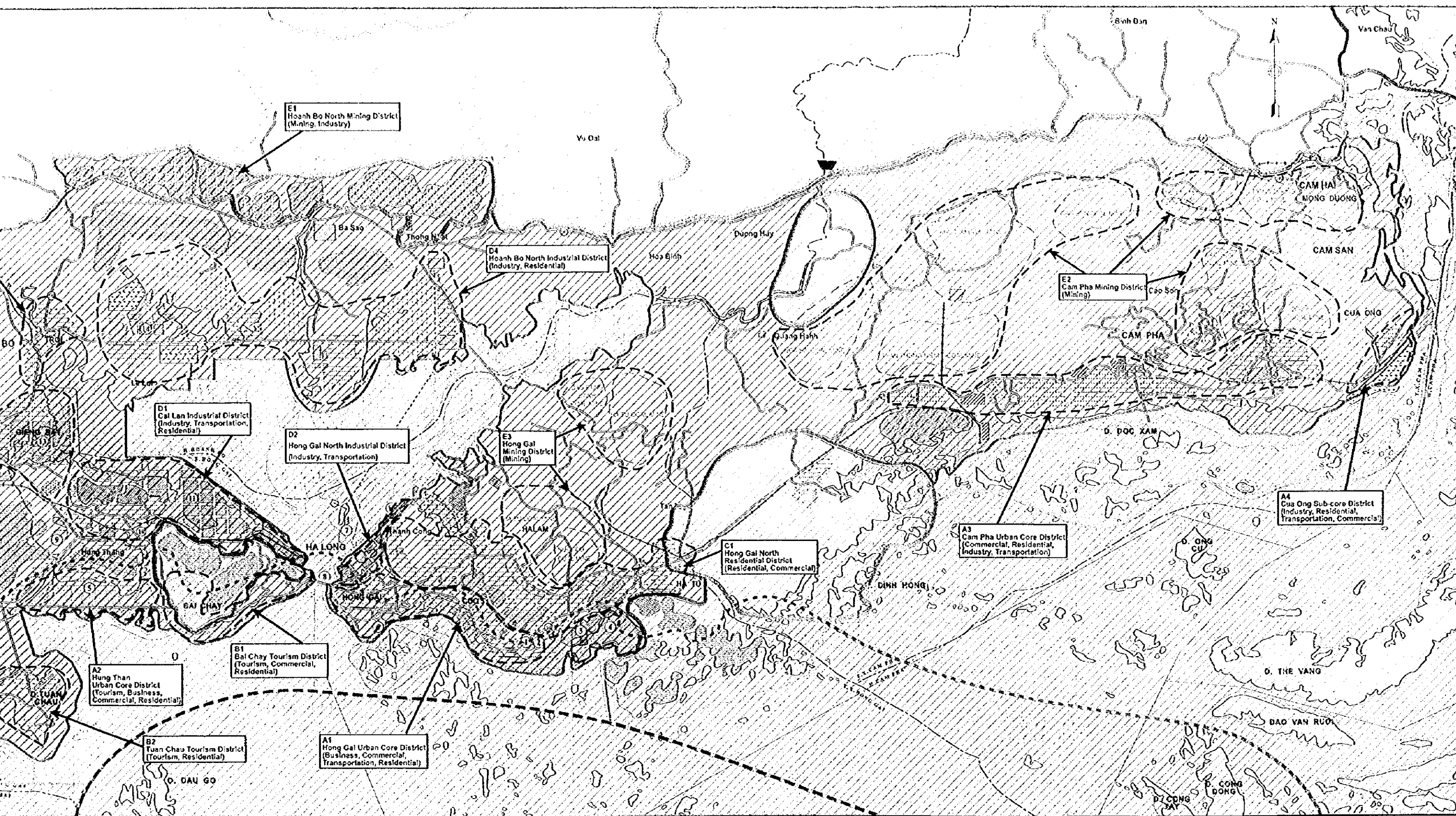






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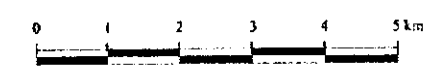
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| <ul style="list-style-type: none"> <li>--- UNESCO World Heritage Site</li> <li>--- Buffer Zone</li> <li>--- Railway</li> <li>--- Road</li> <li>--- Administrative boundary</li> </ul> | <ul style="list-style-type: none"> <li>--- Mangrove</li> <li>--- Tidal Flat</li> <li>--- River and Reservoir</li> <li>--- Sea Route</li> </ul> | <p><i>Development Master Plan of Ha Long City for 1996-2010</i></p> <ul style="list-style-type: none"> <li>--- Residential area</li> <li>--- Public open space &amp; park</li> <li>--- Office, school, hospital</li> <li>--- Clay &amp; limestone site</li> <li>--- Reserved land for housing development</li> <li>--- Central district</li> <li>--- Coal mine boundary</li> <li>--- Tourism development area</li> <li>--- Military land</li> <li>--- Forest</li> </ul> | <ul style="list-style-type: none"> <li>--- Reserved land for industrial development</li> <li>--- Industry, storage, port (wharf)</li> <li>--- Cemetery</li> <li>--- Future Reclamation</li> <li>--- Marine recreational area</li> </ul> | <ul style="list-style-type: none"> <li>① Provincial people's committee</li> <li>② Provincial communist party's committee</li> <li>③ Coal processing plant</li> <li>④ Navy port</li> <li>⑤ Recreational area</li> <li>⑥ Ha Long people's committee</li> <li>⑦ Cement shipping port</li> <li>⑧ Cua Luc bridge</li> <li>⑨ Solid waste treatment plant</li> <li>⑩ Ha Long railway station</li> </ul> | <ul style="list-style-type: none"> <li>⑪ Concentrated industrial zone</li> <li>⑫ Local industrial zone</li> <li>⑬ Dong Dang industrial area</li> <li>⑭ Hitech industrial area</li> <li>⑮ Yen Lap reservoir</li> <li>--- Special Conserva</li> <li>--- Conservation Zone</li> <li>--- Active Managem</li> <li>--- Development Zone</li> </ul> |
|---|--|---|---|--|--|



for 1996-2010

- |   |   |  |  |  |
|---|---|--|--|--|
| <ul style="list-style-type: none"> <li>Central district</li> <li>Coal mine boundary</li> <li>Tourism development area</li> <li>Military land</li> <li>Forest</li> </ul> | <ul style="list-style-type: none"> <li>Reserved land for industrial development</li> <li>Industry, storage, port (wharf)</li> <li>Cemetery</li> <li>Future Reclamation</li> <li>Marine recreational area</li> </ul> | <ul style="list-style-type: none"> <li>① Provincial people's committee</li> <li>② Provincial communist party's committee</li> <li>③ Coal processing plant</li> <li>④ Navy port</li> <li>⑤ Recreational area</li> </ul> | <ul style="list-style-type: none"> <li>⑥ Ha Long people's committee</li> <li>⑦ Cement shipping port</li> <li>⑧ Cua Luc bridge</li> <li>⑨ Solid waste treatment plant</li> <li>⑩ Ha Long railway station</li> </ul> | <ul style="list-style-type: none"> <li>⑪ Concentrated industrial zone</li> <li>⑫ Local industrial zone</li> <li>⑬ Dong Dang industrial area</li> <li>⑭ Hi-tech industrial area</li> <li>⑮ Yen Lap reservoir</li> </ul> |
|---|---|--|--|--|

- Special Conservation Zone (SCZ)
- Conservation Zone (CZ)
- Active Management Zone (AMZ)
- Development Zone (DZ)



The Study on Environmental Management  
for Ha Long Bay in the Socialist Republic of Vietnam  
JAPAN INTERNATIONAL COOPERATION AGENCY

Figure 7.3.1 Major Development Districts



# CHAPTER 8

## CHAPTER 8 TARGET CONSERVATION CRITERIA

### 8.1 Management Targets

The following are selected as main target items and indicators for each goal set for formulating the EMP.

**Target Items and Indicators for Each Goal of the EMP**

Approach	Target Items	Indicators
<b>Goal I: Absolute Protection of the World Heritage</b>		
a) Keeping clean and clear water quality of the World Heritage area	water quality	transparency, BOD, COD, SS, T-N, T-P, oil, floating solid wastes
b) Conserving natural ecosystem and seascape of the World Heritage area	water quality environmental resources landscape	transparency, BOD, COD, SS, T-N, T-P, oil, floating solid wastes coral reefs, tidal flats and mangrove swamps, fish and shellfish shape and conditions of islands, natural impression
c) Managing solid wastes disposal	water quality	floating solid wastes
<b>Goal II: Achievement of Environmental Protection for Sustainable Economic Growth</b>		
a) Controlling area wide pollution load	water quality	BOD, COD, SS, T-N, T-P
b) Conserving natural coast and tidal area	water quality environmental resources	transparency, BOD, COD, SS, T-N, T-P, oil, floating solid wastes, coliform bacteria tidal flats and mangrove swamps, fish and shellfish
c) Protecting forest and water resources	water quality environmental resources	SS forests coverage
<b>Goal III: Establishment of Enforcement Capability of Environmental Management</b>		
a) Capacity building of the responsible agency	technical capacity	monitoring activity, database quality, level of public awareness
	institutional capacity	responsibility demarcation, conservation criteria
	financial capacity	amount of budget, number of staff and equipment
b) Institutional set up for enforcement of the EMP	technical capacity	inspection quality, management level of measures
	institutional capacity	control power, licensing system
	financial capacity	funding sources, cost recovery system

## 8.2 Conservation Criteria by Environmental Zones

### 8.2.1 Examination of Environmental Conservation Level

#### (1) Setting Scenarios for Environmental Management Level

The following three scenarios of environmental management in the future (2010) are set for water quality in the bays. The scenarios were considered based on the current progress of countermeasures and expected assimilative capacity in the bays. Scenario I considers only the current progress of environmental controls including planned project which will have been done by 2010, namely "without the EMP". Scenarios II and III considers the levels of the pollution loads comparable to the assimilative capacity of the bays.

- Scenario I: Present progress of environmental control.
- Scenario II: Environmental control to keep pollution loads at the present level. This scenario also includes pollution control for specific areas such as the Bai Chay beach, Hong Gai and Cam Pha areas.
- Scenario III: Environmental control to reduce the present level of pollution loads (organic and inorganic pollutants, nutrients) in order to alleviate progress of eutrophication in the bays.

#### (2) Possible Projects of Each Scenario

Based on the socioeconomic frame and alternatives of countermeasures set above, the possible countermeasures set for each scenario are as shown below and listed in Table 8.2.1.

- Scenario I:
  - Sewage construction and management project in the Bai Chay area,
  - First stage of Ha Long City Water Supply and Sanitation Project (HWSSP),
  - Present practices of sanitation,
  - Wastewater treatment to attain effluent standards for industrial development projects including mining from now on,
  - Present reforestation activities, and

- Present pollution control for coal mining activities by VINACOAAL.
- Scenario II:
  - Projects mentioned in Scenario I,
  - Additional sewage and solid wastes control,
  - Wastewater treatment of existing factories to attain effluent standard,
  - Imposition of stringent effluent standard to the new factories
  - Additional reforestation of coal mining area and other bare areas, and
  - Additional pollution control for coal mining activities
- Scenario III:
  - Projects mentioned in Scenario I and II,
  - Additional sewage and solid wastes control,
  - Wastewater treatment of existing and future factories to attain more stringent effluent standards,
  - Additional reforestation of coal mining area and other bare areas, and
  - Additional pollution control for coal mining activities.

### (3) Future Pollution Loads by Scenarios

Projected future runoff pollution loads of each scenario are shown below:

**Future Runoff Pollution Loads of Scenarios**

(Units: tons/day)

Items		BOD	COD <sub>Mn</sub>	SS	T-N	T-P
Present (1996)		7.2	21.9	241	15.5	6.0
Future (2010)	Scenario I	12.9	30.2	272	20.0	6.8
	Scenario II	8.7	23.7	233	18.0	6.4
	Scenario III	6.4	21.3	168	14.7	5.9

#### 8.2.2 Comparative Analysis of Scenarios

The projected future water quality by the simulation model revealed effectiveness of each scenario to the ambient water quality in the bays. In the case of Scenario I, the water quality, for example COD<sub>Mn</sub> in Bai Chay bay was estimated to increase from 4 mg/l to 5 or 6 mg/l in the upper-layer. The increase in COD<sub>Mn</sub> will be most pronounced in the coastal area from Tuan Chau to Hong Gai areas, and it will

extend out to the World Heritage core area. Thus, the projects in Scenario I are not enough to prevent water quality deterioration in the World Heritage core area, so more stringent countermeasures are required.

In Scenario II, almost same level of water quality as that of the present was projected.

In case of Scenario III with nearly the double cost of Scenario II, little changes of water quality were identified compared with Scenario II. These almost full-scale countermeasures can not improve the water quality in the bays drastically, especially in the World Heritage core area. This is because more than 50% of runoff pollution loads, SS and nutrients, arise from non-specific pollution sources which can hardly be controlled. It follows from this that the Scenario II level is relatively efficient one to conserve water quality in the bays.

Therefore, it is recommended that the Scenario II level, namely current pollution load level, be applied to establish management level of the whole MEP area from the viewpoint of efficiency of the projects.

### 8.2.3 Conservation Criteria

Based on the examined management level, the conservation criteria by environmental zones are proposed for water quality, environmental resources as summarized below.

It should be noted that the proposed conservation criteria are not standards for the whole Vietnam, but just for the EMP area. QNPC and agencies concerned for implementation of the EMP are recommended to authorize the proposed conservation criteria. However, the proposed conservation criteria are not absolute ones, they should be, therefore, revised based on reliable data to be obtained by the future environmental monitoring.

(1) Water Quality Conservation Criteria

1) Sea area

Considering the significance of each environmental zone, and the current water quality and beneficial uses of water in each zone, the water quality conservation criteria are set as shown below:

Water Quality Conservation Criteria (Sea area)

Environ. Zone	Applied area	Transparency (m)	BOD (mg/l)	COD <sub>Mn</sub> (mg/l)	T-N (mg/l)	T-P (mg/l)	SS (mg/l)
SCZ	Western Part	3.0	1.5	7.0	1.3	0.6	5
	Eastern Part	3.5	1.0	4.5	1.1	0.5	4
CZ	-	3.0	1.0	4.5	1.1	0.5	5
AMZ	Bai Chay coastal	0.5	1.3	7.5	1.6	0.7	15
	Hong Gai coastal	1.5	1.3	7.5	1.6	0.7	5
	Bai Chay bay	1.5	1.3	7.5	1.6	0.7	5
	Cam Pha and Cua Ong coastal	1.5	1.1	5.0	1.6	0.7	7
	Binh Huong estuary	0.5	1.3	7.5	1.6	0.7	15

Supplemental conservation criteria such as DO, pH, oil slick, floating solid wastes, and fecal coliform are set based on the Japanese Coastal Waster Quality Standards.

They are summarized as follows:

Environ. Zone	DO (mg/l)	pH	Oil slick	Floating solid wastes	Fecal coliform (MPN/100 ml)
SCZ	5	7.0-8.3	nd	nd	nd
CZ	5	7.0-8.3	nd	nd	nd
AMZ	5	7.0-8.3	nd	nd	1,000

Note: 1) nd shows not detectable.

2) Fecal coliform is applied to sea bathing area.

2) Catchment Area

The Inland Water Quality Standard of Vietnam (TCVN 5942) can be applied to the surface water for all environmental zones.

In terms of effluent standard, the following conservation criteria, which is maximum allowable concentration of pollutants, should be applied to the effluents from industrial plants and other places of business in DZ.

Environ. Zone	Applied Area	BOD (mg/l)	COD <sub>Mn</sub> (mg/l)	T-N (mg/l)	T-P (mg/l)	SS (mg/l)
DZ	Bai Chay bay catchment	20	30	30	4	50
	Others	50	65	60	6	100

Note: COD<sub>Mn</sub> was set based on the ratio of COD<sub>Cr</sub> and COD<sub>Mn</sub> which was obtained by the Field Survey by the JICA Study team.

As for discharge of treated water from the sewerage system, the following effluent discharge standards were set on the basis of technically possible treatment level.

Environ. Zone	Applied Area	BOD (mg/l)	COD <sub>Mn</sub> (mg/l)	T-N (mg/l)	T-P (mg/l)	SS (mg/l)
DZ	Bai Chay bay catchment (treatment level 2)	10	15	15	2	15
	Others (treatment level 1)	25	35	-	-	35

Note: 1) Treatment level-1 is a basic secondary treatment.

2) Treatment level-2 is one with nitrification/denitrification and enhanced biological phosphorus removal.

### 3) Intermediate Conservation Criteria

The proposed conservation criteria of the seawater are rather more stringent than the existing coastal water quality standards in Vietnam. In order to attain the proposed conservation criteria, building up technical, institutional, and financial capacities of DOSTE and other relating agencies is prerequisite because of their weakness. Thus, it will take a certain time to attain the proposed conservation criteria. Considering required time to build up their capacities, it is reasonable to set intermediate conservation criteria of the seawater quality.

The intermediate conservation criteria were set at the year of 2005. They are based on the equilibrium of progress of planned projects and possible environmental measures.

Intermediate Water Quality Conservation Criteria (Sea area)

Environ. Zone	Applied area	Transparency (m)	BOD (mg/l)	COD <sub>Mn</sub> (mg/l)	T-N (mg/l)	T-P (mg/l)	SS (mg/l)
AMZ	Bai Chay coastal	0.5	1.6	9.2	1.8	0.8	17
	Hong Gai coastal	1.0	1.6	9.2	1.8	0.8	6
	Bai Chay bay	1.0	1.6	9.2	1.8	0.8	6
	Cam Pha and Cua Ong	1.0	1.1	5.0	1.6	0.7	8
	Binh Huong estuary	0.5	1.3	7.5	1.6	0.7	15

Note: Since no intensive development project is planned in Binh Huong estuary by 2005, intermediate criteria are same as those of 2010.

## (2) Environmental Resources

The tidal flats are classified into three categories: a) tidal flats in SCZ, b) tidal flats with more than 16% of coverage ratio by mangrove, and c) other tidal flats. Separate conservation criteria were developed for each category. No land reclamation is permitted in tidal flats in SCZ. For tidal flats with more than 16% coverage with mangrove, only existing planned land reclamation is permitted. For other tidal flats, 75% is to be conserved leaving some room for controlled development. As for mangrove swamps, at least the present acreage in each area should be protected to keep their functions. In terms of mangrove swamps with relatively low coverage ratio, conservation criteria were set at the present average coverage ratio of 16% to improve their function together with tidal flats.

The most of the coral reefs in the EMP area are located in the southern part of SCZ only and are categorized as poor reef. As discussed in the water quality sector, drastic improvement of that could not be expected. Thus, conservation criteria shall be set on the basis of the present distribution, species composition, and living coral cover.

Since fish and shellfish can be regarded as indexes of marine environment as well as economic value, their management need to be based on species composition and the amount of catches. Thus, it is recommended that management criteria should be carried out by controlling of illegal fishing at the fishery grounds.

### 1) Natural environment

Summarized conservation criteria of natural environment are shown below:

Environ. Zone	Forest (green) coverage	Tidal flats	Mangrove swamps	Coral reefs	Fish and shellfish
SCZ	464km <sup>2</sup> (94%)	1,120ha	200ha	Present conditions	No illegal fishing at fishing grounds
CZ	208km <sup>2</sup> (85%)	-	-	-	ditto
AMZ	-	17,300ha	3,800ha	-	ditto
DZ	228km <sup>2</sup> (52%)	-	-	-	-

Note: Present conditions of coral reefs are distribution, species composition, and living coral reefs.

### 2) Landscape

The present condition of landscape of the World Heritage area (SCZ) should be absolutely protected. This requires that the elements producing high value of



landscape, such as shape and the surface conditions of islands as well as color and clearness of seawater should be conserved as they are. As for natural scenery, artificial obstacles should be controlled strongly in SCZ. Therefore, the following conservation criteria are proposed on the sea area in SCZ.

Environ. Zone	Shape and surface of islands	Color and clearness of seawater	View of natural resources	Natural scenery
SCZ	No islands changed artificially	To be controlled as water quality	- No islands having bald spots - To be controlled as tidal flats and mangrove swamps	No cargo ships anchored in the World Heritage core area and deviated from the courses

As for the sea areas in CZ and AMZ, landscape there should be controlled as water quality and tidal flats and mangrove swamps management. In terms of inland landscape, it is controlled by green coverage ratio. In DZ, landscape concern should be taken into consideration by development projects and urban designing.

### 8.3 Technical, Institutional, and Financial Capacities

Built up capacities of technology, institution, and finance is essential to implement the EMP effectively and appropriately. The current situations of these capacities of DOSTE and other relating agencies, however, are not enough to implement the EMP. Thus, it is recommended that their capacities should be built up so that they can manage environment in the EMP area by themselves. The following aspects should be attained qualitatively.

- Technical capacity: appropriate monitoring and database management, high public awareness,
- Institutional capacity: color responsibility demarcation, higher control power, established licensing system
- Financial capacity: enough budget and number of staff, established funding sources, and cost recovery system

# TABLE



Table 8.2.1 Possible Projects by Scenarios

Pollution Sources		Scenario I		Scenario II		Scenario III	
Sources	Location	Projects	SC	Projects	SC	Projects	SC
Domestic	Sewered area	Gien Day WWTP (20,000)	3,4	Gien Day WWTP (76,000)	2,3,4	Gien Day WWTP (106,000)	2,3,4
		Deo Sen WWTP (45,000)	7,8	Deo Sen WWTP (166,000)	6,7,8	Deo Sen WWTP (196,000)	6,7,8
				Cam Pha WWTP (50,000)	10	Cam Pha WWTP (77,000)	6,10
						Ha Tu WWTP (32,000)	6,9
						Cam Phu WWTP (12,000)	11
					Cua Ong WWTP (12,000)	12,13	
	Others	no		no		no	
Industry	Existing Factory (sewered area)	treated by sewerage system	3,4,7,8	treated by sewerage system	2,3,4,6,7,8,10	treated by sewerage system	2-4,6-13
	Existing Factory (Others)	no		treated to Effluent Standard B		-	
	New Factory	treated to Effluent Standard B		treated to Effluent Standard A		Scenario II x 70%	
Coal Mining	Wastewater (coal mining areas,	existing treatment system		treated to Effluent Standard B		Scenario II x 50% (SS)	
	coal processing plants, coal ports)					Scenario II x 70% (Other items)	
Livestock	Pigs (sewered area)	50% treated by sewerage system	3,4,7,8	50% treated by sewerage system	2,3,4,6,7,8,10	50% treated by sewerage system	2-4,6-13
	Others	no		no		no	
Non-S.	Bare land	no		Reforestation (300ha)		Reforestation (1,500ha)	
	Coal mining area	no		Reforestation (1,000ha)		Reforestation (4,300ha)	
	Others	no		no		no	

Note: 1) SC means sub-catchment, WWTP means Wastewater Treatment Plant.

2) Figures in parenthesis of WWTP mean sewerage population.

3) Effluent Standard A, B are from Vietnamese Effluent Standard (TCVN5945-1995)

Standard A: BOD 20mg/l, COD<sub>Mn</sub> 30mg/l, SS 50mg/l, T-N 30mg/l, T-P 4mg/l (COD<sub>Mn</sub> was set by the JICA Study team)

Standard B: BOD 50mg/l, COD<sub>Mn</sub> 65mg/l, SS 100mg/l, T-N 60mg/l, T-P 6mg/l (COD<sub>Mn</sub> was set by the JICA Study team)

1

2

3