

CHAPTER 6:

PRIORITY PROJECT SITE SELECTION FOR FEASIBILITY STUDY

Chapter 6 Priority Project Site Selection for Feasibility Study

6.1 Criteria for Priority Project Site Selection

In the present study, some priority project(s) are to be selected for execution of feasibility study. Selection of the site of priority project(s) requires certain criteria or guidelines for bestowing objectivity on its result. In the following, a certain set of criteria are proposed as the guidelines for selecting the site of priority project(s)

Table 6.1.1: Elements for priority selection and assignment of their scores

Category	Entry of elements	Range of score	Remarks
Coastal Protection	Threat of cliff erosion by waves to people and housing	0 – 5	5 for largest threat
	Threat of beach erosion to people and housing	0 – 10	10 for largest threat
	Integrity of existing facilities	0 – 5	0 for excellent and 5 for poorest conditions, and 5 for no facilities
	Range of Sub-total Score	0 – 20	
Beach Utilization	Population density along the coast	0 – 5	5 for highest density
	Beach visitor density	0 – 5	5 for highest density
	Number of hotels, bars, etc.	0 – 5	5 for largest number
	Beach area reduction by future erosion	0 – 5	5 for largest reduction
	Range of Sub-total Score	0 – 20	
Economical feasibility of project implementation	Relative cost of project	1 – 5	5 for lowest cost
	Relative benefit of project	1 – 5	5 for highest benefit
	Range of Sub-total Score	2 – 10	
Needs for promotion of regional development	Threat of geotechnical cliff failure to people and housing	0 – 5	5 for highest threat
	Potential of future tourism development	0 – 5	5 for largest potential
	Range of Sub-total Score	0 – 10	

The criteria are based on a multiple score system, which assigns certain scores to various elements related to the twenty (20) coastal sub-sectors of the Southern Romanian Black Sea Shore, defined in 5.1. Scoring is made in the categories of coastal protection, beach utilization, environmental protection, economical feasibility, and promotion of regional development.

The elements and scores to be considered are listed in Table 6.1.1. The scores of the respective elements of a given coastal sub-sector in each category are summed up and thus the total score is counted. All the sub-sectors are ranked with their total score in each category.

Table 6.1.2: Score and ranking of sub-sectors

Category	Elements	I-1	I-2	I-3	I-4	I-5	I-6	I-7	II-1	II-2	II-3	III-1	III-2	IV-0	V-0	VI-1	VI-2	VI-3	VII-1	VII-2	VII-3
		Nav. N.	Nav. S.	Ma. N.	Ma. C.	Ma. S.	Tom. N.	Tom. S.	Efo. N.	Efo. M.	Efo. S.	Tuz. N.	Tuz. S.	Cos- tines.	Schi- tu	Oli- Man.	Bal. Man.	Sat. Man.	2 Mai	Lim- anu	Vama Veche
Coastal Protection	Threat by cliff erosion	0	0	0	0	0	4	3	4	0	3	2	2	3	2	2	0	0	4	5	2
	Threat by beach eros	3	3	3	3	10	4	4	4	8	6	4	2	4	0	4	8	6	4	2	4
	Facility integrity	5	5	5	3	3	2	1	2	4	5	5	5	5	5	3	5	4	2	5	5
	Total Score	8	8	8	6	13	10	8	10	12	14	11	9	12	7	9	13	10	10	12	11
Beach Utilization	Population density	2	3	2	2	2	5	5	4	1	3	1	0	3	0	2	2	4	2	1	1
	Beach visitor density	1	1	3	3	5	2	3	5	2	4	0	0	4	0	3	1	2	3	0	4
	Nos. hotels etc.	1	2	4	5	5	1	3	5	2	4	0	0	4	0	3	3	3	2	0	3
	Beach area reduction	1	1	2	3	5	1	1	3	4	4	1	2	1	1	4	3	2	3	1	2
Total Score	5	7	11	13	17	9	12	17	9	15	2	2	12	1	12	9	11	10	2	10	
Economical Feasibility	Relative cost	--	--	--	5	5	4	3	4	2	2	--	--	2	--	5	--	1	--	--	--
	Relative benefit	--	--	--	4	4	3	2	4	1	4	--	--	2	--	3	--	3	--	--	--
	Total Score	--	--	--	9	9	7	5	8	3	6	--	--	4	--	8	--	4	--	--	--
Regional Development Promotion	Threat by cliff failure	0	0	0	0	0	5	3	5	0	5	2	2	2	2	2	0	0	2	3	2
	Future potential	5	4	3	2	2	1	2	2	4	2	1	1	3	1	2	1	2	2	1	2
	Total Score	5	4	3	2	2	6	5	7	4	7	3	3	5	3	4	1	2	4	4	4

Table 6.1.3: Category-wise score and ranking of sub-sectors

Category	Elements	I-1 Nav. N.	I-2 Nav. S.	I-3 Ma. N	I-4 Ma. C.	I-5 Ma. S	I-6 Tom. N.	I-7 Tom. S.	II-1 Efo. N.	II-2 Efo. M.	II-3 Efo. S.	III-1 Tuz. N.	III-2 Tuz. S.	IV-0 Cos- tines.	V-0 Schi. tu	VI-1 Oli- Man.	VI-2 Bal. Man.	VI-3 Sat. Man.	VII-1 2 Mai	VII-2 Lim- anu	VII-3 Vama Veche
Coastal Protection	Total Score	8	8	8	5	13	10	8	10	12	14	11	11	12	7	9	13	10	10	12	11
	Ranking	14	14	14	20	2	9	14	9	4	1	7	7	4	19	13	2	9	9	4	6
Beach Utilization	Total Score	5	7	11	13	17	10	12	17	9	15	2	2	12	2	12	9	11	10	2	10
	Ranking	16	15	8	4	1	12	5	1	12	3	17	17	5	17	5	12	7	10	17	10
Economical Feasibility	Total Score	--	--	--	9	9	7	5	8	3	7	--	--	4	--	8	--	4	--	--	--
	Ranking	--	--	--	1	1	5	7	3	10	5	--	--	8	--	3	--	8	--	--	--
Regional Devl. Promt.	Total Score	5	4	3	2	2	6	5	7	4	7	3	3	5	3	4	1	2	4	4	4
	Ranking	4	7	12	17	17	3	4	1	6	1	12	12	4	12	6	20	17	7	7	7

Judgment of scores for each sub-sector on each entry was made at a joint meeting by the team members of the Study and the team of counterparts at the Water Directorate Dobrogea - Litoral of Apele Romane. The results of scores are listed in Table 6.1.2.

The ranking of one sub-sector may differ by the category concerned. Table 6.1.3 lists the category-wise total score and ranking of each sub-sector. Overall ranking of the sub-sectors with high priority is summarized in Table 6.1.4.

Table 6.1.4: Sub-sectors with high priority

Category	Ranking of sub-sectors				
	Mamaia South	Eforie Nord	Eforie Sud	Tomis Nord	Costinești
Coastal protection	2	9	1	9	4
Beach utilization	1	1	3	12	5
Economical feasibility	1	3	5	5	8
Regional development	17	1	1	3	4
Overall ranking	1	2	3	4	5

As listed in Table 5.7.2 in **5.7.3** of this volume, the sub-sectors of Năvodari North and South, Tuzula North and South, Costinești, Schitu, Balta Mangalia, 2 Mai, Limanu, and Vama Veche have been recommended for “zero-option” by several reasons. In the case of 2 Mai, Limanu, and Vama Veche, no coastal protection works have been proposed because of the natural reserve of marine aquarium in the water area of these sub-sectors. Thus, these sub-sectors are excluded from the candidate sites of priority projects.

6.2 Selection of Feasibility Study Sites

The results of Tables 6.1.2 to 6.1.4 were presented to the Steering Committee for the Study on November 4, 2005 held at the Ministry of Environment and Water Management, Bucharest. After some discussions, the sub-sectors of Mamaia South and Eforie Nord were selected as the sites of the first and second priorities by overall consideration of the category-wise ranking, respectively. The sub-sectors of Eforie Sud, Tomis Nord, and Costinești were selected as the third, fourth, and fifth priorities, respectively. Although “zero-option” was recommended to the sub-sector of Costinești in **5.7.3**, a special request was made by the Romanian side to include it in the candidate sites for priority project site.

In consideration of the limitation in the resources and time schedule of the Study, it was agreed at the Steering Committee for the Study that the feasibility study on protection and rehabilitation of the southern Romanian Black Sea shore shall be made at the two sites of Mamaia South and Eforie Nord.

The selection of the sub-sectors of Mamaia South and Eforie Nord for the feasibility study was acknowledged at the third stakeholder meeting in Constanța held on November 24, 2005 held at the Water Directorate Dobrogea – Litoral of Apele Romane, as well at the second stakeholder meeting in Bucharest held on November 25, 2005 at the Headquarter of Apele Romane. There was consensus that the two sites are the hot spots of beach erosion and the protective measures should be taken as early as possible.

6.3 Outline of Priority Project at Mamaia South

The plan of the coastal protection and rehabilitation at Mamaia South as the priority project is shown in Fig. 6.3.1. The plan includes the following components:

- 1) Rehabilitation of two existing breakwaters (I-B-5 and 6),
- 2) Sand-retaining groin of 210 m long (MS-J-1)
- 3) Beach fill with the sand volume of 180,000 m³, and
- 4) Three short groins of 100 m long each (MS-J-2 to 4).

The beach fill area is shaded in brown color, while new groins are shown in red colors. The layout and design of shore protection facilities are made on the basis of the coastal topographic survey maps in 1997 as compiled in the report by PROIECT S.A. They are to be revised on the newest information of bathymetric and topographic survey results to be executed during the feasibility study of the priority projects. The results of the revised facility plans are given in Chapters 3 of Volume 2. In the present volume, however, the facility plans based on the previous information are presented as a part of the coastal protection plan for the Southern Romanian Black Sea shore. Differences between the two plans will indicate some refinements in coastal protection design to be introduced by the use of reliable survey data.

The facility plan shown in Fig. 6.3.1 is based on the condition that coarse river sand from the river bed of the Danube can be utilized for beach fill. When river sand mining is not authorized for a certain period awaiting the result of environment impact assessment, an alternative plan of using fine sand to be mined from the seabed off Midia Port or the Sulina area will be considered. In this alternative plan, the project components are altered as follows:

- 5) Rehabilitation of two existing breakwaters (I-B-5 and 6),
- 6) Sand-retaining groin of 310 m long (MS-J-1),
- 7) Beach fill with the sand volume of 460,000 m³,
- 8) Three short groins of 100 m long each, and
- 9) Underwater dike of 1,200 long (MS-J-2 to 4).

Figure 6.3.2 shows the facility layout of the alternative plan. The beach fill area is enlarged because of gentle slope of equilibrium beach profile and an underwater dike is to be built along the edge of beach fill area. The sand-retaining groin is elongated to the length of 310 m. For the cross sections of breakwaters, groins, and underwater dike, please refer to Annex F.2.

6.4 Outline of Priority Project at Eforie Nord

The plan of the coastal protection and rehabilitation at Eforie Nord as the priority project is shown in Fig. 6.3.3. The zone marked as Eforie Nord (1) is for the priority project in the first phase of the coastal protection plan. The plan includes the following components:

- 1) Extension of two existing jetties by 160 m (EN-J-1 and 2),
- 2) Construction of two new submerged breakwaters of 275 and 325 m long (EN-B-1 and 2),
- 3) Beach fill with the sand volume of 330,000 m³, and
- 4) Construction of two temporary access roads, one on land with the length of 1,200 m and another in water with the length of 500 m..

The layout and design of shore protection facilities are also made on the basis of the old topographic information. They are somewhat different from those introduced in Chapter 4 of Volume 2.

The alternative plan using the sea sand will have the following components:

- 1) Extension of two existing jetties by 160 m (EN-J-1 and 2),
- 2) Construction of two new submerged breakwaters of 275 and 325 m long (EN-B-1 and 2),
- 3) Beach fill with the sand volume of 740,000 m³,
- 4) Construction of an underwater dike of 1,100 m long, and
- 5) Construction of two temporary access roads, one on land with the length of 1,200 m and another in water with the length of 500 m..

Figure 6.3.4 shows the facility layout of the alternative plan for Eforie Nord. For the cross sections of jetties, submerged breakwaters, and underwater dike, please refer to Annex **F.2**.

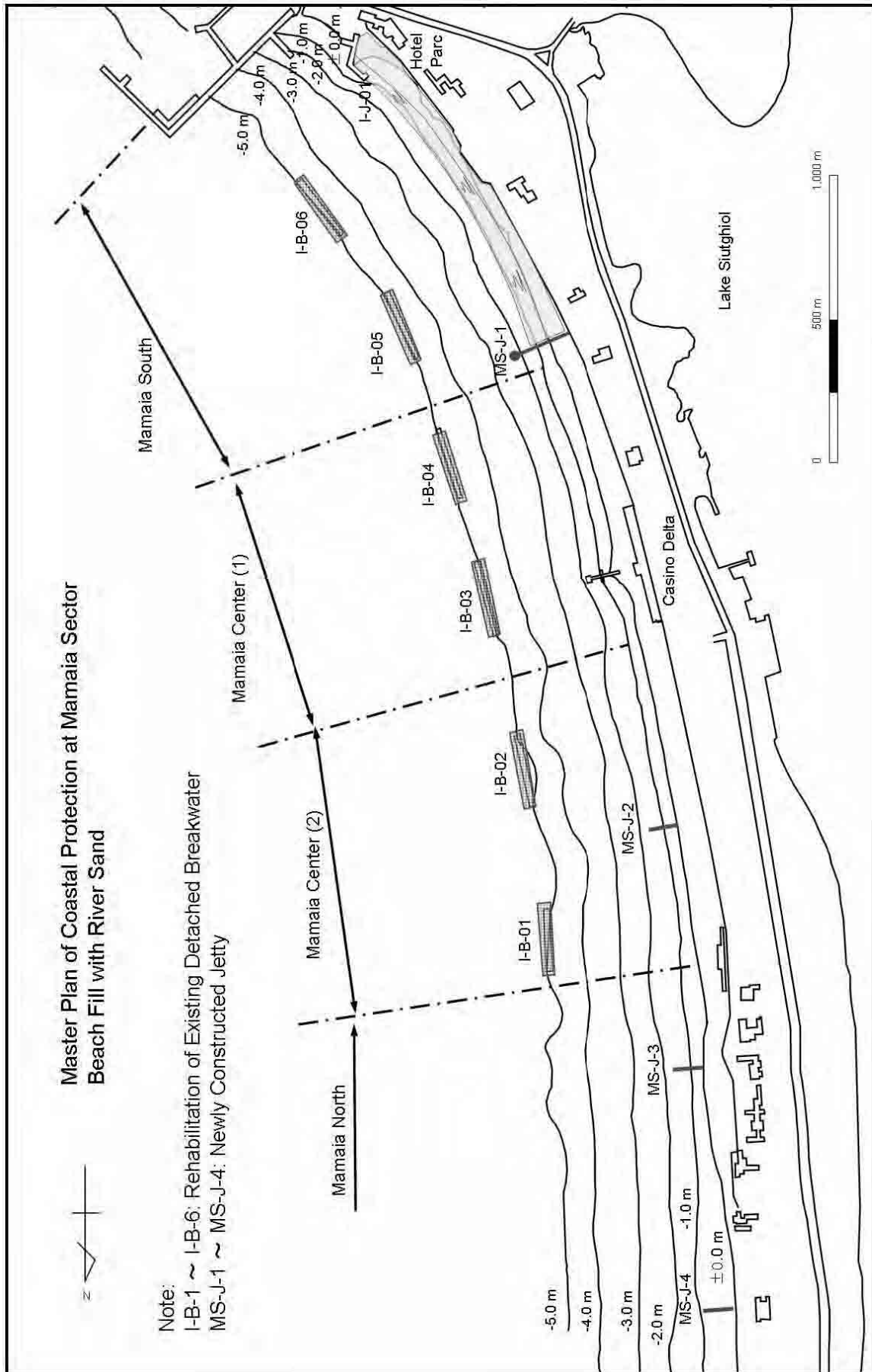


Fig. 6.3.1: Facility layout of priority project using river sand in Mamaia South

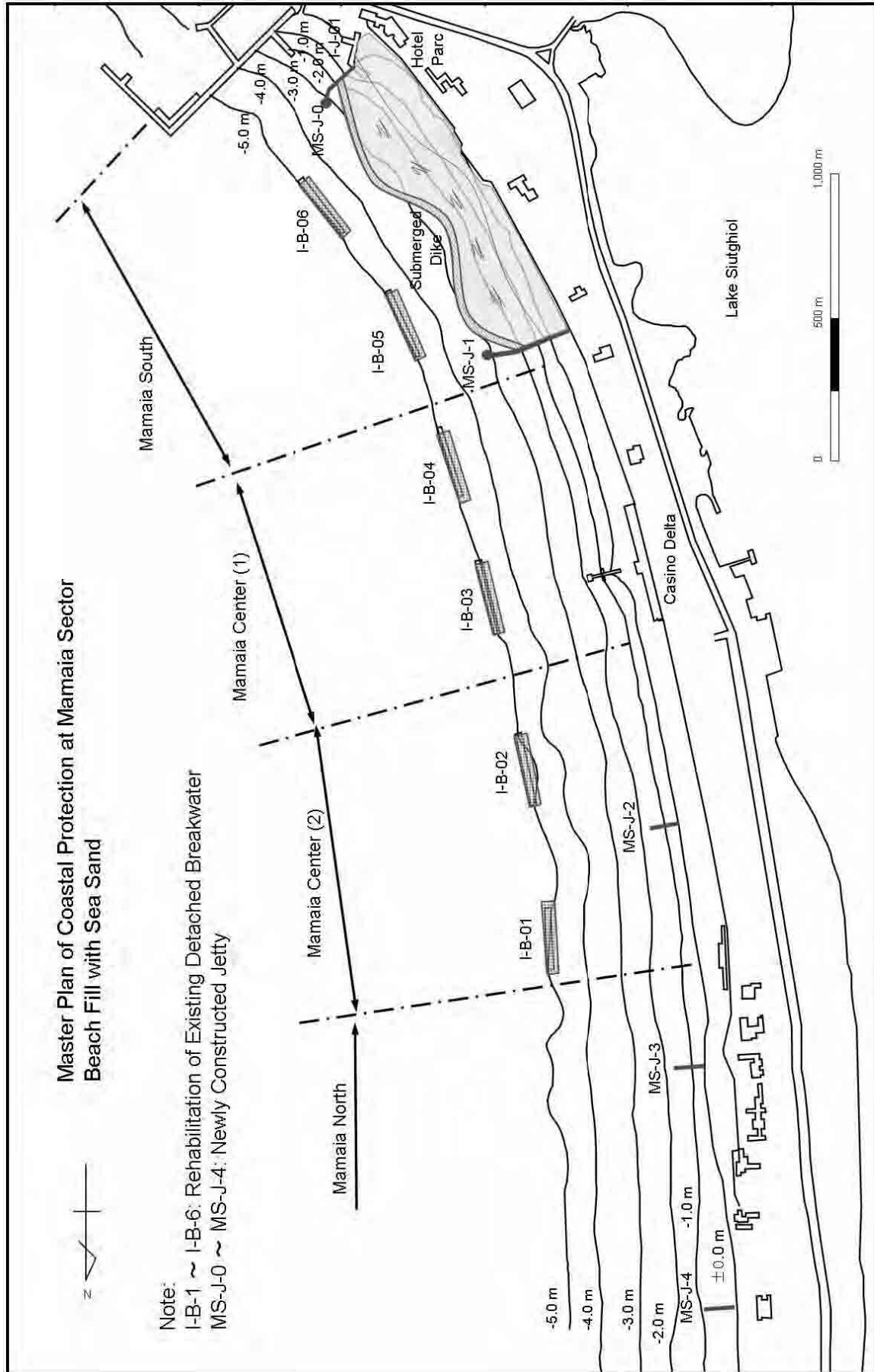


Fig. 6.3.2: Facility layout of priority project using sea sand in Mamaia South

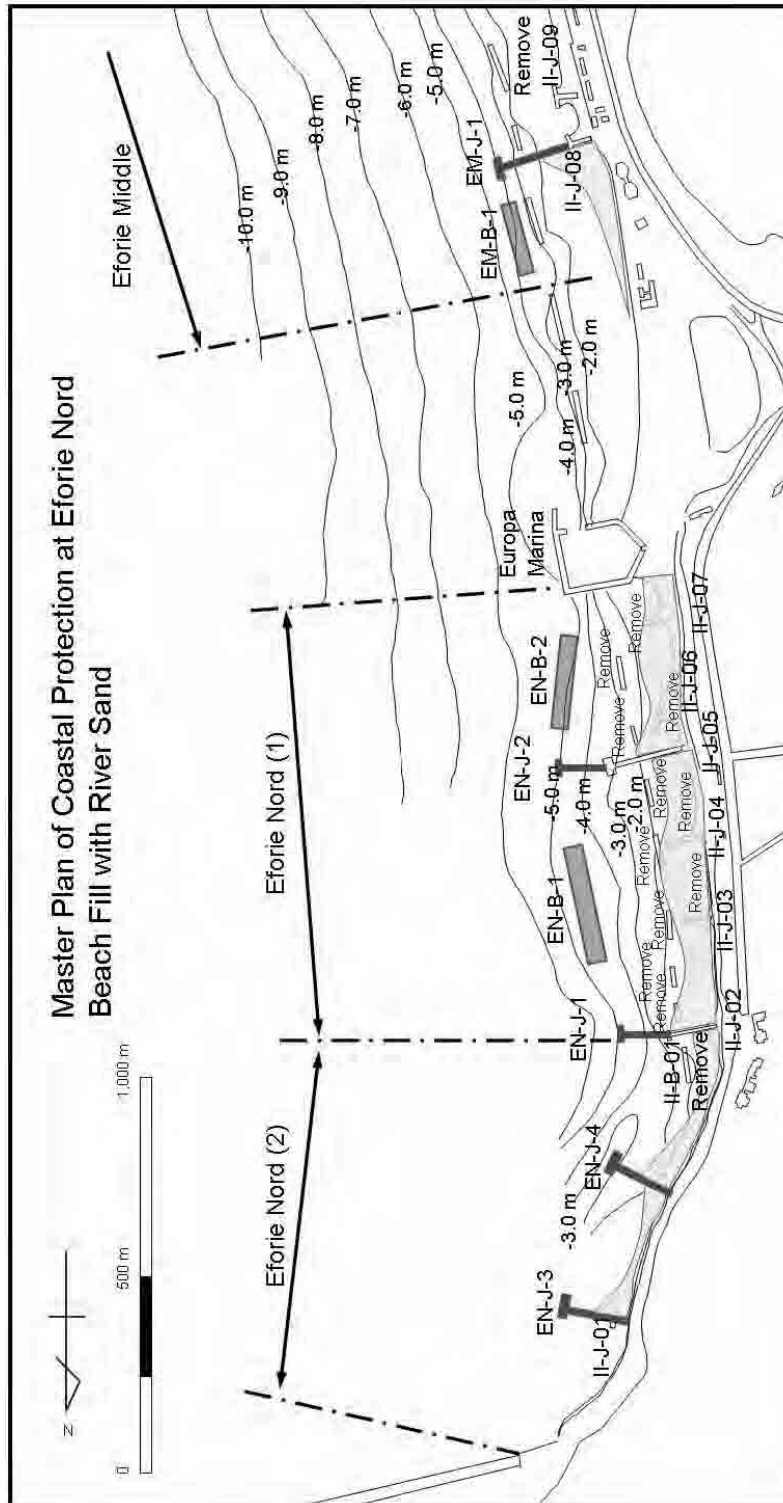


Fig. 6.3.3: Facility layout of priority project using river sand in Eforie Nord

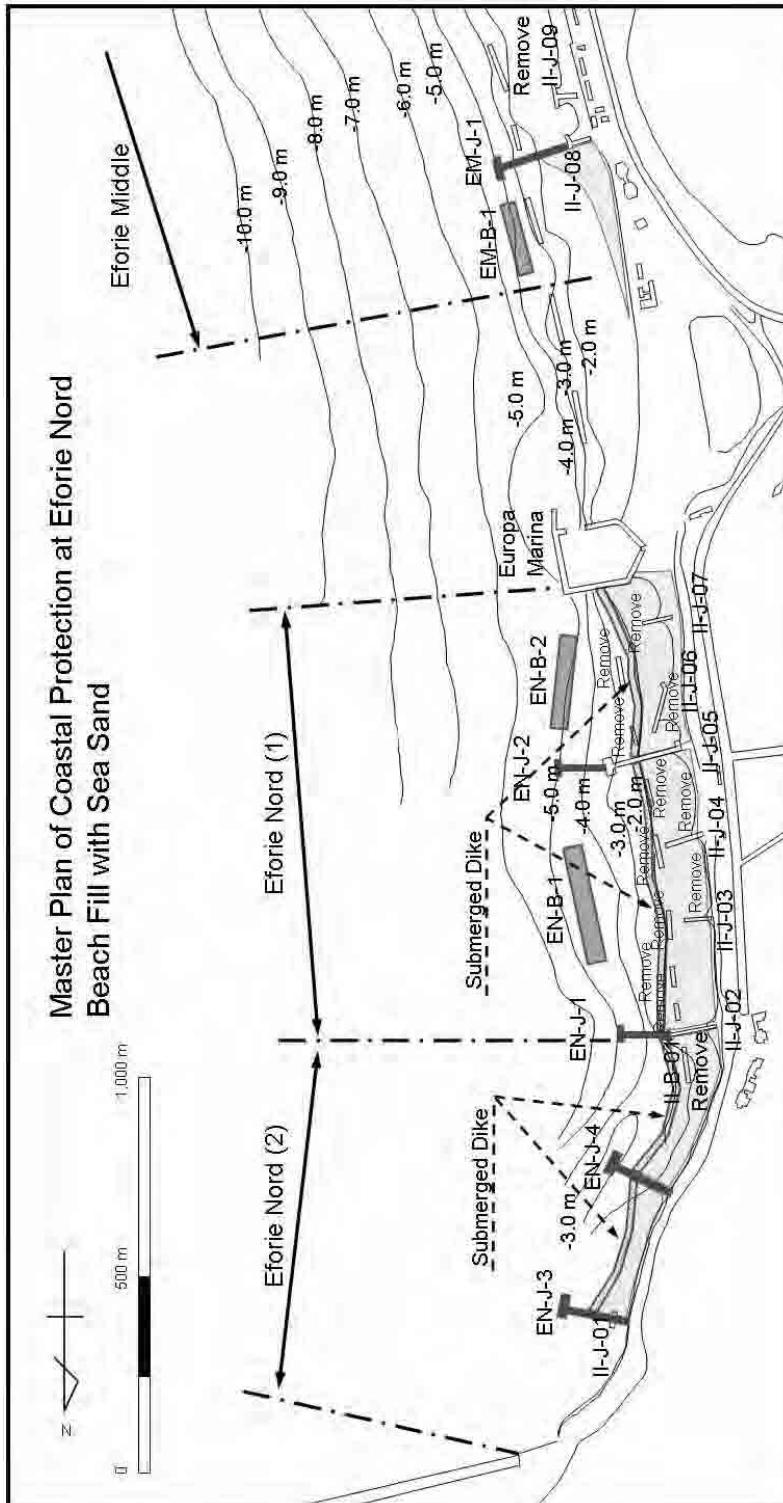


Fig. 6.3.4: Facility layout of priority project using sea sand in Eforie Nord

Chapter 7:

ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

Chapter 7 Environmental and Social Considerations ¹

7.1 Policy, Legal Aspects and Administrative Framework on Environmental Protection in Romania

7.1.1 Policy: Environmental Policy in Romania and Constanta County

(1) Environmental policy in Romania

Practically inexistent before the 1980s, though a few basic and collateral environmental laws gave it an illusory reality, the Romanian National Environmental Policy (NEP) came into being as an independent domain of the national policies after 1990, at the same time with establishment of the former Environment Ministry.

At the beginning it was based on earlier environmental laws, dating from the 1960s to '70s, such as Law no. 9/1973 on Protection of the environment, the Water Law of 1974, the Forestry Code of 1962, the Toxic Substances Law of 1979 etc., but NEP was soon enforced by a new legal framework.

Of the greatest importance was the recognition in 1991 of the fundamental right of its citizens to a healthy environment, in full conformity with the Universal Declaration of the Human Rights and with the pacts and treaties recognized by Romania, which is based on the fundamental law of Romania, i.e. its Constitution. The constitutional provisions contain three categories of state obligations relevant for the environmental protection:

- 1) Rational exploitation of the natural resources;
- 2) Restoration and protection of the environment, as well as the maintaining of the ecological equilibrium; and
- 3) Creation of the condition for the improvement of the life quality.

Thus, the Constitution states:

- in art. 41 (6): The right of property compels to the observance of duties relating to environmental protection and ensurance of neighbourliness, as well as of other duties incumbent upon the owner, in accordance with the law or custom;
- in art. 134 (2e): The State must secure: environmental protection and recovery, as well as preservation of the ecological balance; and
- in art. 135 (4): Subsoil riches of any nature, ways of communication, the air space, waters with hydropower availabilities and those which can be used for the public interest, beaches, territorial waters, natural resources of the economic zone and the continental shelf, as well as other assets established by law shall be exclusively public property.

Another important step was done in 1992, by the appearance of the first official document establishing the national priorities for the environment – The National Strategy for

¹ In execution of the study of environmental and social considerations, an initial environmental examination (IEE) was commissioned to the National Institute of Marine Geology and Geo-ecology (GeoEcoMar) by the Study team. A large part of this chapter owes to the IEE report submitted by GeoEcoMar. Some portions of the report are reproduced in Annex G. The terms of reference for the subcontract are listed in Annex **G.1.1**.

Environmental Protection (NSEP). The document, updated in 1996 and 2002, is structured in two parts:

- 1) a review of the main natural resources, elements concerning the economic state and the quality of environmental factors, and
- 2) the proper strategy, that is the general principles for environmental protection, priorities, short, medium and long term objectives.

Following the Second Ministerial Conference “Environment for Europe”, held in 1993 in Lucerna, Switzerland, the National Environmental Policy materialized in 1995 in a National Action Plan for Environmental Protection (NAPEP). The Plan is based on the Action Program for Environmental Protection for Central and Eastern Europe, also considering other national documents such as the National Strategy for Environmental Protection, the National Strategy for Water Management, the Strategy for the Development of Forestry, the National Strategy and Action Plan for the Conservation of Biodiversity etc., as well as international reference documents such as the Strategic Action Plan for the River Danube Basin, the Strategic Action Plan for the Rehabilitation and Protection of the Black Sea, other multilateral and bilateral agreements and conventions ratified by Romania. The NAPEP's structure respects the general directions outlined at Lucerna presenting in a succinct manner the natural resources (regenerable and non-regenerable), the economic state, the quality of environmental factors, the strategy for environmental protection, the legislative and institutional framework, the sectorial strategies for protection and the implementation modalities.

Beginning from 1996 a convergence of the National Strategy principles, priorities and objectives with the communitary ones may be observed. Thus, the main principles of the strategy are:

- conservation and betterment of the humans health conditions;
- sustainable development;
- pollution prevention;
- conservation of biodiversity;
- conservation of the cultural and historical heritage;
- the principle “the polluter pays”; and
- stimulation of the environmental recovery (by subventions, low interest credits etc.).

The identified priorities reflect not only the national needs but also the global tendencies and initiatives:

- maintenance and betterment of the population health and life quality;
- maintenance and improvement of the existing natural potential;
- defense against natural calamities and accidents;
- maximum ratio cost-benefit; and
- compliance with the international programs and conventions regarding the environmental protection.

The 1992 and 1996 strategies constituted the framework for structuring the national environmental policy up to 1999, when the National Accession Program was adopted. Within this framework several essential laws, regulating the social relations related to the use and development of the environment components and the environmental protection were adopted.

The most relevant are the Environmental Protection Law no. 137/1995, the Water Law no. 107/1996, the Law no. 26/1996 for the approval of the Forestry Code etc. Also, during this period, several international treaties and conventions dealing with environmental topics were ratified by Romania; according to the constitutional provisions “Treaties ratified by Parliament, according to the law, are part of national law” (Romanian Constitution, art. 11 (2)). Among them the most important were: International Convention for the Prevention of Pollution from Ships, ratified by Romania through the Law no. 27/1993, the Convention on the Conservation of European Wildlife and Natural Habitats coming into power in Romania through the Law no. 13/1993, the Convention on Biological Diversity ratified by the Law no. 58/1994, the Convention on International Trade in Endangered Species of Wild Flora and Fauna ratified by the Law no. 69/1994 and so on.

After the adoption of the National Accession Program in 1999, NEP has evolved, according to the EU strategy for the candidate states, being orientated towards identification of priority action areas, establishment of key objectives and especially the adoption, transposition and implementation of the community *acquis*². The main priorities identified by the EC were related to the air and water pollution and waste management.

Accordingly, NEP was supplemented by a yearly Report on the environment quality in Romania, roughly corresponding to the first part of NEP but completing it with a detailed analysis of the quality of the main environmental factors: quality of the atmosphere, quality of atmospheric precipitations, state of surface and ground waters, state of soils, state of forests, waste management and state of sonic pollution.

In 2002, as a response to an urgent need, a National Strategy for Waste Management was added to NEP; the topic was first addressed in 2000 by taking over into the Romanian legislation the Framework Directive on Waste no. 75/442/EEC through the Government Emergency Ordinance no. 78/2000, approved and completed in 2001 through the Law no. 426/2001.

In 2002 were open the accession negotiations for Chapter 22 “Environmental Protection and the European Commission drew a special document – Roadmaps for Romania and Bulgaria” to help the countries to access to EU in 2007. The environmental topics mentioned in the roadmaps had in view the development of implementing capacities for the adopted environmental legislation, as well as the inter-ministerial coordination for environmental problems to promote the sustainable development and the transformation of the environmental policy in a transversal policy. The main diagnosed short term problems were:

- a general assessment to identify the existing needs;
- development of implementation plans completed with financing strategies;
- improvement of the administrative capacity to implement the *acquis*;
- preparation of the environmental legislation through consultations with the interested parties and detailed evaluation of the implementation costs;
- adoption of horizontal legislation for EIA and access to information;
- strengthening of the structures and mechanisms involved in the implementation of environmental topics in other sectorial policies.

² The term “*acquis*” (or sometimes *acquis communautaire*) is from French and being used in European Union laws to refer to the total body of EU law accumulated so far and adopted by the candidate member states.

Romania fulfilled most of the roadmaps requirements and as a result the negotiations for Chapter 22 were finalized in November, 28 2004.

At the moment the legislative framework of the NEP is constituted for the better part by the environmental *acquis*, that is the horizontal and sectorial legislation regulating the environmental policy of the European Community. The sectorial environmental *acquis* is structured on the following fields: air quality, waste management, water quality, protection of nature, control of industrial pollution and risk management, chemical substances and genetically modified organisms, sonic pollution, civil protection and nuclear safety.

The 2005 EU Comprehensive Monitoring Report for Romania states:

“Romania is generally meeting the requirements for membership and, subject to good progress being maintained both in the alignment of legislation and administrative capacity, is expected to be in a position to implement the *acquis* in the areas of air quality, nature protection, chemicals and genetically modified organisms, noise and nuclear safety and radiation protection by accession. Romania should complete the legal alignment in these areas.

Furthermore, Romania should improve air quality management and monitoring and finalise air quality plans and programmes. In the field of nature protection, Romania should ensure that relevant protection measures are applied by accession.

Increased efforts are needed in the areas of horizontal legislation, waste management and water quality to finalize the transposition process and to ensure the implementation of the transposed legislation. Waste management plans have to be adopted and recycling and recovery rates have to be increased. The monitoring of water quality requires further improvement and action plans have to be adopted.”

(2) Environmental policy in Constanța County

The Local Environmental Policy (LEP) of the Constanța County develops within the environmental legal framework of Romania, in full concordance with the NEP but adapted to the local environmental issues. The programmatic document of LEP is the Local Action Plan for Environmental Protection (LAPEP), initiated and implemented by the county environmental authority – the Environmental Protection Agency Constanța. According to the actual responsibilities of the local environmental authority the director of the agency acts as coordinator of the plan.

LAPEP was elaborated on the basis of the Manual for Drawing and Implementing the Local Action Plan for Environment, edited by the Ministry of Environment and Water Management and is fully correlated with the National Action Plan for Environmental Protection and the Regional Development Plans.

LAPEP is described in the National Action Plan for Environmental Protection as an inventory of the local environmental issues and an argument in the dialogue with intern and international financing organizations containing objectives of local interest for communities with more than 2000 inhabitants.

LAPEP is structured in six chapters, the most important being chapters 3 to 6:

- Chapter 3 – State of environment in Constanța County;
- Chapter 4 – Priority environmental issues/aspects in Constanța County;

- Chapter 5 – Plan for implementation of actions;
- Chapter 6 – Monitoring and assessment of results.

LAPEP identified eleven categories of environmental issues hierarchically ordered on the basis of the influence on human health and environment, unconformities with legal requirements, social costs of solving the problem and benefits for the Public/environment health as follows:

- 1) Quality and quantity of the drinking water;
- 2) Pollution of surface waters;
- 3) Soil degradation;
- 4) Ground water pollution;
- 5) Air pollution;
- 6) Waste management;
- 7) Natural and anthropic environment;
- 8) Dangers generated by natural phenomena;
- 9) Tourism and leisure;
- 10) Urbanization of the environment; and
- 11) Ecological education.

It is worth mentioning that within the eighth category, “Dangers generated by natural phenomena”, one of the identified issues is the natural erosion of beaches and collapse of cliffs. The general goal of the Action Plan for this issue is to identify feasible solution for the littoral protection, the final target being the accomplishment of hydrotechnical works to protect the littoral zone.

7.1.2 Legal Aspects

(1) Environmental quality criteria concerning water, air, soil, noise and vibration

(a) *Environmental quality criteria for water*

Classification of surface water and sediment quality is based on the Order no. 1146/2002. The order establishes a classification of the surface water quality in five quality classes, replacing the provision of STAS 4706/88 – “Categories and quality conditions of surface waters”. The specified limit values listed in Table 7.1.1 correspond to the maximum admissible limit for the respective quality class.

For class I the maximum admissible limits reflect the reference natural conditions or background concentrations. For synthetic toxic substances the detection limit of the analytical method or the minimal interest threshold for monitoring is adopted.

The limits corresponding to the quality class II refer to the target values (reference objectives) and reflect the quality conditions for the protection of the aquatic ecosystems

The limit values for classes III-V are 2 to 5 times greater than the reference objectives and reflect the extent of anthropic influences.

Table 7.1.1.: Classification of surface water and sediment quality

A. Physical-chemical analyses for water

Classified limit values	Measuring Unit	Quality class				
		I	II	III	IV	V
A.1. Physical indicators						
Temperature	°C	Not normed/regulated				
pH		Ranging from 6.5 to 8.5				
A.2. Oxygen regime						
Dissolved oxygen	mg/l O ₂	7	6	5	4	<4
BOD ₅	mg/l O ₂	3	5	10	25	>25
COD-Mn	mg/l O ₂	5	10	20	50	>50
COD-Cr	mg/l O ₂	10	25	50	125	>125
A.3. Nutrients						
Ammonium N-NH ₄ ⁺	mg N/l	0.2	0.3	0.6	1.5	>1.5
Nitrites N-NO ₂ ⁻	mg N/l	0.01	0.06	0.12	0.3	>0.3
Nitrates N-NO ₃ ⁻	mg N/l	1	3	6	15	>15
Nitrogen, total - N	mg N/l	1.5	4	8	20	>20
Ortophosphates P-PO ₄ ³⁻	mg P/l	0.05	0.1	0.2	0.5	>0.5
Phosphorus, total - P	mg P/l	0.1	0.2	0.4	1	>1
Chlorophyll "a"	µg/l	25	50	100	250	>250
A.4. General ions, salinity						
Filterable residue dry at 105°C	mg/l	background	500	1000	1300	>1300
Sodium (Na ⁺)	mg/l	background	50	100	200	>300
Calcium (Ca ²⁺)	mg/l	75	150	200	300	>300
Magnesium (Mg ²⁺)	mg/l	background	25	50	100	>100
Iron, total	mg/l	background	0.1	0.3	1.0	>1.0
Manganese, total	mg/l	background	0.05	0.1	0.3	>0.3
Chlorides (Cl ⁻)	mg/l	background	100	250	300	>300
Sulphates (SO ₄ ²⁻)	mg/l	80	150	250	300	>300
A.5. Metals						
A.5.1. Dissolved fraction						
Zinc (Zn ²⁺)	µg/l	background	5	10	25	>25
Copper (Cu ²⁺)	µg/l	background	2	4	8	>8
Chromium, total (Cr ³⁺ +Cr ⁶⁺)	µg/l	background	2	4	10	>10
Lead (Pb ²⁺)	µg/l	background	1	2	5	>5
Cadmium (Cd ²⁺)	µg/l	background	0.1	0.2	0.5	>0.5
Mercury (Hg ²⁺)	µg/l	background	0.1	0.15	0.3	>0.3
Nickel (Ni ²⁺)	µg/l	background	1.0	2.0	5.0	>5.0
Arsenic (As ²⁺)	µg/l	background	1.0	2.0	5.0	>5.0
A.5.2. Total concentration						
Zinc (Zn ²⁺)	µg/l	background	100	200	500	>500
Copper (Cu ²⁺)	µg/l	background	20	40	100	>100
Chromium, total (Cr ³⁺ +Cr ⁶⁺)	µg/l	background	50	100	250	>250
Lead (Pb ²⁺)	µg/l	background	5	10	25	>25
Cadmium (Cd ²⁺)	µg/l	background	1	2	5	>5
Mercury (Hg ²⁺)	µg/l	background	0.1	0.2	0.5	>0.5
Nickel (Ni ²⁺)	µg/l	background	50	100	250	>250
Arsenic (As ²⁺)	µg/l	background	5	10	25	>25
A.6. Organic toxic substances						
Phenols (phenolic index)	µg/l	background	1	20	50	>50
Anionic active detergents	µg/l	background	500	750	1000	>1000

Classified limit values	Measuring Unit	Quality class				
		I	II	III	IV	V
AOX (adsorbable organic halogenes)	µg/l	10	50	100	250	>250
Petroleum Hydrocarbons (TPH)	µg/l	background	100	200	500	>500
PAH (sum of 6 compounds)	µg/l	-	-	-	-	-
PCB congeners (sum of 7)	µg/l	-	-	-	-	-
Lindane (γ-HCH)	µg/l	0.05	0.1	0.2	0.5	>0.5
pp' DDT	µg/l	0.001	0.01	0.02	0.05	>0.05
Atrazine	µg/l	0.02	0.1	0.2	0.5	>0.5
Trichloromethane	µg/l	0.02	0.6	1.2	1.8	>1.8
Tetrachloromethane	µg/l	0.02	1	2	5	>5
Trichloroethane	µg/l	0.02	1	2	5	>5
Tetrachloroethane	µg/l	0.02	1	2	5	>5

B. Physico-chemical determinations on sediments (Fraction < 63 µm)

Component	Measuring Unit	Limit concentration
Arsenic	mg/kg	17
Cadmium	mg/kg	3.5
Chromium	mg/kg	90
Copper	mg/kg	200
Lead	mg/kg	90
Mercury	mg/kg	0.5
Zinc	mg/kg	300
Benzo(a)pyrene	mg/kg	750
Lindane	mg/kg	1.4
PCB congeners (sum of 7)	mg/kg	280

C. Biological analyses

Parameter	Cl. I-a	Cl. II-a	Cl. III-a	Cl. IV-a	Cl. V-a
Saprobic index MZB	<1.8	1.81-2.3	2.31-2.7	2.71-3.2	>3.2

D. Microbiological analyses

Parameter	Cl. I-a	Cl. II-a	Cl. III-a	Cl. IV-a	Cl. V-a
Total coliforms	500	10000	-	-	-
Faecal coliforms	100	2000	-	-	-

* probable number of colies/100ml

E. Parameters for eutrophication process – natural and storage basins

E.1. Nutrients values

Trophic stage	Total P mg P/l	Total mineral N mg N/l
Ultra-oligotrophic	Up to 0.005	0.200
Oligotrophic	0.005 – 0.01	0.200 – 0.400
Mesotrophic	0.01 – 0.03	0.400 – 0.650
Eutrophic	0.03 – 0.1	0.650 – 1.500
Hypertrophic	>0.1	1.500

E2. – Values for phytoplankton biomass

Trophic stage	Maximum biomass of phytoplankton in photic zone (mg/l)
Ultra-oligotrophic	0 – 1
Oligotrophic	1 – 3
Mesotrophic	3 – 5
Eutrophic	5 – 10
Hypertrophic	>10

E3. – Values for chlorophyll “a”

Trophic stage	Average Annual average in photic zone (mg. m-3)	Maximum Media maxime anuale în zona fotică(mg. m-3)
Ultra-oligotrophic	<1	<2.5
Oligotrophic	<2.5	<8
Mesotrophic	2.5 – 8	8 – 25
Eutrophic	8 – 25	25 – 75
Hypertrophic	25 - 75	>75

E4. – Values of dissolved oxygen saturation

Trophic stage	Minimum oxygen saturation (%)
Ultra-oligotrophic and Oligotrophic	>70
Mesotrophic	10 – 70
Eutrophic and Hypertrophic	<10

Table 7.1.2: Elements and quality standards for the marine coastal water (tentative values)

No.	Indicator	M.U.	Ecological state	Impact area of the anthropic activity	Observations
A. General physico-chemical indicators					
1	Floating mixtures		No floating substances or materials unusual for the marine water in the superficial layer. No opalescence from floating stains of oil or other origin	No floating substances or materials unusual for the marine water in the superficial layer. No opalescence from floating stains of oil or other origin	
2	Color		Natural; without visible differences from the usual natural color of the marine water	Natural; without visible differences from the usual natural color of the marine water	
3	Taste and smell		Natural. Taste and smell identical to normal marine water	Natural. Taste and smell identical to normal marine water	Seafood without abnormal taste and smell
4	Transparence, Secchi disc	m	2	2	
5	pH		6.5 – 9	6.5 – 9	
6	Ammonium N-NH ₄ ⁺	mg/dm ³	0.1	0.1	
7	Nitrites N-NO ₂ ⁻	mg/dm ³	0.03	0.03	
8	Nitrates N-NO ₃ ⁻	mg/dm ³	1.5	1.5	
9	Phophorus, total - P	mg/dm ³	0.1	0.1	
10	Toxicity		Forbidden	Forbidden	No harm to life or to the viability of marine organisms
B. Organic pollution indicators					
11	Dissolved oxygen	mg/dm ³	Not less than 80% of the oxygen saturation	6.2	6.2
12	BOD ₅	mg/dm ³	6.0	6.0	
13	Extractible substances	mg/dm ³	0.15	0.20	
C. Substances of industrial origin					
14	Anionic active detergents	mg/dm ³	0.1	0.1	
15	Phenols	mg/dm ³	0.005	0.005	
16	Oil and oil products		No visible pellicle on the water surface and no smell	No visible pellicle on the water surface and no smell	
17	Pesticides (total)	mg/dm ³	0.01	0.01	
D. Biological indicators					
18	Chlorophyll A ¹⁾	mg/dm ³	3.0	5.0	
19	Total coliforms	MPN in 0.1 dm ³	1000	10000	
20	Faecal coliforms	MPN in 0.1 dm ³	2000	2000	

No.	Indicator	M. U.	Ecological state	Impact area of the anthropic activity	Observations
21	Indicators of contagious disease at intestinal level	Bp/dm ³	Forbidden	Forbidden	
E. Radiological indicators					
22	Radioactivity		According to the in force national norms		
F. Metals					
23	Iron	mg/dm ³	0.1	0.1	
24	Cadmium	mg/dm ³	0.005	0.005	
25	Total chromium	mg/dm ³	0.1	0.1	
26	Nickel	mg/dm ³	0.1	0.1	
27	Zinc	mg/dm ³	0.05	0.05	
28	Mercury	mg/dm ³	0.001	0.001	
29	Arsenic	mg/dm ³	0.05	0.05	
30	Lead	mg/dm ³	0.01	0.01	
31	Copper	mg/dm ³	0.03	0.03	

¹⁾ – The measuring units for Chlorophyll A are probably either mg/m³ or µg/dm³. As they are, the limit for the impact area of anthropic activity is 200 times greater than the limit indicating an hypertrophic environment for lakes.

Table 7.1.3: Bathing water quality parameters (according to the Governmental Decision no. 459/2002)

No.	Reference parameter	Reference value ¹⁾	Compulsory value ²⁾
Microbiological parameters			
1	Total coliforms/100 ml	500	1000
2	Faecal coliforms/100 ml	100	2000
3	Faecal streptococci/100 ml	100	–
4	Salmonella/l	–	0
5	Enteroviruses, UFP/10 l	–	0
Physico-chemical parameters			
6	ph	–	6-9
7	Color	–	No modifications
8	Mineral oils, mg/l	=0.3	No film
9	Tensioactive substances	=0.3	No foam
10	Phenols	=0.005	No smell
11	Transparency, m	2	1
12	Dissolved oxygen saturation, %	80-120	
13	Tar residues and floating materials such as wood, plastic items, glass containers, rubber or any other material. Wastes or splinters	Absent	
14	Ammonium, mg/l NH ₄		0.05
15	Nitrogen – Kjeldahl mg/l		1
Other substances considered as pollution indicators			
16	Total pesticides (parathion, HCH, dieldrin), mg/l		0.001
17	Dissolved iron, mg/l		0.3
18	Manganese, mg/l		0.05
19	Copper, mg/l		0.05
20	Zinc, mg/l		3
21	Nickel, mg/l		0.05
22	Arsenic, mg/l		0.05
23	Cadmium, mg/l		0.005
24	Total Chromium, mg/l		0.05
25	Lead, mg/l		0.05
26	Selenium, mg/l		0.01
27	Mercury, mg/l		0.001
28	Barium, mg/l		0.1
29	Cyanides, mg/l		0.05
30	Nitrates, mg/l		50
31	Phosphates, mg/l		0.4
32	BOD, mg/l O ₂	5	
33	Total suspensions	Absent	–

1) – the reference value is the value qualitatively superior to the compulsory value and which must be reached during the requested derogation period;

2) – the compulsory value is the minimal value to be respected for physico-chemical, microbiological, special and toxic parameters, during the use of water for bathing purposes.

The provisions of this order will be soon amended by a new order prepared by the Ministry of Environment and Water Management. As of August 2006, the draft of the order was available for public consultation on the Ministry website at the address http://www.mmediu.ro/legislatie/ape/ORDIN_STARE_ECOLOGICA_1_.pdf and at the moment is probably the subject of a final revision before approval. The order extends the list of quality parameters and stipulates new limits for most of the old quality parameters. A novelty is represented by the introduction of quality parameters for the marine coastal waters. As these are relevant for the project they are presented in Table 7.1.2, although at the moment they are only tentative.

The bathing water quality parameters are regulated by the Governmental Decision no. 459/2002, as listed in Table 7.1.3.

(b) *Quality criteria for air*

The quality criteria for air have been specified by the Order 592/2002, as listed in Table 7.1.4.

Table 7.1.4: Air quality parameters

Parameter	Maximum value	Observations
NO ₂ , µg/m ³	200	Maximum hourly value
NO ₂ ,	40	Maximum yearly value
NO _x ,	30	Maximum yearly value
Deposable particles PM ₁₀ ,	50	Maximum daily limit
Deposable particles PM ₁₀ ,	40	Maximum yearly value
Lead,	0.5	Maximum yearly value
Benzene	5	Maximum yearly value
CO, mg/m ³	10	Maximum value

(c) *Noise standards*

The admissible limits for noise level are specified by the standards for protection of noise, prepared by Ministry of Transport, Construction and trade as listed in Tables 7.1.5 to 7.1.8, and by the Government Decision 539/2004 as listed in Table 7.1.9.

Table 7.1.5: Admissible limits for levels of noise produced by any activities inside the functional zones

Crt. No.	Functional zone	Admissible limit for equivalent noise level dB (A)
1	Parks	75
2	Recreational and rest area, zones of medical and watering and climatic attendance	50
3	Markets, commercial spaces, open air restaurants	80
4	Precincts of schools, nurseries, kindergartens, playgrounds for children	80
5	Auto parkings	90

Table 7.1.6: Admissible limits for noise levels at the limits of urban functional zones considered as noise sources for adjoining zones

Crt. No.	Functional zone	Admissible limit for equivalent noise level dB (A)
1	Parks	50
2	Markets, commercial spaces, open air restaurants	65
3	Precincts of schools, nurseries, kindergartens, playgrounds for children	75
4	Industrial precincts	65
5	Stadiums, open air cinemas	90 ^{*)}
6	Auto parkings	90 ^{*)}
7	Auto parkings with underground service stations	90
8	Railway zones ^{**)}	70

Observations:

^{*)} the time considered in the determination of the equivalent noise level is the real one, corresponding to the service duration

^{**)} The limit of a railway zone is considered at a distance of 25 m from the axis of the railway closest to the measuring point

Table 7.1.7: Admissible limits for noise levels in the vicinity of protected buildings

Crt. No.	Protected building	Admissible limit for equivalent noise level dB (A)
1	House, hotels, hostels, guest houses	55
2	Hospitals, polyclinics, health units	45
3	Schools	55
4	Kindergartens, nurseries	50
5	Office buildings	65

Table 7.1.8: Admissible value for external noise level on streets and underground passages

Crt. No.	Street type, passage	Equivalent noise level, L_{ech} dB(A)
1	Street of the technical category IV, of local service	60
2	Street of the technical category III, collecting streets	65
3	Street of the technical category II, connecting streets	70
4	Street of the technical category I, thoroughfares	75 to 85
5	Pedestrian passages	65
6	Underground stations	65

Table 7.1.9: Noise limits for equipments to be used outside buildings
(Governmental Decision 539/2004)

Equipment type	Net installed power P (in kW) Electrical power P_{el} ¹⁾ in kW m mass in g Cutting front L in cm	Admissible acoustical power level dB/1pW	
		Stage I From 3. 01. 2005	Stage II From 3. 01. 2005
Compacting machines using only vibrating cylinders, plates and rams	P=8	108	105
	8<P=70	109	106
	P>70	89 + 11 log P	86 + 11 log P
Caterpillar bulldozers, loaders, loaders- excavators	P=55	106	103
	P>55	87 + 11 log P	84 + 11 log P
Tyre bulldozers, loaders, loaders- excavators, dumpers, graders, compacting machines for dumps of loader type, self-propelled cranes equipped with internal combustion engines, mobile cranes, compacting machines only with non-vibrating cylinders, pavement finishing machines, hydraulic drive groups	P=55	104	101
	P>55	85 + 11 log P	82 + 11 log P
Excavators, yard freight-elevators, winches for buildings, motor hoes	P=15	96	93
	P>15	83 + 11 log P	83 + 11 log P
Concrete crushers and portable drill hammers	m=15	107	105
	15<m<30	94 + 11 log m	92 + 11 log m
	m=30	96 + 11 log m	94 + 11 log m
Tower cranes		98 + log P	96 + log P
Generating sets, generators for arc welding	$P_{el}=2$	97 + log P_{el}	95 + log P_{el}
	2< P_{el} <10	98 + log P_{el}	96 + log P_{el}
	$P_{el}=10$	97 + log P_{el}	95 + log P_{el}
Compressors	P=15	99	97
	P>15	97 + 2 log P	95 + 2 log P
Turf mowing machines, turf cutting machines/machines for cutting turf edges	L=50	96	94 ²⁾
	50<L=70	100	98
	70<L=120	100	98 ²⁾
	L=50	105	103 ²⁾

¹⁾ P_{el} for welding generators: the conventional welding current multiplied by the conventional loading tension at the lowest active time indicated by the producer.

²⁾ These are only indicative numbers. The definitive numbers will depend on the subsequent modifications of the present decision. In the absence of such modifications the numbers for stage I will continue to apply for the stage II. The admissible power level will be rounded to the closest integer (less than 0.5 to the inferior integer, equal to or greater than 0.5 to the superior integer).

7.1.3 Strategic Environmental Assessment (SEA)

(1) SEA in Romania

The strategic environmental assessment (hereinafter referred to as “SEA”) aims at administering a high level of environmental protection control over the spatial and temporal scales much larger than those envisaged in environmental impact assessments for individual projects. It originates from the Directive 97/11/EC and Directive 2001/42/EC of the European Commission (SEA Directive), which have been transposed into the Romanian legal system in the form of the Government Decision no.1076 of 8/07/2004 (hereinafter referred to as “the GD”).

The SEA procedures are applied to plans and programmes which are prepared and/or adopted by an authority at national, regional, or local level or which will be adopted by Parliament or Government, and which are required by legislative, regulatory or administrative provisions. Specific types of plans and programmes to be assessed through the SEA procedures have been listed in the Order no.995 of 21/09/2006 of the Minister of Environment and Water Management. The plans for coastal protection are subject to the SEA procedure under the stipulation of the paragraph “e) Strategy on the protection against coastal erosion” in the article “8. Waters management” in the Annex.

The goal of the SEA procedure is to obtain “*environmental approval for plans and programmes.*” The approval is to be issued by the competent authority for environmental protection (hereinafter referred to as “the competent environmental authority”), which confirms the integration of the aspects regarding the environmental protection into the plan or programme submitted to adoption. The owner of a plan or programme has to make appropriate environmental assessment, to submit an environmental report, to invite justified proposals of the authorities concerned and the public through a public debate and, and to revise the plan or programme according to the justified proposals.

(2) Outline of Romanian SEA (GD no.1076/2004)

(a) General

The GD is composed of five chapters and three annexes. Chapter I is the general provisions in Art. 1 to Art. 4. It states the objectives of the GD, and defines the specific terms used in the GD decision such as *environmental approval, environmental assessment, plan and programmes, environmental report, and the plan or programme owner.*

(b) Scope

Chapter II sets out the scope of SEA in Art.5 to Art.8. It clarifies what plans or programmes are subject to the SEA procedure by referring to Annexes 1 and 2; the Ministerial Order no.995/2006 provides more specific lists. It states that the plan or programme owner shall apply the environmental assessment procedure, that the issuing competence of the environmental approval belongs to the central public authority for environmental protection for national and regional plans or programmes (otherwise to the regional environmental protection agencies), and that the public participation is carried out from the beginning of the plan or programme (Art.7). The amount of taxes for issuing environmental approval and tariffs for carrying out the procedural stages are also stipulated in Art.8.

(c) Procedural steps – general

Chapter III describes the procedural steps in Art.9 to Art.34 in five sections. The procedural steps are composed of the screening stage, the stage of finalizing the draft plan or programme and drawing up to the environmental report, the stage of reviewing the quality of the environmental report and decision making, the public participation to the environmental assessment procedure, and the procedures for a plan or programme which might have significant transboundary (beyond the territory of Romania) effects.

(d) Procedural steps – screening stage

Section 1 of Chapter III discusses the screening stage in Art.9 to Art.13. The stage begins when the plan or programme owner notifies in writing the competent environmental authority and inform the public on starting the elaboration of the plan or programme and carrying out of its first version. The plan or programme owner must make repeated announcement in newspapers and by displaying on its own website (Art.9, par.(1)). The competent environmental authority advises the plan or programme owner about the obligation to carry out the environmental assessment in 10 calendar days from the date of receiving the first version of the plan or programme (Art.9, par.(2)).

The competent environmental authority leads the screening stage to decide whether the plan or programme should go through the SEA procedure, because some plan or programme might be judged as not needing the environmental assessment (Art.10, par.(1)). A committee is specially established to assist the screening process (Art.10, par.(2)-(4)). The competent environmental authority shall take the screening decision within 25 calendar days from receiving of the notification from the plan or programme owner and inform the public on its decision (Art.10, par.(3)). The public has the period of 10 calendar days for formulating and sending comments in writing to the competent environmental authority, which may reconsider the decision on the basis of the justified proposal of the public within 15 calendar days from the end of the term for the formulation of public comments. The final decision of the screening stage is published in newspapers by the plan or programme owner (Art.12).

(e) Procedural steps – stage of finalizing the draft plan and drawing up the environment report

Section 2 of Chapter III discusses the stage of finalizing the draft plan or programme and drawing up the environment report in Art.14 to Art.20. This stage is carried out by a working group, which is composed of the representatives of the plan or programme owner, competent environmental and health authorities, other authorities concerned, and one or more natural or legal persons certified for environmental assessment (consultant), as well as employed experts as appropriate (Art.14). The plan or programme owner presents to the working group the specific objectives of the plan or programme. The certified persons analyze the significant environmental issues, including the current state of the environmental and its evolution without the implementation of the plan or programme (Art.15). The plan or programme owner draws up the possible alternatives and presents them to the working group, which assesses how the proposed alternatives are compatible with the relevant environmental objectives of the plan or programme (Art.16). The certified persons analyze the significant effects on the environment of the proposed alternatives and establish the prevention, mitigation, offset and monitoring measures for each alternative and make recommendations. The measures and recommendations are presented to the working group (Art.18).

Taking into consideration the results of above works, the plan or programme owner establishes the draft plan or programme and presents it to the working group. The draft plan or programme must be composed of: a) the final alternative; b) the prevention, mitigation and offset measures, and c) the monitoring programme of the significant environmental effects by implementation of the plan or programme. The certified persons analyze the measures and the monitoring programme proposed by the plan or programme owner and draw up the environmental report according to the framework content laid down in Annex 2 (Art.19).

The plan or programme owner shall announce in newspapers and its own website the availability of the draft plan or programme, the environmental report, and the place and consultation schedule for the comments by the public (Art.21, par.(1)). The announcement in newspapers must be made in 2 times at the interval of 3 calendar days. The public can submit written comments to the plan or programme owner and to the headquarter of the competent environmental authority in 45 calendar days from the last announcement (Art.30, par.(2)). The plan or programme owner modifies the draft plan or programme and/or the environmental report based on the justified observations received from the public (Art.21, par.(3)).

(f) Procedural steps – stage of quality review and decision making

Section 3 of Chapter III discusses the stage of quality review and decision making in Art.22 to Art.24. The plan or programme owner shall transmit the modified version of the draft plan or programme and the environmental report to the competent environmental authority, the competent health authority, and other authorities concerned within 5 calendar days from the date of finalizing them (Art.22, par.(1)). The competent authority for health and other authorities concerned shall draw up and transmit in writing detailed and motivated opinions on the proposed draft plan or program and the environmental report to the competent environmental authority within 45 calendar days from the date of receiving the draft plan or program and the environmental report (Art.22, par.(3)).

The plan or programme owner must organize the public debate of the draft plan or program and the environmental report and announce it in newspapers and its own website at least 45 calendar days before the date of the public debate (Art.23, par.(1) and Art.31, par.(1)). The competent environmental authority has the responsibility to lead the public debate, to register the justified proposals from the public and the authorities concerned, and to elaborate the debate minutes (Art. 31, par.(5)).

In order to review the quality of the environmental report and to ensure the compliance with the provisions of the GD, the competent environmental authority shall take into account the received points of view of all the other authorities and analyze the results of the public consultation and their integration in the environmental report (Art.24, par.(1)-(2)). The seven elements to be considered in the quality review by the competent environmental authority are listed in Art.24, par.(3). The competent environmental authority may decide and communicate to the plan or programme owner the necessary rectification of the environmental report in writing, in case when the environmental report is incomplete or does not have a sufficient quality in order to ensure the compliance with the provisions of the GD (Art. 24, par.(4)).

The competent environmental authority shall take the decision to issue the environmental approval in 15 calendar days from the public debate (Art. 25, par.(1)), inform the plan or programme owner about the decision in writing, and display it on its own website in 3 calendar days from the date of decision taking (Art. 25, par.(3)). The environmental approval

include: a) the reasons on which it was issued; b) the monitoring measures; and c) mitigation or offset measures (Art.25, par.(4)).

The environmental effect monitoring program is to be attached to the documentation submitted to the competent environmental authority in order to obtain the environmental approval and is integrated in the environmental approval (Art.26, par.(2)). The accomplishment of the monitoring program is the responsibility of the plan or programme owner, who must submit annually the results of the monitoring program to the competent environmental authority (Art. 26, par.(3)). The authority reviews the monitoring program results and informs the public by displaying on its webpage (Art.26, par.(4)).

(g) Public information and participation to the environmental assessment procedure

Section 4 of Chapter III describes the procedures of providing the information to the public and those of public participation to the environmental assessment in Art.28 to Art.33. The responsibility of the public involvement at the screening stage belongs both to the competent environmental authority and to the plan or programme owner (Art.29, par.(1)), while the responsibility of the public involvement at the stage of finalizing the draft plan or programme and drawing up the environmental report belongs to the plan or programme owner (Art.30, par.(1)).

The announcement of the public debate includes: a) the place and the day and hour of the public debate; b) the authorities concerned, and c) the fact that the debate is opened to the public (Art. 31, par.(2)).

(h) Environmental assessment in transboundary context

Section 5 of Chapter III discusses the environmental assessment procedure for a plan or programme that might have significant impact on the environment of another state in Art.34. Because the present coastal protection plan does not have any transboundary environmental effects, the description of the content of this section is omitted.

(i) Sanctions and others

Chapter IV discusses sanctions against the offences to the provisions of the GD in Art.35 to Art. 36. Chapter V is the final and transitory statements in Art.37 to Art.44.

(3) Progress of SEA procedure for the coastal protection plan

The SEA procedure for the Coastal Protection and Rehabilitation Plan for the Southern Romanian Black Sea Shore (hereinafter referred to as “the Plan”) has been progressed as listed in Table 7.1.10. The owner of the Plan is the Water Department (abbreviated as WD) of the Ministry of Environment and Water Management (abbreviated as MoEWM) and the competent environmental authority is the Environmental Department (abbreviated as ED) of MoEWM.

The SEA procedure is classified into three stages of screening, elaboration, and decision in Table 7.1.10. The screening stage is the procedural step described in (2)-(d) in the above. The elaboration stage is the procedural step of finalizing the draft plan and drawing up the environment report as described in (2)-(e). The decision stage is the procedural step of quality review and decision making as described in (2)-(f).

Table 7.1.10: Progress of SEA procedure of the Plan

No.	Stage	Step	Actors	Date	Remarks
1	Screening	Notification	WD to ED	Feb. '06	SEA application
2		Public information	WD	Mar. '06	Publish Interim Report on website
3		Screening decision	ED	Mar. '06	Start of elaboration works
4	Elaboration	Draft plan finalization	JICA & WD	May '06 to Jan '07	Preparation of Draft Final Report
5		Consultant contract	WD	Oct. '07	Transproiect S.A. as the certified persons
6		Working Group	WD	Nov. & Dec. '07	Thrice meetings on 11 Apr., 10 Oct., and 30 Nov. '06
7		Environmental report	Consultant & Working Group.	Dec. '07 to Jan. '07	
8		Public information	WD	09 Feb. '07	Publish Environmental. Rpt. on website
9		Receipt of comments	WD	Feb. to Mar. '07	Several comments from the authorities concerned.
10		Public hearing	WD, ED, Consultant & public	29 Mar. '07	Attendees of about 50
11		Report modification	WD & Consultant	Apr. '07	Reflection of justified comments
12	Decision	Quality review	ED	May to June. '07	
13		Environmental approval	ED	05 July '07	Notification by 16 Apr. '07

The working group was established with the representatives of the following authorities and institutions:

- WD of MoEWM as the plan owner
- ED of MoEWM as the competent environmental authority
- Ministry of Transport, Construction and Tourism
- Ministry of Health and Family
- National Environmental Protection Agency (NEPA)
- National Administration “Romanian Waters” (ANAR), Headquarter
- Department of Waters Dobrogea – Litoral of ANAR (DADL)
- Prefecture of Constanța
- Municipality of Constanța
- National Institute for Marine Research and Development “Grigore Antipa”
- National Institute of Marine Geology and Eco-geology (GeoEcoMar)
- S.C. Transproiect S.A. (Certified person: consultant)
- S.C. IPTANA S.A.

The first meeting held on 11 April 2006 was not attended by the certified person because of no contract having been made at that time; thus it was unofficial one.

(4) Comments and proposals of the public and the authorities concerned

Four governmental institutions submitted written comments on the environmental report to WD. They were: (a) General Directorate of Biodiversity, Biosecurity, Soil and Subsoil of MoEWM; (b) Directorate of Atmospheric Protection and Climate Changes of MoEWM; (c) General Directorate of Territory, Urbanism and Dwelling Politics of Ministry of Transport, Construction and Tourism; and (d) Public Health Authority.

The comments by (a) are mostly indications of misquoting of a GD number, misspelling of several words, etc. The comment by (b) recommends highlighting that the proposed works

also represent actions for adapting to the effects of the climate changes. The comment by (c) asks if the study analyzed the impact of the project on fish species migrating between the sea and seaside lakes. Although the northern unit of the Romanian Black Sea Coast has a few lakes with openings to the sea, the seaside lakes in the southern unit that is the study area are all closed off from the sea. The comment by (d) states that the present coastal protection plan will lead to a reduction of the risks for health caused by the inferior quality of bathing water in the Romanian seashore area.

The public hearing was held on 29 March 2007 at the National Institute for Marine Research and Development “Grigore Antipa” in Constanța; the number of attendees was about 50 including representatives of the Working Group members, representatives of the authorities concerned, representatives of three NGOs, researchers, academicians, reporters of newspaper and TV stations, etc. There were some comments that regretted a small number of participants from the local communities.

Questions and opinions raised during the public debate were mostly concerned with the environmental aspects related to the implementation stage of the priority project at Mamaia and Eforie. The chairperson, who is a staff of the Environmental Department of MoEWM, reminded the questioners that SEA is aimed to assess the plan as whole and the subjects raised by the questioners should be discussed in the EIA phase after the SEA process is concluded. The representatives of the Water Department of MoEWM and DADL, which is the beneficiary of the priority project, promised that due considerations will be made for the environmental subjects quoted by the questioners during the EIA of the priority project.

(5) Environmental approval of the Plan

The certified person revised the environmental report by incorporating in the final version the changes in the facility installation plans at Eforie Nord (2) and Eforie Middle, which was introduced in 5.7.4 of this volume. The Environment Department of MoEWM reviewed the quality of the Plan and the revised environmental report and decided to issue the environmental approval to the Plan. It notified the Water Department of MoEWM of issuing the environmental approval on July 5, 2007. The procedure was publicly announced in mass-media on July 10, 2007 and was posted on the website: www.mmediu.ro. The Plan will be promoted by a Government Decision (GD) and published in the Official Journal as an annex of this GD. MoEWM estimates that this procedure will be finalized by the end of 2007.

7.1.4 Environmental Impact Assessment (EIA)

(1) Laws and guidelines related to EIA

The Governmental Decision (GD) no. 918/2002, transposing the Directive 85/337/EEC as amended by Directive 97/11/EC, establishes the framework procedure for environmental impact assessment of certain public or private projects likely to have significant impact on environment, defines the role of the environmental protection authorities and other central or local public authorities with specific tasks and responsibilities in environmental protection, and lays down the provisions for transboundary environmental impact assessment procedure. The GD also stipulates that the environmental impact assessment is carried out in stages (screening, scoping and review).

In order to implement the provisions of this GD, the Ministry of Environment and Water Management issued four orders as described below.

➤ Order no. 860/2002 concerns with the approval of the environmental impact assessment procedure and issuance of the environmental agreement. It details the screening, scoping and review stages, the information and public participation to the procedure and the competences of the environmental public authorities. The order contains the following items in its annexes:

- 1) List of activities that have significant impact on environment and are subject to EIA procedure;
- 2) List of activities/installations likely to have significant impact on environment, subject to the screening stage;
- 3) Standard contents for the technical memorandum necessary for issuance of the environmental agreement/integrated environmental agreement; site checking report;
- 4) Content of public announcement; and
- 5) Content of environmental agreement/integrated environmental agreement; the form for recording public comments on the environmental impact assessment and the model for evaluation of the public proposals.

This order also provides for the level of competence for issuing the environmental agreement/integrated environmental agreement.

➤ Order no.863/2002 is for the approval of the methodology guidelines applied to the environmental impact assessment framework procedure transposes the EC guidelines on the EIA procedural stages (Screening, Scoping and Review).

➤ Order no. 864/2002 is for the approval of the impact assessment procedure and public participation to the decision making process for projects with transboundary impact. It establishes the responsibilities of the competent authorities and the specific requirements relating to activities under the incidence of the Convention on transboundary environmental impact assessment, ratified by Law no. 22/2001 and of the provisions referring to transboundary environmental impact assessment comprised by the Governmental Decision no. 918/2002 on environmental impact assessment framework procedure and for approval of the public or private project list, subject to this procedure.

➤ Order no. 1388/2003 concerns with setting up the technical review committee (TRC) at central level.

Some of these orders were later subject to modifications or replacements. Thus, the Order no. 210/2004 modifies the Order no. 860/2002, GD no. 1705/2004 modifies article 5, paragraph (2) from the GD no. 918/2002, while Order no. 171/2005 replaces Order no. 1388/2003.

(2) Legal procedure of EIA

The EIA procedure is led by the competent authorities for environmental protection (at local, regional and central level) and is accomplished with the participation of the public central and/or local authorities, as appropriate, with specific tasks and responsibilities in environmental protection. All authorities involved in the process of environmental impact assessment are consulted within a Technical Review Committee (TRC), participating in all stages of the EIA procedure. Besides the representatives of the Ministry of Environment and Water Management, representatives of the following authorities are also part of the TRC: Ministry of Economy and Trade, Ministry of European Accession, Ministry of Health,

Ministry of Agriculture, Forests and Rural Development, Ministry of Transport, Constructions and Tourism and Ministry of Administration and Interior – The General Inspectorate for Emergency Situations – Civil Protection and Fire Brigade.

At the end of the procedure, the competent environmental authority issues the environmental agreement, which contains the conditions for undertaking a project from environmental point of view. The competent authorities for issuing the environmental agreements are: Ministry of Environment and Water Management, Regional Environmental Protection Authorities and Local Environmental Protection Authorities. The level of competence depends on the nature and size of the project (i.e. projects that comprise two or more counties are regarded as regional competence). The competences are provided for by Order 860/2002 in Annexes I.1. and I.2.

A summary outline of the Procedure for obtaining the environmental agreement is presented in Fig. 7.1.1.

Annex 2 to GD no.918/2002 and Annex I.2 to Order 860/2002 lay down the public or private projects likely to have significant impact on the environment. These projects are subject to the screening stage, which is accomplished based on a case by case examination, taking into consideration the criteria set out in Annex 3 to the GD no. 918/2002 and the checklist provided by Order no.863/2002 (EC guidelines for screening stage).

The screening stage (see Fig. 7.1.1) is accomplished by the competent environmental authority with the consultation of the authorities within the Technical Review Committee (TRC). The project is presented within TRC together with the result of the site's checking. The analysis of the project is realized by using the checklist mentioned above. At the same time, the developer informs the public about the project and his request to obtain an environmental agreement by publishing an announcement in a newspaper. The public is also informed about the screening stage decision, within 10 days from the date of decision and have the right to submit to the competent authority for environmental protection documented proposals for reconsideration of the decision made following the screening stage, within 10 days from the publication of the decision. The public proposals are presented by the competent environmental authority to the TRC. After analyzing the information presented, the TRC takes the final screening decision, within 15 days. The public is also informed about the final screening decision.

Within 20 working days from the date of communication of the final decision the competent environmental protection authority proceeds to the scoping stage (definition of the EIA report content), elaborating a guide/checklist or the EIA study.

Article 10 of GD no. 918/2002 stipulates that the information supplied by the developer within the EIA report must include the following:

- a. the description of the project, including data regarding the site, the technical solutions adopted and the size of the project,
- b. the description of the measures taken into account to avoid, mitigate or, if possible, to remedy the negative effects on environment,

- c. the necessary data for identification and assessment of the potential main effects of the project on environment,
- d. a general presentation of the main alternatives studied by the developer, indicating the reasons for his choice, taking into account the environmental effects, and
- e. a resume of the information mentioned at the items a) and d)

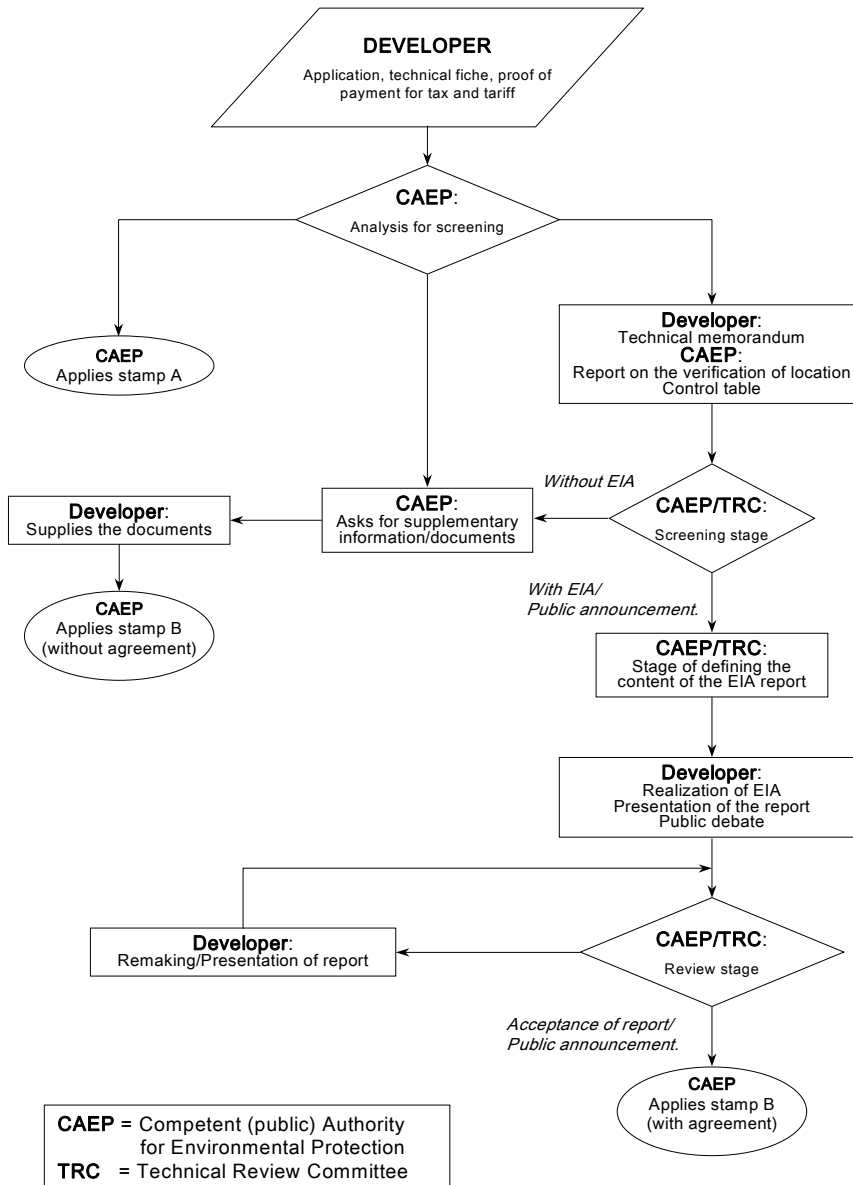


Fig. 7.1.1: Flow-diagram of the Procedure for obtaining the Environmental Agreement

The competent environmental protection authority transmits to the developer the guide/checklist within 20 working days from the date of the scoping stage.

According to the art.11 of GD no. 918/2002, the EIA report is drawn up by the certified independent persons, in conformity with the provided guide/checklist; the framework content

of the EIA report is laid down in Annex 4 of GD no.918/2002. According to art. 9 par. (1) of GD no.918/2002, the EIA report must include a general presentation of the main alternatives studied by the developer with the indication of the reasons for his choice, taking into consideration the effects on the environment.

Within 5 days from receiving the EIA report, the competent environmental authority initiates the stage of EIA report review by establishing together with the developer the opportunities for public participation to the project related decisions. The developer publicly announces the opportunities and organizes the public debate for the presentation of the EIA report, after the EIA report and the project are made available for public consultation for 30 working days. The public comments and proposals are assessed by the developer and are presented to the competent environmental authority and to the TRC, which have 40 working days at their disposal to review the EIA report and to reach a decision about the issue or the motivated rejection of the environmental agreement in a common meeting. If a decision could not be reached in the common meeting, art. 30 par. (1) of the Order 860/2002 stipulates a further delay of 30 working days for the participating authorities to reach and communicate their point of view about the EIA report. Failing to do this is equivalent to the absence of objections about the project.

The final decision is transmitted within 10 working days to the developer, together with the content of the public announcement to be published in the mass media. After 20 working days from the publishing, if no public comments are made, the competent environmental authority issues the environmental agreement.

In September 2006, the Ministry of Environment and Water Management issued a new Governmental Decision nr. 1213/2006 which has amended the procedure for EIA and expanded the list of public or private projects subjected to the procedure. According to Art. 8, Par. 4 of the new decision, all projects stipulated in Annex 2 of the decision to be realized in the coastal zone will be subjected to EIA. This is of the utmost importance for the projects under the Plan, because the foreseen works belongs to Annex 2, Category 10 – Infrastructure projects, Point k – Works against the coastal erosion and maritime works which may modify the coastal profile through building of breakwaters, piers, jetties etc., excluding the maintenance and reconstruction of such works.

(3) Prospective schedule of EIA

Table 7.1.11 lists a prospective schedule of EIA for the priority projects introduced in **6.3** and **6.4** being envisaged as of April 2007. It is said that an EIA procedure normally requires 12 months to complete it. According to the Romania regulations, an EIA procedure is carried out after an initial feasibility study is made and all relevant information has been collected. Inclusion of the EIA procedure in the feasibility study by JICA will necessitate a long duration of feasibility study over a dozen months or so.

Table 7.1.11: Prospective schedule of EIA for the priority projects at Mamaia Sud and Eforie Nord

Step No.	Process	Date	Responsible Agency	Work Items
1	Contract with Romanian Consultant	Nov. '06	•Water Department (WD)	<ul style="list-style-type: none"> • Employment of a certified person (CP) for preparation of application documents with technical memorandum (TM) (Art. 26). • GeoEcoMar was given contract as CP.
2	Preparation of Document	Nov. '06 to Feb. '07	WD and CP	Preparation of a set of EIA application documents
3	EIA Application	Apr. '07	• WD • REPA, Galati	<ul style="list-style-type: none"> • Submission of application documents together with TM (Art. 12 (1) & (4)). • Examination by LEPA (Art. 13) with 20 working days. • Field survey by LEPA and Screening checklist (Art. 13 b) • Preparation of draft for public announcement by REPA (13 c & d)
4	Screening stage	Apr. to May '07	• REPA • TRC • WD	<ul style="list-style-type: none"> • Proceeding to the screening stage by REPA (15 working days after receipt of the application (Art. 14(1)).) • Establishment of Technical Review Committee (TRC) by REPA (Art. 14 (1b)), • Review of TM by TRC • Decision on the necessity of scoping stage • Notice to WD of the decision (within 15 working days: Art. 14 (1d)). • Public announcement by WD on the decision (within 10 working days: Art. 16 (1)) and the response of public (within 10 working days: Art. 16 (2)).
5	Scoping stage	June to July '07.	• REPA • TRC • WD	<ul style="list-style-type: none"> • Proceeding to the scoping stage by REPA (within 20 working days: Art. 23 (1)). • EIA guidelines by REPA to WD (20 working days after the conclusion of scoping stage: Art. 25).
6	EIA study report	July to Sep. '07	• CP • WD	<ul style="list-style-type: none"> • Preparation of EIA study report (probably in 2 to 3 months: Art. 26) and submission to REPA
7	Review stage	Sep. to Feb. '08	• REPA • TRC • WD	<ul style="list-style-type: none"> • Public announcement of the receipt of EIA study report (5 working days: Art. 27 (1)). • Public debate with prior notice of 30 working days (Art. 39) and preparation of public proposal by WD. • Review of EIA report and public proposal by TRC (40 working days: Art. 29 (1)) and decision on environmental agreement by TRC (within 30 working days: Art. 30). • Issuance of environmental agreement by REPA (within 10 working days: Art. 31).

(4) Subjects to be examined in EIA of the priority project

During the public debate of the SEA procedure on the coastal protection and rehabilitation plan of the Southern Romanian Black Sea shore, which was held on March 29, 2007 at the National Institute for Marine Research and Development in Constanța, several questions and opinions were raised regarding the Master Plan. Among them, the following is the main opinions:

- Consultations with and approval from the local community (especially the fishermen) and owners are needed.
- Transport of sand by dump trucks on road may cause significant environmental impact. The methods of transport by water should be studied and examined.

In preparation of EIA application documents and execution of EIA procedures in future, it is recommended to pay due considerations to outcomes of public debates and other relevant matters.

7.1.5 Administrative Framework Related to Environmental Conservation

The main institutional actors of the environmental policy of Romania are the Ministry of Environment and Water Management, the Ministry of European Integration and the Parliament of Romania. Other ministries with important environmental responsibilities are:

- The Ministry of Health, responsible for monitoring consequences of environmental quality, water and foodstuff quality control, issuing regulations on people health safety requirements;
- The Ministry of Transport, Construction and Tourism and the Ministry of Interior, responsible for controlling the motor vehicles emissions, noise and vibrations, and transport of goods and products;
- The Ministry of Agriculture covers soil utilization and protection;
- The Ministry of Industries, responsible for mineral resources and energy.

The Ministry of Environment and Water Management is the principal Ministry for the administration, compliance checking and enforcement of legislation relating to environmental protection and water management. The Ministry implements policy with regard to water and environmental protection at national level, establishes strategy and specific regulations for the development and harmonisation of activities within the general framework of government policy, and provides and coordinates the application of government strategy in the mentioned areas. It plays the role of national authority and undertakes the synthesis, coordination and control of these activities.

The Ministry comprises three Departments: the Department of Environment, the Department of Water and the Department of European Integration. Under the direct subordination of the Ministry there is the National Environmental Protection Agency (NEPA), the specialized organization of the central public administration with competencies in the implementation of the environmental protection legislation. Within the framework of existing legislation, the NEPA exerts attributions regarding the strategic planning, monitoring of environmental factors, authorization of the activities with environmental impact, and implementation of environmental legislation and policies at national, regional and local levels.

NEPA acts at regional level through 8 Regional Environmental Protection Agencies (see Fig.7.1.2) and further, at local level, through 41 Local Environmental Agencies, one in each county and one in Bucharest. The agencies play a central role in the practical implementation of environmental policy and law enforcement including permitting, monitoring, compliance checking and instigating legal action for non-compliance. They are responsible for pollution control, conservation and ecological restoration. Key environmental protection functions are the responsibilities of the Section for Regulations, which issues environmental permits and collects data.

The National Environmental Guard (NEG) is the enforcement arm of the Ministry of Environment and Water Management with attributions in implementing the Government

policy in the matter of preventing, establishing and sanctioning the breaking of the legal provisions regarding the protection of environment, waters, soil, air, biodiversity as well as of those stipulated by specific laws for industrial pollution control and risk management, the environmental fund including the observing of the legal permitting procedures. NEG has an organizational structure similar to the NEPA, having in its subordination 8 Regional Environmental Guards and 41 Local Environmental Guards.

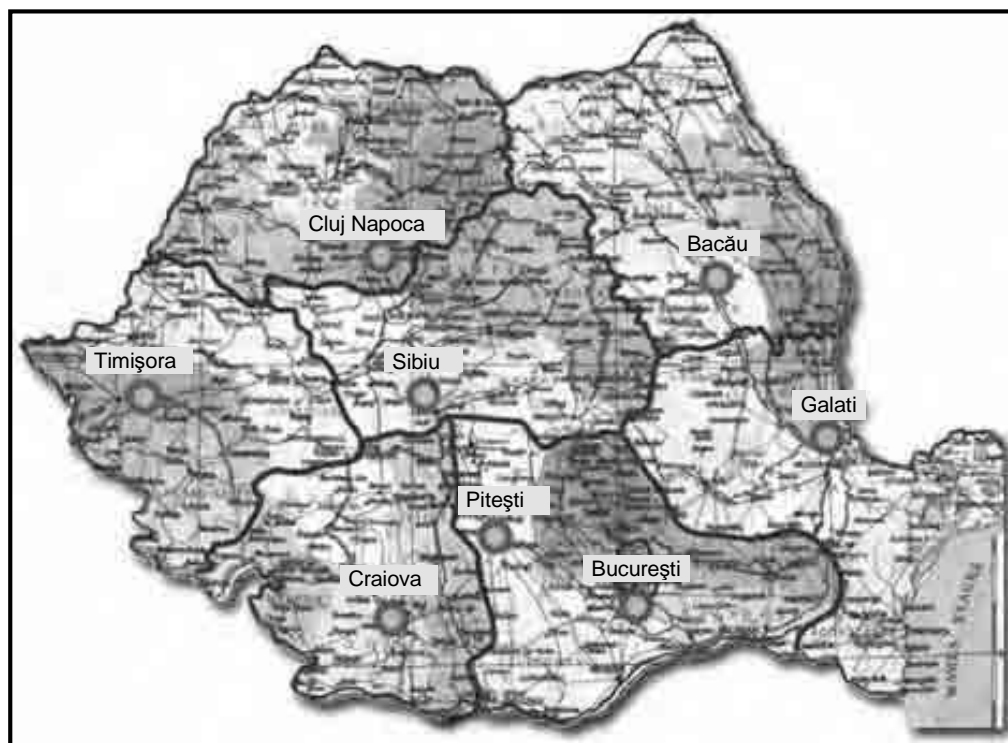


Fig. 7.1.2: Regional Environmental Protection Agencies and their jurisdiction areas (Source: NEPA)

At local level, besides the local branch authorities of the ministries acting in the field of environment, the local governments have less power. The Law on Local Public Administration requires local authorities to act in order to restore and protect the environment, parks and nature reserves, and to conserve and protect historical and architectural monuments. To carry out such tasks the local councils have the authority to organize local ecological and environmental protection commission. However, local authorities have very little financial resources.

Since the political changes in 1989, environmental NGOs have played an increasingly important role in addressing environmental issues in Romania. The number of NGO's has increased to almost 200 during the last years. NGO's, including highly professionalized groups and local volunteer organizations, have undertaken a wide range of initiatives, including pressure to achieve policy or management improvements and organising various field activities (garbage clean-up, species protection, warding etc.). Together with local, regional or international governments, agencies and institutions, NGOs have also organised or participated effectively in co-operative projects aiming at biodiversity conservation.

The NGOs that are most actively involved in environmental activities at the Romanian littoral of the Black Sea are presented in Table 7.1.12.

Table 7.1.12: Romanian NGOs – Coastal and Black Sea Environment

No.	NGO	Contact Person, Position	Telephones	Fax	Email	Web
1	Mare Nostrum, Constanta	Laura Boicenco Executive Director	40 241 612422 40 341 407433	40 341 407432	mare-nostrum@cier.ro	www.cier.ro
2	Oceanic Club, Constanta	Razvan Popescu Mircei President	40 241 661956	40 241 661956	club@oceanic.ro	www.oceanic.ro
3	Earth Friends, Galati	Carmelia Zamfir Director	40 236 462564	40 236 462564	earthfriends@rdslink.ro	
4	Romanian Ornithological Society, Cluj	Moga Anastasia	40 264 438086	40 264 438086	office@sor.ro	www.sor.ro
5	Black Sea Operational Oceanographic Center, Bucharest	Gabriel Ion, Programme Coordinator	40 21 2094982	40 21 2522594	gion@geoecomar.ro	www.geoecomar.ro
6	GESS - Group for Underwater and Speological Explorations – Bucharest	Alexandra Hillebrand, Programme Coordinator	40 21 3124051	40 21 3124051	office@gess.ro	www.gess.ro
7	The Association for the Conservation of the Bio-Cultural Protected Area – Bucharest	Miroslav Tascu Programme Director	40 21 2103379	40 21 2103375	svv@salvativamaveche.ro	www.salvativamaveche.ro
8	ECOS Youth Organization – Tulcea	Zsolt TÖRÖK Programme coordinator	40 721 508521	40 240 534953	m_tascu@yahoo.com torok@indd.tim.ro	www.ecostulcea.freehosting.net/
9	UNESCO Pro Natura- Bucharest	Peter Lengyel Biodiversity Coordinator	40 21 3112644	40 21 3112644	lengyelbeter@yahoo.com m / pronatura@ccs.ro	www.pronatura.ro
10	Eco Counselling Centre – CCEG - Galati	Petruța Moise President	40 236 499 957	40 236 312331	eco@cceg.ro	www.cceg.ro
11	Association for the protection of human being and environment for sustainable development in the world – ECOM - Constanta	Maria Nastac, President	40241617043	40241617043	marianastac@yahoo.com	www.ecomorg.ro
12	Romanian Naval League Str. N. Titulescu 13, Constanta	Ioan Porumb Department Coordinator	40+241 611836,	40+241 640619		
13	Save Danube Delta Association Str. Portului, nr.10, Jurilovca, Tulcea CP5-73 București"	Echim Andrei Macsim Busla President	40+21 4114965			
14	Foundation for Promotion of SMEs – INFOLITORAL Center Str Traian nr 5, Constanta	Florentina BoariuManager	40+241 555000		info@infolitoral.ro	
15	GAEA Environmental Organization Str. Călărași, Nr.8a Bis, Constanta	Samoiă Cîprian PR Coordinator	40+241 692 981	40+722 138 132	Gaea@mymail.ro	

7.2 Description of Environmental Conditions in the Coastal Units of the Southern Romanian Black Sea Shore

7.2.1 Environmental Pollution (soil, water, air, noise and vibration)

The analysis of the state of the environment for the Southern Romanian Black Sea shore is based mainly on the data provided by the Reports on the State of Environmental Factors in Constanța County and the 2005 Local Action Plan for Environmental Protection of the Environmental Protection Agency Constanța, supplemented by the data from GeoEcoMar and the National Institutes of Research and Development (NIMRD) “Grigore Antipa”. As it will be seen, most of the available data are contradictory and characterized by a high uncertainty, especially due to the loose use of the measuring units and lack of quality controls, so they should be carefully considered.

(1) Soil pollution

The specific quantitative data concerning the soil pollution are extremely scarce. The local environmental agency did not monitor on a regular basis the quality of soils, doing only occasional surveys in cases of accidental oil pollution and/or in priority areas until 2005.

During the period 2002-2005, the responsibility for monitoring the soil quality belonged to the Constanța Office for Pedological and Agrochemical Studies. The EPA Constanta assumed beginning from 2005 the monitoring, aimed mostly at sensitive areas. The monitored parameters included the following specific pollution indicators:

- residues of inorganic compounds (heavy metals, sulphur and fluorine compounds);
- residues of organic compounds (petroleum hydrocarbons, PAH, organochlorine pesticides),

But the data presented in the 2005 Report on the State of Environmental Factors in Constanța County are mostly qualitative.

However, it may be inferred from these data and the listing of the actions for ecological reconstruction of the degraded lands and to improve the soil quality, that the main problem for the soils in the littoral area is the contamination with oil products. The strongly affected areas are limited mainly to the precincts of Constanța harbour where the concentrations of total petroleum hydrocarbons reached up to 100 times the intervention value, Ovidiu harbour and the fuel storage area of the SC Electrocentrale SA – CET Ovidiu.

Pollution of the beaches, especially the Mamaia beach, with petroleum hydrocarbons originating from the Midia refinery and/or from offshore illegal discharging of bilge water is quite common.

A few analytical data for heavy metals concentrations in soils (Table 7.2.1) from some locations in the Constanța County, very few of them in the interest area, were available in the 2001-2002 reports on the State of Environmental Factors in Constanța County of the local EPA.

Table 7.2.1: Heavy metals concentrations in soils from locations in the interest area (in mg/kg)
(Source: Environmental Protection Agency Constanța 2001, 2002)

Location	2001			2002		
	Cu	Zn	Pb	Cu	Zn	Pb
Corbu	24 - 35	50 - 80	1 - 15	24 - 62	130	83
East Năvodari	–	–	–	1325	1774	750
West Năvodari	13.9 - 276	41.4 - 483	5.6 - 14.7	51 - 350	128	35 - 307
South Năvodari	2.5 - 24.5	23.5 - 81.5	5.6 - 14.7	259	278	169
North Eforie	–	–	–	21 - 25	40	–
Mangalia	23 - 28	48 - 89	35 - 57	23 - 25	–	30 - 33
Alarm limit (acc. Order 756/1997)	For sensitive soils			For less sensitive soils		
	100	300	50	200	600	100

The great difference between concentrations recorded in some cases between the years of sampling, going up to one order of magnitude for all analyzed metals at South Năvodari, throw a doubt on the entire data set. However, it may be concluded from the available data that no heavy metal pollution is present in the Southern part of the Romanian littoral. Occasional exceedings of the alert and even intervention limits may occur in the Năvodari area. Similar exceedings were signaled by EPAC in the waste dumps from South Eforie and Constanța harbour.

There are no other publicly available data concerning the soil pollution. Seemingly, the environmental problems related to the subject are limited to characteristic pollution with petroleum hydrocarbons (sometime acute) and local pollution with heavy metals.

(2) Coastal sediment pollution

The scarcity of data for soil pollution does not characterize the pollution of the near-shore sediments so that their environmental state is apparently much better known. However, the mentioned uncertainties, even more pronounced for the marine environment, make extremely difficult an environmental assessment.

For the coastal sediments the main inventoried contaminants are the heavy metals, total petroleum hydrocarbons (TPH), polyaromatic hydrocarbons (PAH) and organochlorine pesticides.

(a) Heavy metal pollution

Data concerning the heavy metal concentrations in marine sediments are available for the years 2001 and 2003-2005 (Table 7.2.2). No specific data were available for the year 2002. However, systematic exceedings of proposed quality criteria for Black Sea sediments are signaled for Cd (0.8 µg/g) and Cu (35 µg/g) and occasional exceedings for Pb (90 µg/g) at Constanța South and South Eforie.

An analysis of the existing data reveals very high inter-years variability for the same laboratory, as well as inter-laboratory. Notably, Cd concentrations cited by the EPAC are usually extremely high. All concentrations for the years 2001 and 2004 exceed the apparent effects threshold, that is the contaminant concentration in sediment above which adverse effects are always expected for a particular biological indicator (Buchman, 1999). At the same time the average concentrations for 2003 and 2005 suggest exceedings of AET, at least locally. The reported Pb and Cu concentrations are also quite high, frequently exceeding the ERL

(Effects range low) and occasionally even the PEL (Probable effects level) concentrations.

This means that the littoral zone of the Black Sea has a serious problem with heavy metal pollution, a fact in clear contradiction with the conclusions of several pollution surveys in the Black Sea stating that, although there are some polluted areas, the heavy metal pollution does not represent a major problem for the Black Sea (BSEP, 1997).

More realistic are the data for the year 2002. The maximum concentrations cited for the Constanța South harbour are plausible for a highly polluted harbour. Unfortunately no specific data were available for the rest of the littoral, so it is hard to reach a conclusion on the degree of pollution with heavy metals. Such discrepancies within the same laboratory (the maximum Cd concentration in 2002 is less than the minimum one for the year 2001) are possible only if the analytical reproducibility and accuracy are very poor and/or if sampling locations differ greatly from one year to another.

Reported as means, NIMRD "Grigore Antipa" results (Oros, personal communication) for the same components (Cu, Cd, Pb) are probably more accurate if the sampling included highly polluted areas.

At the same time the EPAC and NIMRD results for metals such as Ni, Cr and especially Mn, which in marine sediments is considered as a minor, not trace element, are much lower. This may be the result of incomplete acid digestion. Besides being present in sediments in easily extractable forms, all these metals are also present as minerals highly resistant to the acid digestion, which may sometimes represent their major form of occurrence.

However, despite the analytical limitations and despite the signaled high concentrations, both laboratory conclude that heavy metal pollution is not a matter of great concern for the Romanian littoral and its intensity has decreased in the last years. The most affected areas are the Northern sector of the littoral, from Gura Buhaz to Sulina, situated under the direct influence of the Danube River and local hot spots, notably the Constanța harbour.

Table 7.2.2: Heavy metal concentrations in near-shore sediments from the Black Sea Romanian littoral
(data reported as µg/g, unless otherwise stated)

Metal	2001 ⁽¹⁾	2002 ⁽¹⁾	2003 ^(1,2,3)	2003 ^(4,5)	2003 ^(6,7)	2004 ⁽¹⁾	2005 ^(1,5)	
Cu	77.2 - 175.2	No specific data.	122.8	62.98	7.6 - 79.1, 40.1	37.65 - 114.16	57.96	
Cd	5.04 - 29.8		4.1	2.5	0.17 - 2.33, 0.61	3.07 - 14.26	2.26	
Pb	6.06 - 90.7		129.9	59.64	3.89 - 48.25, 25.07	28.19 - 72.74	76.86	
Mn	81.7 - 142.8		–	213.8	108 - 1379, 743	–	–	
Ni	–		–	15.42	9.65 - 61.63, 42.57	6.54 - 72.74	49.11	
Cr	–		–	–	19 - 105, 82.8	0.95 - 19.86	19.16	
Zn	–		–	–	121.3	2 - 149, 80.5	–	–
Notes:								
(1) – Source: Environmental Protection Agency Constanța;								
(2) – Only maximum values, recorded in the Constanța South Harbour are reported;								
(3) – Reported as mg/g, an obvious mistake in the use of the measuring units that the other results from the same source are reported in µg/g and such concentrations are not possible even in ores;								
(4) – Source: National Institute for Marine Research and Development "Grigore Antipa);								
(5) – Reported as mean concentrations;								
(6) – Source: National Institute for Marine Geology and Geoecology "GeoEcoMar". Samples from the 2003 GEF Cruise, water depth interval – 10-50 m, sediment depth – 0-15 cm (unpublished data);								
(7) – Reported as both range and mean.								

Both first conclusions are fully supported by GeoEcoMar researches. However, the conclusion about the pollution of the Northern sector is valid only for the sediments under the

direct influence of the Danube River. The configuration of the shore combined with the general circulation of currents in the Black Sea shelter most of the near-beach sediments, mostly sandy, from the Danube input of pollutants. A GeoEcoMar study performed in the Gura Buhaz area (Tofan et al., 2004) indicate very low concentrations for most metals. Only Cr and V have unusually high due to their concentration in heavy mineral accumulations, common for the area.

(b) Total petroleum hydrocarbons pollution

Excepting the same loose use of the measurement units, the data concerning the total petroleum hydrocarbons pollution of the coastal sediments are much more consistent (Table 7.2.3).

The reported concentrations are very high. As no mention of the analytical method was made it is hard to evaluate the accuracy of the data. However, it is well known that TPH determination is subject to high analytical uncertainties (Irwin et al., 1997). At the same time such high concentrations would certainly have biological consequences, considering that biota is probably sensitive above 800 to 1000 µg/g TPH (Irwin et al., 1997).

Table 7.2.3: TPH concentrations in near-shore sediments from the Black Sea Romanian littoral

	2001 ⁽¹⁾	2002 ^(1,2)	2003 ^(1,2)	2003 ⁽³⁾	2004 ⁽¹⁾	2005 ⁽¹⁾
Concentration range, µg/g	70 - 2625	27.3 - 7236	5.5 - 10478.5	27.3 - 7236	10.5 - 4060	10.5 - 21599
Concentration mean, µg/g	–	181	490.1	–	–	–
Notes:	⁽¹⁾ – Source: Environmental Protection Agency Constanța; ⁽²⁾ – Reported as mg/g, an obvious mistake in the use of the measuring units that the other results from the same source are reported in µg/g and such concentrations are not possible even in ores; ⁽³⁾ – Source: National Institute for Marine Research and Development "Grigore Antipa".					

Despite these uncertainties, it is clear that TPH pollution is intensive at the Romanian littoral. Apparently, the pollution is higher in its Southern sector (EPAC, 2001), indicating that the Danube discharge does not play the most important role in the TPH pollution.

The NIMRD "Grigore Antipa" data indicate higher pollution in offshore sediments, with mean concentrations of 501 µg/g d. w. along the 5 m isobath and 1319 µg/g d. w. along the 20 m isobath (Oros, personal communication), while samples from the 0 m isobath had a mean TPH concentration of 181 µg/g d. w. This is an indication that illegal discharges of bilge water as well as oil pollution from the offshore oil extraction activities may play an important part. However, at least for the year 2004, no accidental oil spills in the marine environment were signaled (EPAC, 2004), while GeoEcoMar data from 2003 and 2004 indicate TPH concentrations of maximum 130 µg/g in sediments from the oil extraction area.

(c) PAH contamination

PAH (Polycyclic aromatic hydrocarbons) is a generic abbreviation designating a group of chemical compounds that consist of fused aromatic rings, do not contain heteroatoms and do not carry substituents, found usually in fuels, oils and creosote. Many of them are known or suspected carcinogen and have a high environmental toxicity. As a result, most of them were included on lists of priority pollutants and in most environmental monitoring programs. At the Romanian littoral PAH are regularly monitored by EPAC. Some data are also available from NIMRD "Grigore Antipa" (for the year 2003) (see Table 7.2.4).

Excepting for year 2004, the reported data are consistent and indicate no major problems related to PAH contamination of sediments. Excepting for a single upper limit of the acenaphthene variation range greater than ERL and one for naphthalene, greater than AET, recorded in 2003, all the other upper limits are less than ERL.

The situation is completely different for year 2004. Most of the upper limits of the concentration variation ranges are greater than AET, in some cases by one order of magnitude. An increase of the maximum concentration of specific PAHs, by one to two orders of magnitude in some cases, is highly implausible. Either some new, very polluted locations were included in the sampling plan for 2004 or some error was made in the calculations of concentrations. Do to these uncertainties the 2004 data cannot be taken into account.

Table 7.2.4: PAH concentrations in near-shore sediments from the Black Sea Romanian littoral (all data reported as ng/g)

Compound	2001 ⁽¹⁾	2002 ⁽¹⁾	2003 ⁽¹⁾	2003 ⁽²⁾	2004 ⁽¹⁾	2005 ⁽¹⁾	ERL ⁽³⁾	AET ⁽³⁾
Acenaphthene	0.14 - 2.87	0 - 4	–	0 - 21.4	0 - 1410	0 - 2874	16	130
Acenaphthylene	–	0 - 36	–	0 - 35.7	0 - 127	0 - 2637	44	71
Anthracene	0.3 - 16.5	–	–	–	0 - 1063	0 - 6372	85.3	280
Benzo[A]anthracene	–	–	–	0 - 44	0 - 839.5	0 - 1920	261	960
Benzo[A]Pyrene	–	–	–	–	0 - 1804	0 - 879	430	1100
Benzo[B]fluoranthene	–	–	–	0	–	0 - 200	–	1800
Benzo[GHI]perylene	–	–	–	0 - 22.2	0 - 274	0 - 5745	–	670
Chrysene	–	–	–	0 - 5	0 - 5.0	0 - 1431	384	950
Dibenzoanthracene	–	–	–	0 - 58	0 - 59.0	0 - 3320	63.4	230
Fluoranthene	0.13 - 5.06	–	–	0 - 16.5	0 - 1648	0 - 484	600	1300
Fluorene	–	0 - 14	–	0 - 14.6	0 - 1506	0 - 3424	19	120
Indeno[1,2,3-CD]pyrene	–	0-2	–	0 - 136	0 - 2653	0 - 264	–	600
Naphtalene	0.5 - 87.5	0 - 2	–	0 - 314.2	0 - 1027	0 - 1821	160	230
Phenanthrene	0.3 - 15.8	0 - 1.61	–	0 - 28.6	0 - 1064	0 - 6104	240	660
Pyrene	–	–	–	0 - 3.4	0 - 1520	0 - 282	665	2400
Total PAH	–	–	636.7	–	–	–	4022	–

Notes: ⁽¹⁾ – Source: Environmental Protection Agency Constanța;
⁽²⁾ – Source: National Institute for Marine Research and Development "Grigore Antipa);
⁽³⁾ – Data from Buchman, 1999. ERL – Effects range low, AET – Apparent effects threshold.

(d) Organochlorine pesticides in the near-shore sediments

No data related to this topic were available for the years 2001 and 2002, while the data for 2003 are implausible (wrong measuring units). For 2004 the analytical data indicate the presence of a high variety of organochlorine pesticides (HCB, lindane, heptachlor, aldrin, dieldrin, endrin, DDE, DDD, DDT) in concentrations of up to 500 ng/g d. w. Occasional higher concentrations (between 760.94 and 1910 ng/g d. w) were determined for heptachlor, DDD, DDT, dieldrin and eldrin (EPAC, 2004). The most affected areas were Sf. Gheorghe, Portița, South Eforie and Mangalia, the last two belonging to the area of interest for the project.

For 2005 the situation is roughly the same, with concentrations of up to 1000 ng/g d. w., slightly higher in the Sf. Gheorghe and Portița areas (concentrations up to 1200 ng/g d. w.

These values are rather high, much greater than AET concentrations, indicating at least an intense pollution with organochlorine pesticide. Considering the difficulty of organochlorine determination and its sensitivity to the solvents these results may be overestimated up to 10-12 times. Fillman et al. (2002) indicate for DDT in sediments from the Romanian coast of the Black Sea a range from 0.6 to 72 ng/g d. w. This is rather similar with the DDT range for

Danube sediments (<0.01-24 ng/g d. w.) found by Equipe Cousteau (1993). For other pesticides the Equipe Cousteau indicates the following ranges, all of them with up to one order of magnitude lower:

- HCB – 0.036-35 ng/g d. w.;
- DDE – 0.03-16.9 ng/g d. w.;
- Lindane – 0.033-6.4 ng/g d. w.;
- Dieldrin – <0.002-0.26 ng/g d. w.

At the same time a comprehensive survey of the Black Sea contamination (Readman, 1998) based on the study of superficial sediments, included among the sampling stations locations close to the Casino Mamaia, Constanța, Constanța Harbour, Costinești and Mangalia. While higher concentrations were recorded near the Danube, the highest concentration in the area of interest for the project was recorded in Constanța harbour for DDD – 25 ng/g. the highest DDT concentration was recorded at Mangalia – 1.9 ng/g. Even more, the DDE/DDT ratio was usually high, indicating long-term degradation of the DDT, in conformity with the control imposed in Romania to the use of organochlorine pesticides in the late 1970s. The concentrations of DDT related components were generally lower than those reported for the Baltic Sea. They are comparable or slightly higher than those reported for other regions of the Russian Federation, USA and Mexico. The high concentration associated with the Danube and adjacent coastal areas indicate the river as a major source of contamination for the Black Sea.

Considering all these facts it may be concluded that although the Black Sea sediments are contaminated with organochlorine pesticides the level of pollution is moderate.

A field campaign was carried out in June 2006 by the National Institute of Marine Geology and Geo-ecology (GeoEcoMar) under the subcontract with the Study Team, having among its main objectives the aquirement of the latest environmental data on the quality of water, sediment and biota in the areas of the priority projects – Mamaia South and Eforie North.

The obtained chemical data (Table 7.2.5) confirm that heavy metal pollution is not a problem at the Romanian littoral. The maximum concentrations are usually one order of magnitude lower than the permissible values for sediments stipulated by the Order 1146/2002 and even that the tentative values proposed by the draft order, in some cases much lower than the actual ones (Cd – 0.8 µg/g instead of 3.5 µg/g). As a rule, the Mamaia area is characterized by higher maximum and average concentrations, for the most part explained by the significantly lower participation of the carbonated material, with very low heavy metal concentrations, to the constitution of the Mamaia South sand (Mamaia South sand – 16.89% CaCO₃, Eforie North sand – 44.38% CaCO₃). However, in the cases of Pb and especially Cd, this cannot explain the almost doubling of the average concentrations and the presence of some unusually high Cd concentrations indicating a moderate heavy metal pollution, at least for Cd. A potential source of the excess Cd and possibly Pb is represented by the fresh water discharge from the Tabacarie Lake in the Mamaia South beach area.

The TPH and organochlorine pesticides do not appear to represent a problem in both areas, all concentrations being less than the detection limit (25 µg/g for TPH and 0.001 µg/g for pesticides).

Table 7.2.5: Pollutant concentrations in the Mamaia South and Eforie North areas

(all concentrations in µg/g d. w.)

Parameter	Mamaia South			Eforie North		
	X _{min}	X _{max}	Mean	X _{min}	X _{max}	Mean
Heavy metals						
Ba	LDL ¹⁾	183	63.3	LDL	342	166.8
Ni	0.26	16.88	8.92	1.49	15.3	7.81
Zn	11.9	21.59	17.135	5.09	21.16	12.28
Cr	LDL	51	31.4	LDL	29	13.1
V	LDL	31	21	LDL	29	9.4
Co	1.1	6.56	3.4	3.28	13.01	5.75
Pb	4	8.72	6.36	0.49	5.08	3.23
Cu	2.19	6.8	3.77	3.51	8.52	5.06
Cd	0.088	0.715	0.270	0.073	0.236	0.144
Zr	92	139	110.7	105	202	137.7
Organic pollutants						
TPH	<25	<25	<25	<25	<25	<25
PAH (total) ²⁾	1.34	11.45	3.90	0.88	2.75	2.02
Benzo[B]fluoranthene	0.96	10.49	2.99	0.63	2.56	1.71
Chrysene	0.38	1.89	0.914	0.14	0.66	0.364
Phenanthrene	<0.01	<0.01	<0.01	<0.01	0.05	–
Organochlorine pesticides	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

¹⁾ – LDL – less than detection limit

²⁾ Excepting the following three components all other PAH were less than detection limit (0.01 µg/g)

On the contrary, total PAH concentrations exceeds up to 10 times the tentative value proposed in the mentioned draft Order. Most of the total PAH concentrations comes from the high concentrations recorded for Benzo[B]fluoranthene and in a lesser measure by chrysene. The highest values were recorded for the Mamaia South area (twice the concentrations in the Eforie North area), indicating a more active pollution here. Area specific potential sources of PAH pollution are the fresh water discharge from Tabacarie lake for Mamaia South and minor discharges of municipal water for Eforie North (Figure 7.2.1). Common pollution sources might be automobile exhaust, industrial emissions and even cigarette stubs, obviously likely to affect more the Mamaia area, a lot more agglomerated than Eforie Nord and much closer to the oil refinery from Midia-Navodari.

(3) Water pollution

An abundant literature has repeatedly underlined that the main ecological problem of the Black Sea was excessive eutrophication, far beyond the tolerance of the ecosystem. The increased quantities of nutrients, introduced by the Danube not only from Romania but from all over the Europe, have determined frequent explosive development of some microphytes algae (red tide, sea bloomings) followed by hypoxia and anoxia leading to mass-mortalities.

However, after 1990 the general economical decline, including the agriculture and the closing of several fertilizers factories, notably the Fertilchim SA, Navodari, led to a continuous diminishing of the nutrients loads of the Danube waters (Figures. 7.2.2 and 7.2.3) and consequently of their concentrations in the coastal waters (Figures. 7.2.4 and 7.2.5).

As a result the frequency of bloomings and episodes of hypoxia decreased considerably and a general improvement of the environmental state of the marine environment may be seen.

Nevertheless, the water pollution problem owing to eutrophication is still present. Figure 7.2.1 shows four examples of the sites where polluted waters seems to be directly discharged to the sea. Figure 7.2.1 (1) shows the outlet channel of Lake Tăbăcărie, which is often covered with algae by eutrophication. Figures (2) to (4) depict the wastewater pipe opened to the sea, one at the northern part of Eforie Nord and two at the Tomis sub-sector. Although it is not clear if these pipes carry the primary treated sewage water or the rain water, they certainly indicate deficiency in the wastewater treatment system. In addition to them, there is a number of wastewater pipes opened directly to the sea along the Southern Romanian Black Sea shore. These open outlets of wastewater should be closed at the earliest opportunity by connecting all the sewage pipelines to the wastewater treatment plants.

Although construction of two tertiary wastewater treatment plants being built at Mamaia and Eforie Sud would certainly reduce the level of eutrophication, they can perform their full capacity only after all the waste waters are collected without bypassing them. Further efforts by all the authorities concerned should be made to contain the pollution load below the allowable level.



(1) Outlet channel of Lake Tăbăcărie



(2) Outfall of wastepipe at north Eforie Nord



(3) Wastewater pipe opened to the beach (Tomis)



(4) Wastewater pipe laid upon a groin (Tomis)

Fig. 7.2.1: Examples of wastewater discharge in Mamaia, Tomis, and Eforie Nord

In case of no further improvement of wastewater treatment installations including full administration of pipeline systems, there may appear a possibility of water quality degradation by construction of shore protection facilities owing to potential decrease of water

circulation in the nearshore zone. Close collaboration with another EU project on wastewater treatment plants at Mamaia and Eforie Sud and timely adjustment of execution schedules of coastal protection and wastewater treatment projects will be called for.

The year 2005 was marked by significant increases of all nutrient concentrations – twice the 2004 concentration for P- PO_4^{3-} , and 8 μM for the total inorganic nitrogen compared with the 1996-2004 period. Silicates concentration increased also with 3 μM compared with 2004. The increases were attributed to the exceptional discharges of the Danube River in 2005, although the increase of total inorganic nitrogen fits into the slight increasing tendency recorded in the last years.

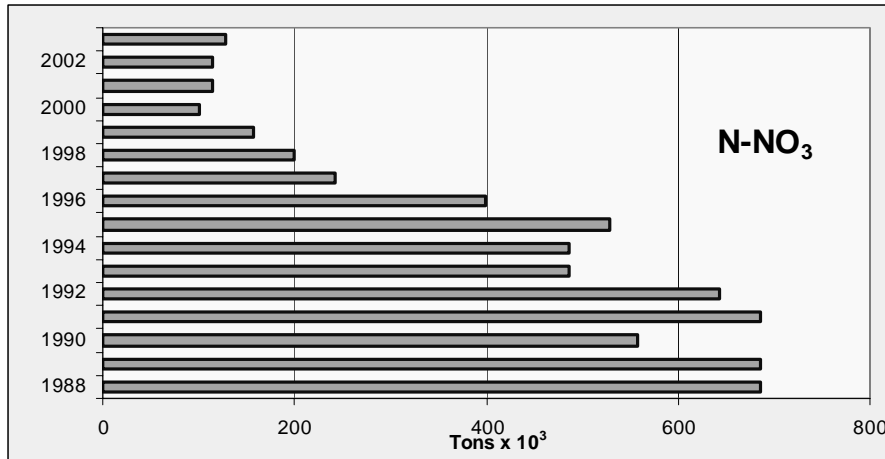


Fig. 7.2.2: Evolution of nitrates loads in the Danube water (after Cociașu and Popa, 2004)

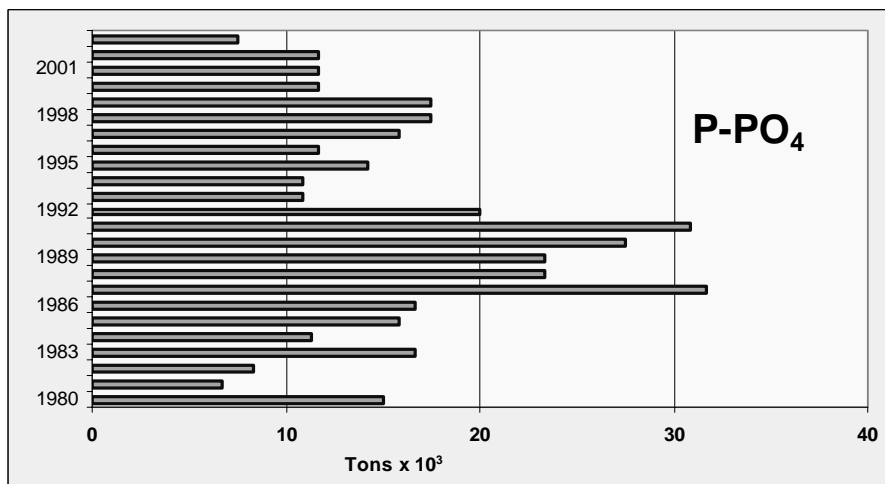


Fig. 7.2.3: Evolution of phosphate loads in the Danube water (after Cociașu and Popa, 2004)

GeoEcoMar data obtained in 2006, under the subcontract with the Study Team, indicate a returning to normality of total inorganic nitrogen concentration (concentration of 7-8 μM , with a single exceptional value of 13.5 μM in the Eforie North area). However, the phosphorus concentrations remain high, especially in the Mamaia North area (average concentrations – 0.56 μM in the Eforie North area and 0.97 μM at Mamaia North), despite the intensive phytoplankton activity demonstrated by dissolved oxygen saturations (114.2% -

142.5% – Eforie North, 104.0% - 127.2% – Mamaia North). This indicates moderate local inputs of nutrients, the most likely sources being the same as for heavy metals: discharge of fresh water from Tabacarie Lake for Mamaia South and discharge of municipal waters for Eforie North.

As for other contaminants, notwithstanding the use of measurement units, the heavy metals pollution does not represent a problem. Excepting for Pb, the values (means and/or variation range) reported both by the EPAC and NIMRD "Grigore Antipa" are significantly lower than the tentative values for the coastal marine waters.

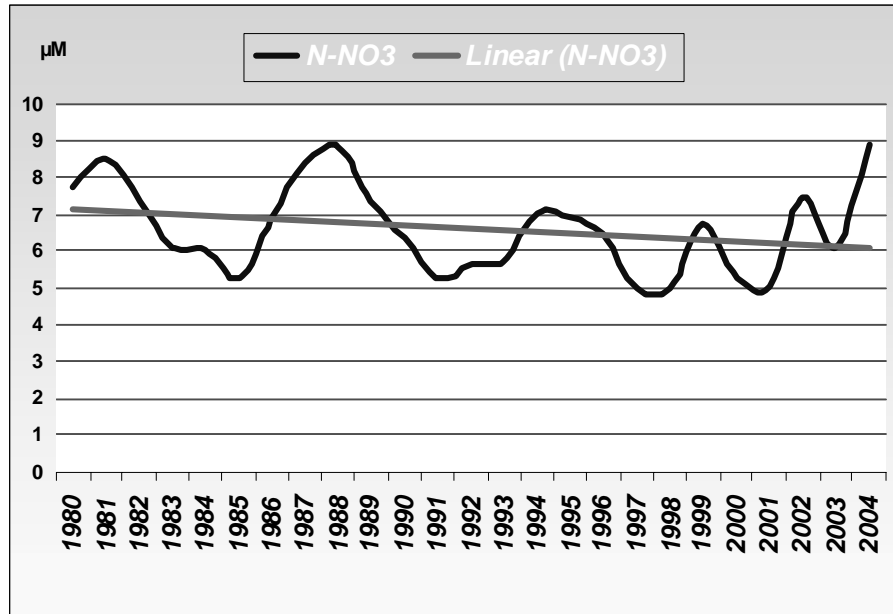


Fig. 7.2.4: Evolution of nitrates concentration in the Romanian coastal waters (Cociaşu, 2005)

The concentrations of the total petroleum hydrocarbons ranging between 0 and 3500 µg/l, one order of magnitude higher than in the W. Mediterranean (GEF/BSEP, 1997), with a significant percentage of the concentrations >100 µg/l (95.6% in 2005), reflects a general state of chronic pollution. However, the GeoEcoMar 2006 data do not indicate any TPH pollution in the project priority areas (all concentrations <50µg/l).

Considering that previous data (Bayona et al, 1998) indicate total PAH concentration (dissolved plus particulate) ranging from 0.6 ng/l in waters from the Danube Prodelta to 7.6 ng/l in the Danube Delta Front, the reported variation limits for PAH concentrations in the coastal waters (EPAC, 2004 – Table 7.2.6) are very high, especially some of the data reported for 2005, exceeding in some cases the previous maxima with two-three orders of magnitude. If the data for 2001-2004 do not exceed the CMC (Criteria maximum concentration – the highest level for a 1-hour average exposure, not to be exceeded more than once every three years, synonymous with acute) (Buchman, 1999) and are well under the proposed tentative quality criteria for coastal marine waters, some of the 2005 data (acenaphtene, acenaphthylene, fluorene, phenanthrene) exceeding CMC up to 200 times, indicate an acute toxicity of the aquatic environment with regard to PAH. However, the discordance of these data with the internationally reported ones and even with the rest of the PAH data reported for 2005, having

rather similar variation ranges with the 2001-2004 data raise a big question mark on the analyses quality.

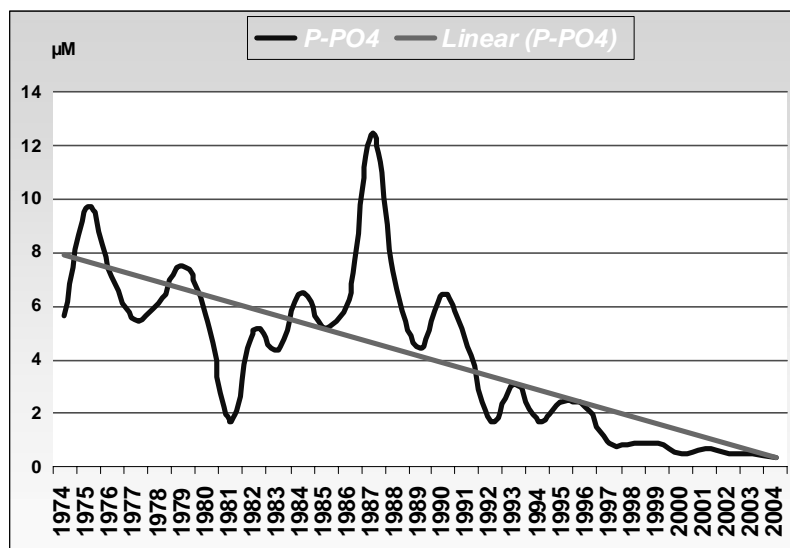


Fig. 7.2.5: Evolution of phosphates concentration in the Romanian coastal waters (Cociaşu, 2005)

Table 7.2.6: PAH concentrations in coastal water from the Black Sea Romanian littoral. (all data reported as ng/l)

Compound	2001-2004	2005
Acenaphthene	0 - 27.5	0-34504
Acenaphthylene	0 - 102.2	0-4536
Benzo[A]anthracene	0 - 713	0-1052
Benzo[B]fluoranthene	0 - 97	0-225
Benzo[GHI]perylene	0 - 277	0-205
Chrysene	0 - 531	0-748
Dibenzoanthracene	0 - 672.4	0-928
Fluoranthene	0 - 296	0-1227
Fluorene	0 - 45	0-64390
Indeno[1,2,3-CD]pyrene	0 - 863.7	0-115
Naphtalene	0 - 836	0-237
Phenanthrene	0 - 517	0-71845
Pyrene	0 - 72	0-286

The concentration of pesticides was found to be rather low, with some slightly elevated concentrations of lindane near the Danube discharge (GEF/BSEP. 1997). The concentrations reported by EPAC are significantly lower than the tentative quality criteria for coastal marine waters.

(4) Air pollution

The only organization monitoring the air quality on a regular basis is the Environmental Protection Agency Constanţa. The most important monitorized parameters are NH₃, SO₂, NO₂ and rates of particle deposition.

Despite some temporary exceedings of the quality norms (Order 592/2002) the yearly average general pollution coefficients are usually low (Table 7.2.7), indicating low atmospheric pollution, but with a well marked increasing tendency for the last four years.. The general

pollution coefficient is defined as the sum of individual coefficients/number of pollutants, while the individual coefficient is the average determined concentration/MPC, which is the maximum permissible concentration according to Order 592/2002.

Table 7.2.7: The evolution of the yearly general pollution coefficients during the years 2000-2004

Year	2000	2001	2002	2003	2004	2005
General pollution coefficient	0.375	0.447	0.373	0.419	0.687	0.995

Critical areas with regard to air pollution in the Constanta county are considered:

- the central area of the Constanta agglomeration;
- the contiguous area of the Termoelectrica S.A. CET Palas, through emissions characteristic to big burning installations (NO_x, SO₂, PM10);
- the contiguous area of LAFARGE ROMCIM Medgidia, especially through pollution with fine dust;
- the Constanta harbor area, in the zones of operations with oil products and bulk powders;
- the Rompetrol Navodari area – refinery and petrochemicals, through CO, SO₂, H₂S and volatile hydrocarbons emissions. Depending on wind direction, the emissions from this air pollution source may affect Mamaia North;
- the Oil Terminal, North Warehouse and Constanta Harbor Warehouse – storing and transport of oil products, through volatile hydrocarbons emissions.

(5) Noise and vibration

Noise and vibration are also regularly monitored by EPAC in different locations from Constanța. Figure 7.2.6 presents the yearly averages of noise levels in zones of intense traffic from Constanța. The levels are quite high for the years 1996-1998 but decreased significantly since 1999, actually being under the admissible limit for markets and commercial spaces (80 dB) and even under the admissible limit for parks (75 dB) (see Table 7.1.5 in 7.1.1).

The EPAC report for 2004 mention occasional determination of noise levels during summer time in the resorts from the Romanian littoral, but no specific values are given..

A few general conclusions may be inferred from the analysis of pollution state at the Romanian littoral of the Black Sea:

- the TPH pollution chronically affects several environmental compartments: soil, water and sediments. Locally, in some hotspots, the concentrations may reach acute levels.
- the POP (PAH and organochlorine pesticides) concentration indicate moderate pollution, with concentrations generally similar to those met in other parts of the world;
- heavy metal pollution, both of marine water and near-shore sediment, does not represent a problem for the littoral;
- eutrophication has undergone a marked decrease, at the moment the nutrient concentrations being rather similar to those of the pre-eutrophication period, although total inorganic nitrogen concentrations began to increase in the last years.

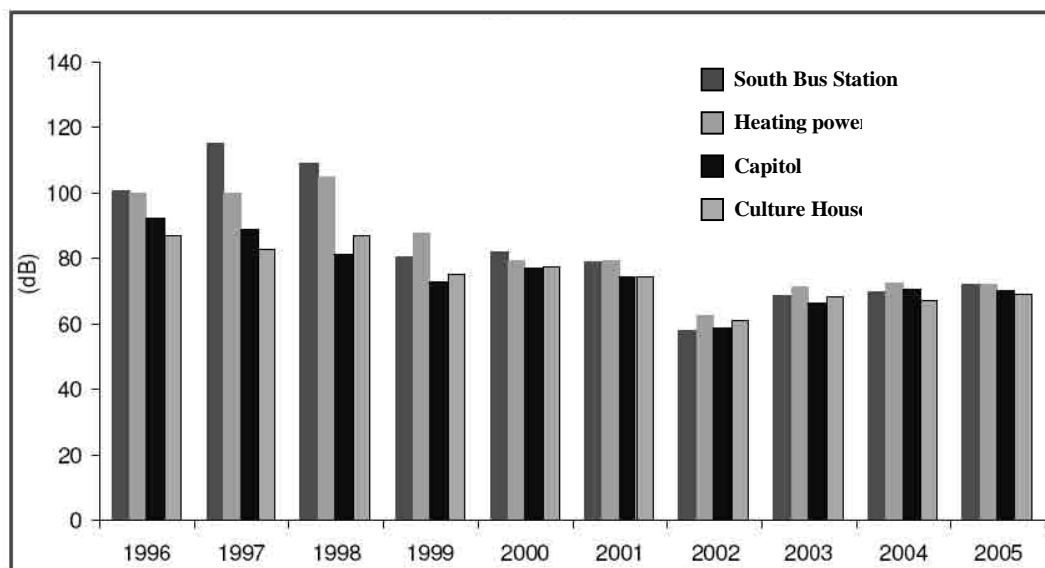


Fig. 7.2.6: Yearly averages of noise levels in selected locations from Constanța (EPAC, 2005)

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7.2.2 Ecosystem (officially protected areas, environmentally vulnerable areas, species of precious flora and fauna, vegetation)¹

(1) Ecological characterization of the sectors proposed for beach rehabilitation

(a) Constanța area

Littoral waters, comprised between the shoreline and 20 – 25 meter depth, are characterized by two types of bottom: i.e. fine sand bottoms in the Cape Midia – Constanta area and medium-coarse calcareous sand bottom alternating with fine sands in the southern part of the coast, especially in the extreme south. The invertebrate associations are different in the two areas, but are dominated by shells. This particularity is very important for the beaches.

Mollusks, especially the bivalve, are the most important group of organisms contributing to sedimentogenesis processes from the Black Sea shelf, forming most of the organic fraction of calcium carbonate from non-consolidated sediments. Out of a total of almost 170 species signaled in the Black Sea (108 at the Romanian littoral) only a few are more important as occurrence areas and abundances: on the fine sand bottoms – *Corbula mediterranea* (Costa) and its associates (*Cardium edule lamarcki* Reeve, *Chione gallina* L., *Tellina tenuis* Costa etc.), while on the rocky bottoms from the coastal zones the stone mussels (*Mytilus galloprovincialis* Lans.) (Băcescu et al., 1971; Gomoiu, 1976). Approximately at the beginning of the years 1970s these biocoenoses leading species and their associates had quantitatively well represented populations; their total stock on the Romanian continental shelf was evaluated at ~ 4.52 millions tons, with an average of 200 t/km² (Băcescu et al., 1971).

Among all the mollusks, from the coastal sedimentary processes, the most important role belong to the mussels, species whose shells, due to a high content of conchioline, led to the formation of medium and coarse heterogeneous sand deposits from the south of the Romanian littoral.

Corbula – the most representative psammobiont bivalve and the other species from the sandy areas North from Constanța, although transported on the shore in great quantities during storms did not succeed to change the grain size and chemical character of the sands; their shells, with a reduced content of organic substance, "dissolved" (Gomoiu and Grou, 1965); thus, the Northern beaches were fed for the most part by the mineral sediments brought by the Danube.

Before 1976, a long period which may be called the period of calm or of ecological equilibrium, the beaches from the Romanian littoral and their sediments, as well as all the Black Sea ecosystems, thanks to well moderated homeostatic mechanisms, were keeping their structural integrity and personality in well known patterns. Although the shell deposits from the Southern beaches were intensely exploited to be capitalized as fodder floor, the "outputs" from the environment were infinitesimal compared to the "inputs". In 1967, in the Southern part of the littoral, the mussels populations, with an average density of about 250 ex.m⁻² were giving a total gross biomass, with the epibiosis (especially *Balanus*) of 10.88 kg.m⁻², out of which the shell weight was 3.76 kg.m⁻² (Băcescu et al., 1971).

¹ Lists of the names of the flora and fauna in the Romanian Coastal Zone are presented in Annex G.1.2 together with a photo gallery of marine organisms.

It is obvious that such abundant populations, distributed on a surface of more than 100 km², along a 40-50 long shore, from 0 to 20 m water depth, were partly destroyed as a result of strong storms and other unfavorable factors, then transported and amassed in huge quantities on the shores up to the cliffs base, thus feeding the beaches with sandy sediment forming material.

An average mussel stock of 1.1 millions tons was estimated at the end of the years 1960s in the rocky areas from the Southern part of the Romanian littoral, a stock which could have potentially provide 1.65 millions tons/year; theoretically, this potential production release each year almost 500000 tons of shells and each meter from the length of the beach may receive up to 10 tons of shell fragments and biogenous sand. As a result of the increase of the direct and indirect anthropic pressures on the marine environment, disequilibria and ecological changes begun to appear after 1970, at the Romanian littoral, as well as in the entire Black Sea. Many authors signal: morphological and sedimentological disequilibria in the coastal areas – changes of the morphometry, of the shoreline and bottom slope, of the grainsize composition of sediments, changes of biotops, of some hydrological processes patterns, changes of water chemistry, of the structure and abundance of organisms associations, functional disturbances of the metabolism and behavior of ecosystems (especially in production and destruction patterns), exhaustion of some biological resources stocks but particularly the pollution and eutrophication, whose major consequence is the impoverishment of the genetic fund, are signaled everywhere (Gomoiu, 1982, 1985).

A. Invertebrate fauna on sandy bottoms in Constanța area

The formation of shell deposits on the beach is a complex process which depends on a multitude of variable factors. Among them we mention first the shell supply source of the beach, that is the natural populations which potentially form deposits; the shell source depends on the state, size and distribution of the populations of benthic organisms, especially the bivalve ones. It is obvious that these populations can be dislocated from their biotope and carried towards the beach only when dynamic factors are present - waves, swell, currents, etc.; the intensity of these factors can vary much enough and they reach the maximum at the Romanian littoral during the storms caused by the winds blowing the North-East sector. Considering that all the above-mentioned factors are extremely variable, it is obvious that the shell quantities in deposits as well as their spreading on the land will permanently vary, from one month to another.

In this region, dominant species are two bivalvae – the north-atlantic soft shell clam *Mya arenaria* – and the tiny *Corbula mediterranea*. Previously the acclimatization of *Mya arenaria* in the Black Sea, dominant was *Corbula mediterranea* in the entire area included between the Cape Midia and Constanța. In this area, *Corbula* was the most widespread species – between another approximately 100 other invertebrate taxons – and the number of specimens 100 000 ind.m⁻² and biomasses of over 50 g.m⁻². In the past, this association was one of the most important phenomena concerning the trophic value for benthic species of fishes.

After the 1970, the dominant role in this region was taken by the immigrant north-atlantic species *Mya arenaria*. *Corbula mediterranea* is a species sensitive to ecological changes and to the human impact and in these conditions. *Mya arenaria* – more tolerant to oxygen depletion and pollution – became the most important species in the northern part of Romanian littoral.

The stocks of *Mya arenaria* were estimated in 1960 – 1970 at 112 000 tones for the whole Romanian littoral. An important part of the shells of these large species were washed up by the storms on beaches, changing the structure of the beach sand.

Between 1977-1981 on a one meter length of beach at Mamaia there have been accumulated 55 tone of *Mya arenaria* (7 tons per year on an average); this means about 12 tons of calcareous shells entering the sedimentary processes. As we can read on the cumulative curve of the total quantities of *Mya* deposited on the beach (Figure 7.2.7), during the five years of observations and measurements, the accumulations took place irregularly: 6.1 tons (17%) in 1977, 2.2 tons (6%) in 1978, 9.9 tons (28%) in 1979, 6.7 tons (19%) in 1980 and 10.1 tons (29%) in 1981 (Gomoiu, 1983).

The monthly level of accumulations was also irregular; it varied between the maximum of 7.85 tons - recorded in February 1979 and the minimum of only about 2 kg – registered in August 1979 or September 1981 (Figure 7.2.7).

By analyzing the data from 1977, we can observe that the quantities of *Mya* shells and other molluscs deposited on the beach vary much enough from one month to another, but according to the average values for 1977-1981 these quantities are usually bigger during the first months of the year then they greatly decrease until summer and then a slight increase may be observed towards the end of the year. On an average, out of the *Mya* quantities annually accumulated on the beach, more than 72% are deposited during the storms that take place in January through March.

On the Romanian coast generally and on Mamaia beach especially, because of its eastern exposition, the most destructive storms, which are at the same time involved in the formation of shell deposits, are the storms caused by winds blowing from the North and North-East sector but the greatest frequency of these winds and their speed too, as the multiannual monthly average data illustrate, were registered in January - March (Figure 7.2.8); this is the same period when the greatest quantities of *Mya* on the beach were recorded.

The great storms also cause an increase in the width of the beach zone where take place active processes of shell accumulation, of erosion, or the rolling and "grinding" of the shells, of sedimentation and re-sedimentation of old deposits. We underline the fact that the percentage of *Mya* individuals in deposits, with joined valves and flesh, increases during unusually great storms. Thus, the average annual value of the percentage of recently dead individuals represents almost 60% of the deposit; it rises to over 78% during the storms in January, February and March. During the summer months only isolated, empty *Mya* shells, without flesh, appear on the beach. However there were a few exceptions: July 1981 - 3 kg = 12% and especially August 1978 - 995 kg = 100% *Mya* with flesh (the latter value greatly alters the average of August) (Gomoiu, 1983).

Besides *Mya*, all species of molluscs from the neighbouring sedimentary sectors were found in the deposits of the supralittoral zone, but their quantities were extremely poor, negligible. Only certain sectors of the beach sometimes appear, small "islands" formed by shells of *Cardium edule lamarki* (almost 15,000 sps./m²), *Corbula mediterranea* (35,000 sps./m²), *Mytilus galloprovincialis* (3,500 sps./m² - of course very few in comparison with their quantities on the beaches situated South of Constanta), *Hydrobia ventrosa* (715,400 sps./m²), etc. (Gomoiu, 1983).

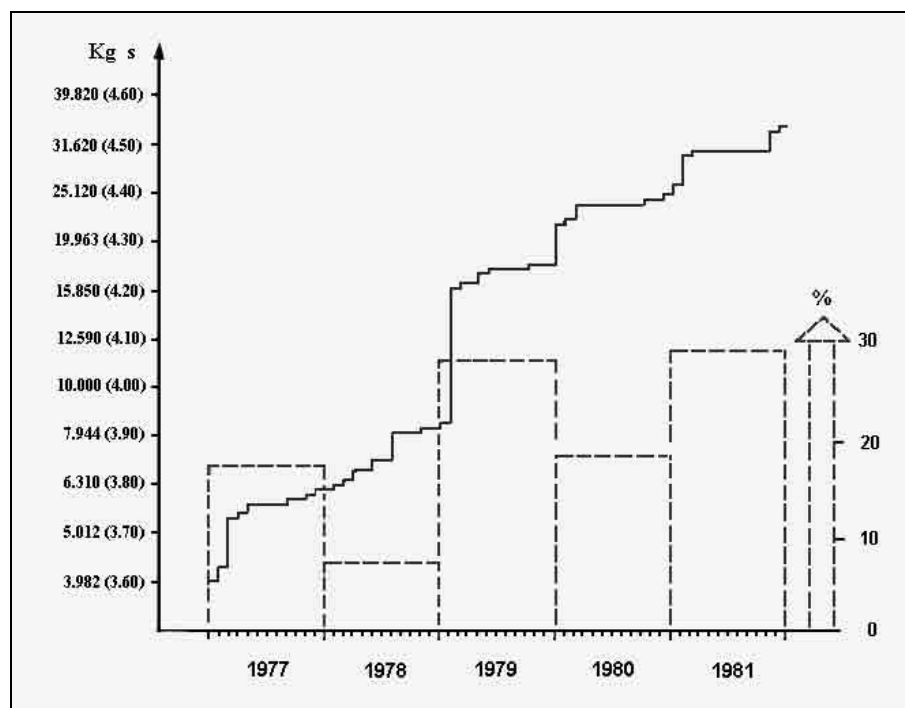


Fig. 7.2.7: Cumulative curve of the total quantities of *Mya arenaria* deposited monthly on a 1 m beach length at Mamaia; annual percentage distribution of total quantities deposited between 1977 - 1981

The great quantities of *Mya* shells that accumulate yearly on the beaches of the Romanian littoral cause great changes in the structure of the sediments. The researches carried out on the beaches North of Constanta (Gomoiu, 1968, 1969) have shown that they consist of fine, mineral (quartz-mica) sands. Before *Mya arenaria* bivalve had penetrated into the Black Sea the shell deposits formed after storms did not change the granulometric and chemical pattern of the sediments present on the beaches North of Constanta, because the species carried by storms and deposited on the beach were low in quantity and their shells having a low content of conchioline (organic nitrogen) dissolved relatively quickly. In addition, the Danube supplied the beaches with sufficient quantities of sediments represented by fine sands.

Thus, the *Mya arenaria* populations of the Romanian littoral can be considered to have a great importance not only because they represent a rich trophic base which realizes the best filtration of waters too, but also because they play a prominent part in the formation of beach deposits. *Mya* shells are at present the only major source to form the sands on the Romanian beaches situated North of Constanta.

Other important species in these associations are bivalvae like *Scapharca inaequivalvis* – another immigrant species, originated in the Indo-Pacific area, *Cerastoderma (Cardium) edule*, *Chione (Venus) galina*, *Tellina exigua*, *Donax trunculus* – rare in the past and mentioned in present days from the Mamaia bay. Between crustaceans we could mention the shrimp *Crangon crangon*, the crabs *Portunus holsatus* and *Diogenes pugilator*, the amphipod *Euxinia maeotica*. The last one had a significant importance for the great trophic value of this amphipod that develops large populations in the shallow waters.

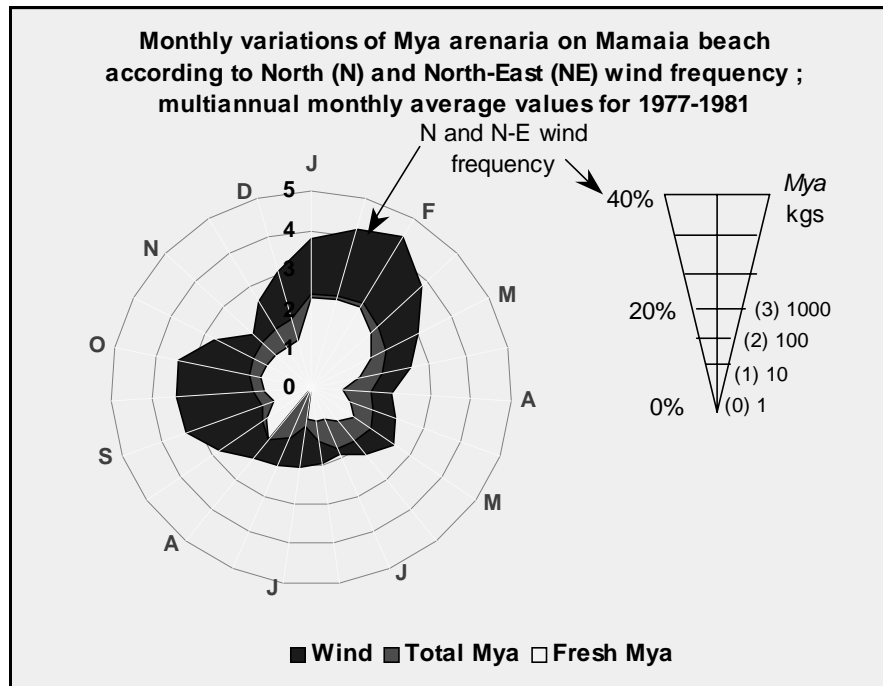


Fig. 7.2.8: Monthly variations of *Mya arenaria* on Mamaia beach according to North (N) and North-East (NE) wind frequency; multiannual monthly average values for 1977-1981

The **typically psammobiont biocoenosis** characteristic to the fine grained sedimentary bottoms and dominated by the small bivalve *Corbula mediterranea*, has known an important decrease of its distribution in the Constanța sector, due to the invasion of the biocoenosis with *Mya arenaria*. The observations and analysis of population during last years (2000-2005) indicate a slight but continuous redressing, to the prejudice of the *Mya arenaria* population development. The densities of the leading species increased from average values of 3700 indv.m⁻² in the years 1990s at about 7350 indv.m⁻² in 2003. However, *Mya* continues to represent a common faunistic element in the Constanța sector, in shallow waters.

The constant contribution of shelly material entering in the sedimento-genesis of the littoral calcareous sand is based more than 70% on the *Mya arenaria* shells. The most important deposits of *Mya* shelly material are signalled in the subsectors North Năvodari – North Mamaia. The impressive quantities accumulated on the beach reach thicknesses of ca. 20-30 cm, covering surfaces up to 50-100 m².

B. Invertebrate fauna on hard bottoms in Constanța area

In the same area is also present the benthal association characteristic for the hard substrata installed on the protection jetties. These associations are dominated by mussels – *Mytilus galloprovincialis*. The protection artificial reefs and jetties changed the composition of the invertebrate fauna in Constanța and Mamaia areas. In the front of Constanța, the hard bottom substrata were represented by some limestone “islands” situated just in the front of the old city. In the past – at the beginning of XXth century – beside mussels on these rocks were present also Black Sea oysters – *Ostrea sublamellosa* and *Ostrea taurica*. Large quantities of subfossil oyster shells are washed up on the beaches even today by the storms in autumn and spring.

The mussel association is composed also by characteristic species of rocky bottoms: *Brachyodontes lineatus* – a small bivalvae with the length of 10 mm, gastropods – *Rapana*

venosa – a predator marine snail originated in the south east Asia, *Rissoa splendida*, *Bittium reticulatum*, *Tricolia pulla*; hydrozoans like *Eudendrium ramosum*, *Obelia gelatinosa*, sea anemones like *Actinia equina*, *Actinothoe clavata*, crabs like *Pachygrapsus marmoratus*, *Xantho poessa*, *Rhithropanopeus harissii tridentatus* - an invasive indo-pacific species, shrimps like *Palaemon elegans* and *Palaemon adspersus*, barnacles – *Balanus improvisus*, isopods – *Idotea baltica*, *Sphaeroma pulchelum*, amphipods – *Corophium crassicorne*, *Erichthonius difformis*, *Hyale pontica*, bryozoans – *Membranipora membranacea*, *Lepralia pallasiana*, etc.

Because of the hydrotechnical works for coastal protection, which may be assimilated to artificial reefs, the biodiversity and impact of the epibiosis forming populations increase considerably in the proposed sub-sectors. This situation is more evident in the case of the Constanța sector, with a sedimentary bottom and without any natural hard bottom.

Shortly, the populations installed on these structures participate to the modification of the sedimentary bottoms grain size by the huge supply of shelly material from the epibiont mollusk associations and to the modification of the limitrophe associations coenotic composition. The mussels – *Mytilus galloprovincialis* followed by *Mytilaster lineatus* and the cirripede *Balanus improvisus*, represent the most important species, with a 100% frequency of participation to the formation of epibiosis on the hard substratum. The amplitudes of the maximum and minimum densities variations in the Mamaia sub-sector vary between 866922 ind.m⁻² and 3853500 ind.m⁻², while biomasses vary between 15937 g.m⁻² and 27927 g.m⁻². Biomasses are dominated in a 90% proportion by *Mytilus galloprovincialis* and *Mytilaster lineatus*. The influence of the epibiont population, both from the artificial and natural substrata on the littoral biocoenoses from the shallow sedimentary bottoms is overwhelming.

(b) Eforie Area

The Agigea area between the south breakwater of Constanța Port and the existing short groin II-J-02 provides a natural rocky support (substratum) for a great variety of microhabitats, and the area is very valuable for conservation of the biodiversity. The fauna is very diverse and abundant in this area, and thus this area is serving as a natural biological filter which assures the good water quality in the Eforie Sector. Furthermore, this area is one of the only two sites on the Romanian coast where *Pholas dactylus* lives. It is a mollusk protected by the **Berna Convention** and **Barcelona Convention**. Preservation of the rocky support is vital for protection of the mollusk *Pholas dactylus*.

The sub-sector of Eforie Middle is provided with the sole colony of *Donacilla cornea* (species included in the Black Sea Red Book, having the IUCN regional status of Critically Endangered) that still survives on the Romanian shore. The strong negative impact of jetties of any kind on this species is already documented (Micu & Micu, 2006). Moreover, the area shelters a massive population of *Donax trunculus*. The existence of these mollusk species has a major importance for the shore fauna, being a sign of fauna recovery. Because these species of bivalves survive on coarse sand only, beach fill operation should be carried out using not fine but coarse sand and the progress of beach fill should be controlled by slow speed so that the bivalves will not be buried deep under filled sand.

(c) Eforie – Limanu

A. *Invertebrate fauna on sandy bottoms*

Medium-coarse sands (average grainsize = 759 - 1001 μm) **biocoenosis** was characterized in the years 1960s - 1970s by the presence of two macrobenthic forms, the bivalve *Donacilla cornea* and the polychaete *Ophelia bicornis*, alongside of different meiobenthic organisms (Băcescu *et al.*, 1971; Gomoiu, 1977). Actually, this benthic association has lost its identity as a biocoenotic unit, due to the disparition of one of the characteristic species – *Ophelia bicornis* and the reduction of the spreading area of the other – *Donacilla cornea*. In fact the main habitat of this biocoenosis was lost as a consequence of building the new harbour Constața South - Agigea; the sandy beach in front of the Agigea railway station disappeared, being covered by the new harbour.

Very recently, in 2003-2004, *Donacilla cornea* was signalled in considerable quantities in the Agigea - North Eforie area. The reappearance of the macrobenthic mollusk species associated to mobile substrata from the shallow zone represents an event of major importance for the littoral biocoenoses, a sign of biocoenosis recovery.

Medium sands (average grainsize = 203-433 μm) **biocoenosis** from the upper supralittoral, dominated by the bivalve *Donax trunculus*, similarly recorded a significant decline being considered as rare even since the years 1970s. The populations were situated at water depths of 2-3 m, occupying small, island like, surfaces. For years the species was not met anymore, being considered as extinct. In 2005 two fresh specimens having a mean size of 20 mm were signalled in the North Mamaia area. Their small size indicate the recent appearance of the mollusks on the sedimentary bottoms from Mamaia.

It is important to mention that in this condition of slow recovery of the ecosystems they are still sensitive to any ecological pressures.

B. *Invertebrate fauna on hard bottoms*

The epibiont system from the Southern sectors is much more diversified because of intercalations and completions of the natural hard substratum with the artificial one, represented by protective jetties. The littoral cells thus created allow the evolution of a particular population in these protected areas based, mainly, on the communities of annual and perennial macrophytes, extremely abundant of the shallow water rocky plateaus.

The nature of the substratum condition the formation of extremely complex epibiont system, dominated by the *Mytilus galloprovincialis* colonies. The most important aspect of the epibiont populations, dominated by calcareous forms, consists in the annual formation of a huge quantity of shelly material contributing to the sand formation. The estimations done on epibiont communities from artificial substratum show that out of the annual production of mollusks appromated at 66 $\text{kg}\cdot\text{m}^{-2}\cdot\text{year}^{-1}$, 22 kg will enter into the sedimentogenesis processes (Gomoiu, 1986). The weighted means of the epibiont mollusks quantities on artificial substratum vary between 10 and 55 $\text{kg}\cdot\text{m}^{-2}$, as a function of depth. The greatest biomasses are recorded in the bathymetric layer 2-6 m.

The maximum numerical densities of the epibiont mollusks are signaled in the breakwater layer and in the mediolittoral, with values which might exceed 100000 $\text{ind}\cdot\text{m}^{-2}$, but with very small sizes and biomasses because of the predominance of young forms of small dimensions.

The numbers of epibiont organisms, both on artificial hydrotechnical structures and on natural hard bottoms, have known an important increase in the last years compared with the period of ecological crisis from the years 1980s-1990s. The increase characterizes all the major groups of epibiont invertebrates from the stone mussels association.

The analysis of the mussel populations, mainly mussels, from artificial substrata represented by hydrotechnical works have shown that they are well developed thanks to the bioproductive potential of the Romanian coastal waters (rich in particulate organic matter, alive and dead and dissolved organic matter). Having in view this, we consider that in the actual phase one of the real possibilities to activate the shelly sand input to the beaches from the Southern Romanian littoral is the introduction of artificial hard substratum into the sea; the substratum, with a high surface able to be populated, will offer to the bottom organisms (afflicted by oxygen deficit or silting of the hard substratum) the possibility to rise in the water mass where the ecological conditions are more favourable.

Of a major importance for the littoral biocoenoses from the hard substrata is the reappearance of the fields of perennial brown algae *Cystoseira barbata* in the Southern extremity of the littoral, a situation leading to habitat diversification and favouring the appearance of some taxa strictly related to this species, in great jeopardy.

The presence of the species in most sub-sectors from the Southern extremity (Tuzla, Costinești, Mangalia, Limanu) of the Romanian littoral is important for the beach rehabilitation works. Due to the preferential distribution of the *Cystoseira* fields in shallow waters, they might be covered shortly after the artificial feeding of the beaches. The reduction of the recovering fields after two decades of constant decline will lead to the simplification and impoverishment of the benthic populations from this sector. However, the direct observations through diving show that the distribution of the *Cystoseira* fields is not limited to the shallow coastal area from within the littoral cells. This guarantees the recovery of the eventually affected associations.

The main taxa vulnerable to any extreme intervention able to alter the ecological conditions from certain coastal habitats from the littoral between Eforie and Limanu are:

- *Corallina mediterranea* (Perennial red algae in the Mangalia and Limanu sector)
- *Cystoseira barbata* (Perennial brown algae in the Tuzla – Limanu sector)
- *Zostera marina* (Plantae in the Eforie, Tuzla and Mangalia sector)
- *Donacilla cornea* (Mollusca in the Eforie sector)
- *Siriella jaltensis jaltensis* (Crustacean in the Mangalia and Limanu sector)
- *Gastrosaccus sanctus* (Crustacean in the Mangalia and Limanu sector)
- *Leptomysis sardica pontica* (Crustacean in the Mangalia and Limanu sector)
- *Upogebia pusilla* (Decapoda in the Eforie sector)

(2) Potential role and ecological effects of artificial reefs constructed on the coastal sandy bottoms of the Black Sea (Romania)²

It is well known that in the past decades, everywhere in the coastal marine ecosystems have been registered profound structural and functional modifications in consequence of a severe increasing interference of the metabolism of human population with marine environment. At present, when man permanently tries to make greater use of marine resources, the changes in the coastal ecosystems resulting from the extraction and/or the addition of substances and energies from and to marine environment are inevitable; they have a generalized distribution and a law-like character. Unfortunately, most of these changes are usually negative ones causing distortions which can finally be seen in the destruction of the genetic fund; however, there are interventions by man in marine environment, which can be positive and among them we can mention the building of artificial reefs (AR) and mariculture.

The main consequence of human interference in marine environment is the dominant and complex process of eutrophication/pollution, which occurs within the whole water mass, in pelagial; but the benthic level reflects most synthetically all the distortions that have appeared in the coastal ecosystems. *The benthos, a real barometer of ecological pressures, represents the basis of littoral ecosystems* from many points of view; the benthic communities closely connected with the substratum are characterized by great inertia and a greater stability than the planktonic associations and in case they are disturbed, their restoration to a new level of ecological equilibrium takes a very long time.

It is also well known that, a poor natural environment with a low biological productivity or one altered by external ecological pressures is enriched through the implantation of a hard substratum in coastal marine zones; taking this fact into consideration, we have suggested that the building of artificial reefs (AR) should hold an important place in a long-term integrated program devised for the ecological reconstruction of shallow-water zones with sedimentary bottoms in the north-western part of the Black Sea (Gomoiu, 1982 d, 1983 b, 1986 a, b, etc.).

The AR were first constructed as a necessary means for increasing fishery production and for creating fishing sports bases; recently, in the Mediterranean countries the implantation of AR has become an element of the policy of coastal fishery improvement and management (GFGM, 1980, 1983, 1986, etc.). We have considered that in the program of ecological straightening the AR must have, complex functions and multiple purposes must be considered when designing them right from the start (Gomoiu 1982 a, d, 1983 b, 1985 b, 1986 a, b, c).

The idea of improving the quality of some fragments of coastal marine ecosystems with sedimentary bottoms in the Black Sea by using AR started from the fact that in this sea the natural hard bottoms, unlike the soft zones, have a much higher ecological and bioproductive potential (Băcescu et al., 1971). Although the general condition of the coastal marine ecosystems in the north-west of the Black Sea is precarious, although the anthropic pictures act almost uniformly along the whole littoral and ecological tension is the same, the rocky bottom populations are better represented and have a greater capacity of restoration (Țigănuș, 1979). Moreover, on the artificial substrata immersed everywhere into the Black Sea waters,

² This sub-section has been reproduced from the Initial Environmental Examination Report prepared by GeoEcoMar. "We" do not refer to the Study team but to the staff of GeoEcoMar. The team regards the information presented here is important for evaluation of the function and environmental effects of artificial reefs being proposed in the Study, even though the structure of artificial reefs contemplated by GeoEcoMar is different.

there are upper particularly strong epibiotic communities, in which the biomasses are tens of times greater than those on sedimentary bottoms on which these substrata lie. For example, in the open sea (100 Nautical miles off shore and approximately 80 m depth) right in the middle of the white ooze bottoms with *Modiolus phaseolinus* (Philippi), an epibiosis dominated by mussels was formed on the underwater structure of an oil-rig within 533 days; the epibiosis had a total biomass of 72 kg m⁻² at the level of 22 m; that means an average rhythm of biological depositing up to 135.21 g m⁻² day¹ (Gomoiu and Țigănuș, 1981).

In the coastal zones with very strong hydrodynamism, on the stabilopods which protect the external seawalls of the port of Constantza, the epibiotic community formed in 5 years can be considered in a quasi-stationary state having rich populations: on the average 97,036 sps. m⁻² and 26,589.39 g m⁻²; the maximum abundance of the main sessile forms can rise to the following values: *Mytilus galloprovincialis* Lam. - 21,733 sps m⁻² and 41,602.13 g m⁻², *Mytilaster lineatus* Gmelin - 18,842 sps m⁻² and 2,905.00 g m⁻², *Balanus improvisus* Darwin - 41,378 sps m⁻² and 1,490.67 g m⁻² (Gomoiu, 1986, b, c).

We consider for the time being that these two examples can illustrate the great capacity of the Black Sea epibiotic forms to populate the hard artificial substratum rapidly and abundantly; GeoEcoMar can be positive that from the moment of its implantation into the sea, the AR will fulfil the biological functions through its settlers, especially mussels.

We have proposed the building of experimental AR in the zone of the famous international touristic resort of Mamaia, close to Constantza, a zone which presents a special interest and is also under the observation of the hydrotechnical experts for geomorphological protection (Spataru, 1986). The ecosystem of the shallow-water sandy bottoms with *Corbula mediterranea* Costa at Mamaia, one of the most productive ecosystems of the Black Sea until the start of the 1970's, was thoroughly studied and known (Băcescu at al., op. cit). All the distortions which appeared in the north-west of the Pontic basin and were mentioned above, were registered in the Mamaia zone too. Thus, in 1982 in the zone of the 5 m isobath (Țigănuș, 1983) the quantitative and qualitative structure of the surviving benthic community was poor, the total average biomass is hardly 61 g m⁻² (Table 7.2.8). In 1986 the situation improved to a great extent, for a little while it seems, and did not rise to the levels of development reached in the 1960's.

But in 1986 the sedimentophilous populations at Mamaia had biomasses over 25 times smaller than the epibiotic populations living in the same zone on the concrete walls of an artificial parallelepipedic block (approx. 8x8x7 m), built 20 years ago as a basis for touristic ship berthing (Table 7.2.9).

In the sand, ten species of molluscs were found, but the average density and biomass of their populations (36,595 sps m⁻² and 704.66 g m⁻²) were much lower than the average density and biomass of the populations of the six species found in the same zone on the artificial concrete "island" (45,522 sps m⁻² and 19,725 g m⁻²); therefore the biomass of the psammobiotic molluscs was 28 times smaller than that of the epibiotic molluscs (Table 7.2.6).

Table 7.2.8: Frequency (F %), average densities (D - sps m⁻²) and biomasses (B - g m⁻²) of organisms on the sandy bottoms at Mamaia in 1982 (after Țigănuș, 1983)

Organisms	F%	D-sps m ⁻²	B-g m ⁻²
MOLLUSCA:			
<i>Corbula mediterranea</i> Costa	90	1.85	27.45
<i>Mya arenaria</i> L.	90	90	18.48
<i>Cardium edule lamarckii</i> Reeve	10	10	6
<i>Tellina tenuis</i> Costa	10	15	6.27
VERMES:			
Nematoda	100	52.85	0.09
<i>Nereis succinea</i> Leuck.	80	780	0.47
<i>Spio filicornii</i> (O.F.M.)	75	1.17	0.7
CRUSTACEA:			
<i>Ampellicca diadema</i> Costa	80	305	1.83
<i>Bathyporeia guilliamioniana</i> (Bate)	5	5	0
<i>Iphinoe maeotica</i> (Sov.)	5	10	0
<i>Balanus improvisus</i> Darwin	5	10	0
TOTAL	-	57.095	61.29

As to crustaceans, both the densities and biomasses are much lower for the psammophilous populations than for rocky bottom ones, 2.9 times and 7.4. times respectively. However the populations of worms are more numerous on sedimentary bottoms (over 8 times for densities and over 3 times for biomasses); it seems that the interstitial system of microporal type is more favourable to this type of organisms in comparison with the interstitial system of secondary tissue-like- type formed in the epibiontic community. With reference to the other organisms, there are no forms of Hydrozoa, Bryozoa, macrophyte algae, etc. on the sandy bottoms (Table 7.2.9).

Table 7.2.9: Average frequency of occurrence (F %), densities (D-sps.m⁻²) and biomasses (B-sps.m⁻²) of benthic organisms at Mamaia in the zone of the 5 m isobath on sandy bottoms (SB) and on the artificial hard substratum (AR) in summer*

No	Organisms	SB	AR	SB		AR	
		F %	F %	D-sps.m ⁻²	B-g.m ⁻²	D-sps.m ⁻²	B-g.m ⁻²
1	<i>Mytilus galloprovincialis</i> Lam.		100			4404	19194.6
2	<i>Mytilus</i> (juv.)	25	100	28	1.12	39049	390.64
3	<i>Mytilaster lineatus</i> Gmelin		100			947	113.02
4	<i>Scapharca inaequalvis</i> (Brug.)	62.5	100	314	7.74	718	7.86
5	<i>Mya arenaria</i> L.	87.5	63.6	18273	144.6	222	19.3
6	<i>Hydrobia ventrosa</i> (Montagu)	62.5	54.5	468	1.17	150	0.36
7	<i>Chiton marginatus</i> Pennant		27.3			32	0.16
8	<i>Corbula mediterranea</i> Costa	100		14800	99.03		
9	<i>Cardium edule lamarckii</i> Reeve	87.5		2012	406.8		
10	<i>Cyclope neritea</i> (L.)	87.5		132	36.9		
11	<i>Rissoa splendida</i> (Eichwald)	87.5		502	1.46		
12	<i>Retusa truncatula</i> Bruguiere	25		18	0.06		
13	<i>Abra ovata</i> (Philippi)	12.5		48	5.7		
	MOLLUSCA			36595	704.6	45522	19725.9
1	Copepoda var.	100	100	4720	0.09	20026	0.39
2	Corophium sp.		100			32518	12.59
3	Decapoda var.		100			208	47.05
4	<i>Balanus improvisus</i> Darwin	75	90.9	1145	11.45	3357	568.52
5	<i>Tanais cavolinii</i> M.-Edw.	50	90.9	160	0.06	2292	
6	<i>Idotea baltica</i> Pallas		36.4			432	13.08
7	<i>Palaemon elegans</i> Rathke		36.4			24	1.95
8	<i>Iphinoe maeotica</i> (Sov.)	100		3380	1.93		
9	<i>Ampelisca diadema</i> Costa	87.5		11145	66.87		
10	<i>Bathyporeia guilliamsoniana</i> (Bate)	25		18	0.01		
11	<i>Upogebia pusila</i> (Petagna)	12.5		2	0.12		
	CRUSTACEA			20570	87.53	58857	643.58
1	Polychaeta	100	100	27690	16.67	8380	4.83
2	Nematoda	100	100	359625	0.61	34791	0.06
3	Turbellaria	12.5	100	3575	0.14	5445	0.22
4	Leptoplana	12.5	45.4	5	0.15	56	1.68
5	Nemertini	87.5	18.2	195	0.68	15	0.06
6	Oligochaeta	87.5	9.1	12810	2.56	10	0
	VERMES			403900	20.81	48697	6.85
1	Bryozoa		63.6			+	+
2	Hydrozoa		54.5			1030	0.83
3	Phoronis	12.5		80	0.06		
	VARIA			80	0.06	1030	0.83
	ZOOBENTHOS			461145	813.0	154106	20377.2
	PHYTOBENTHOS - ALGAE						
	<i>Ceramium rubrum</i> (Huds.) Ag		100			+	427.27

* The organisms are arranged per large taxonomic groups, and within groups in decreasing order of frequency value of the hard substratum forms, then the soft ones.

The comparative analysis of the values of density indices (square root of the product between frequency and biomass) points to the importance of various species in the studied communities (Table 7.2.10).

Table 7.2.10: Density indices ($D_i - \sqrt{f \cdot B}$) of the first important ten species in the associations living on the sandy bottoms and on the hard artificial substratum at Mamaia, in summer

Sandy bottoms (1986)		Hard artificial substratum (1987)	
Organisms	D_i	Organisms	D_i
<i>Cardium edule lamarckii</i>	188.7	<i>Mytilus galloprovincialis</i>	1385.4
<i>Mya arenaria</i>	112.5	<i>Balanus improvisus</i>	227.3
<i>Corbula mediterranea</i>	99.5	<i>Ceramium rubrum</i>	206.7
<i>Ampelisca diadema</i>	76.5	<i>Mytilus juv.</i>	197.6
<i>Cyclope neritea</i>	56.8	<i>Mytilaster lineatus</i>	106.3
Polychaeta var.	40.8	Decapoda var.	68.6
<i>Balanus improvisus</i>	29.3	<i>Corophium sp.</i>	35.5
<i>Scapharca inaequalis</i>	22	<i>Mya arenaria</i>	35
Oligochaeta var.	15	<i>Scapharca inaequalis</i>	28
<i>Iphinoe maetotica</i>	13.9	Polychaeta var.	22

The values of density indices in the epibiontic system are much higher than those in the psammobiontic one; the rocky bottom species *Mytilus*, *Balanus*, *Mytilaster*, *Ceramium*, etc. represent in fact the forms with the greatest role in biofiltration and bioconversion, in water purification, generally in the bio-productivity of the zone.

The comparison between the two benthic communities (Table 7.2.10) formed in the same zone, in the same environmental conditions and living under the same ecological pressures clearly shows, once more, the great ecological potential of the hard substratum in comparison with the sedimentary one, as well as the fact that the building of AR at Mamaia is certainly followed, besides other positive effects, by an increase in the bioproductivity of the arranged ecosystem fragment.

The functions and ecological effects of the AR in shallow-water zones with sedimentary bottoms can be summarized as follows:

- 1) An increase in the biological carrying capacity of marine environment in the arranged zone through:
 - substratum diversification (on the sandy bottoms there appears the hard substratum which can vary in form and structure and has a great capacity to become more complex after being populated with algae, mussels, *Balanus*, etc.);
 - the creation of surfaces available for epibiontic organisms (the primary surface of AR must be several times greater than the constructed surface, and the secondary surface realized by epibiontic organisms becomes even greater);
 - the extension of the space to be inhabited by benthic organisms;
 - the creation of places for attraction, shelter, feeding and reproduction for numerous fishes (Gobiida, Labrida, Mugilida, etc.).

The habitat diversification, the complex stratification and the achieved spatial heterogeneity implicitly lead to the enrichment of ecological diversity in the arranged sector due to the appearance of a rich complex of epibiontic species and of demersal fishes.

- 2) The purification of coastal waters through:
 - biofiltration — the main epibiotic forms are powerful filtrators (filter-feeding) and the AR represent a real filtrating barrier;
 - bioaccumulation (at least macrophyte algae can assimilate part of the nutrients);
 - the increase in the amounts of oxygen due to the photosynthetic activity of the macrophytes which will settle on the AR.
- 3) The conversion of the existing rich primary trophic base (which is practically lost causing secondary pollution) into the biomass utilized by man (mussels) and demersal fish. After the death of calciferous forms, *toasts* of broken shells enter in the sedimentary processes (a sand source for beach supply).
- 4) Coastal protection, especially when the barriers of AR are considerably long. Beach erosion can be limited or stopped by the concrete structure which takes over and dissipates the flux of the incidental energy of the waves. At the same time sheltered zones are formed, with conditions suitable for mariculture development; installations or cages for cultivating some organisms could be easily adapted under the protection of the AR (Gomoiu, 1986 b).

The four functions mentioned above, that is coastal protection, habitat diversification, water purification, and the conversion of the phytoplanktonic primary production have the following global effects: the increase and optimization of the general biological production of the littoral zone and especially of the trophic basis for fishes through the qualitative and quantitative enrichment of the reef communities; the improvement and diversification of the quality of biological production (besides invertebrates, there appear macrophyte algae and especially commercial fishes in the reef community); conditions for mariculture development; a higher degree of ecological stability in the arranged zone; the conservation of the biological fund. The reef zones can become in a short time either economical zones for practicing mariculture or zones for sports, fishing and diving (which will enrich the range of tourist entertainments at the seaside).

The AR barrier at Mamaia will be built out of stabilopods of 4.5 tons in weight (approx. 2.25 m in height) of the type frequently used for coastal protection. The stabilopods, arranged according to the formula 3 + 2 in cross section on a riprap bed (Figure 7.2.9) must form tronsons about 100 m long. The tronsons, linked to one another or free, with openings of approximately 50 m, can be arranged in several variants; the AR thus constructed on the sandy bottoms at 6 m depth and 1,500 m away from the shore represent in fact a "permeable" barrier.

At present, a trusty explicit or implicit evaluation of the role and potential effects of AR can be only deductively and analogically made, on the basis of a comparative analysis which is to take into account several elements.

The main elements we consider for an average qualitative and quantitative evaluation are the following: a tronson of AR, 100 long (for evaluating the size of the new habitat); the quantitative data on the plankton (Bodeanu, 1984) and the benthos (Bodeanu, 1968; Țigănuș, 1983 - Table 1) in the Mamaia zone (for illustrating the average present level of the development of some populations in the sandy bottom ecosystem); qualitative data (specific structure and the structure of some populations per size classes) and quantitative ones on the epibiotic communities formed on the hard natural or artificial substratum (Bodeanu 1968;

Gomoiu and Țigănuș, 1981; Țigănuș, 1979; Vasiliu, 1978, 1980) (to foreshadow the main colonizers of the AR and the average quantitative levels that can be reached in this case); the biofilter capacity of organisms (Gomoiu, 1976; Mironov, 1948) (to establish the power of the biopump formed by mussels and other filter-feeding organisms settled on AR); the medium area of mussel shells, which represent a secondary formed substratum (it was calculated by us as being: 0.33 cm² - for mussels up to 10 mm length, 1.18 cm² - +10 mm, 4.35 cm² - +20mm, 8.01 cm² - +30 mm, 12.61 cm² - +40 mm, 16.85 cm² - +50 mm, 22.58 cm² - +60 mm and 28.28 cm² - +70 mm).

The comparative analysis of the data leads to the following conclusions:

- By building AR out of stabilopods, the populated surface increases 4 - 65 times (the algae have not been counted — they are an ideal substratum for microphytes and protection for invertebrates and fishes); the habitat extends and diversifies.
- The specific diversity increases; besides the main sessile forms (*Mytilus*, *Mytilaster*, *Balanus*) there can appear species of Porifera, Hydroida, Bryozoa, incrustant Polychaeta (*Mercierella*, *Pomatoceros*, *Spirorbis*, etc.), Tunicata (*Botryllus*, *Molgula*), etc.; numerous fishes are certain to school around the AR (go as we mentioned above at present rich populations of goby fish especially *Gobius melanostomus* Pallas and *G. batrachocephalus* Pallas appeared in the places where the jetties of the new ports were built).
- The energy dissipated today in the eutrophication processes is turned to account through the biomasses of secondary producers (only 10% of the large-size mussels on the tronson of AR can supply 3 tons).
- Biofilter power increases 30 times, thus leading to a better water purification.

The functions and effects estimated, deduced through comparisons and analogies will certainly be checked up in nature, on the planned AR. Before and after the installation of the AR it is necessary to watch the behaviour of the AR and of the ecosystem in the arranged fragment and to establish the ecological balance for the main biotic and abiotic components. The study of the colonization problems and of the competition of the colonizing species, of the ecological succession up to climax formation, of the relation between sessile populations and substratum (nature, form, geometry, etc.) can suggest new technologies connected with the immersed materials and structures. Other important aspects should also be studied: the energetic recycling of the productivity of the reef zone and the adjacent cones as well as the long-term ecological implications of AR (secondary pollution, modifications in the seabed profile etc.).

Finally we must mention a very important thing. Although the ecological and even economic role of AR is unquestionable and they have a positive influence in the arranged sector of the ecosystem, the investment cost seems too high to some people. But what is the price of our inaction in this direction? The evaluations on the worsening rhythm of the fish genofund in the north-west of the Black Sea in the last 20 years show that one species is threatened with extinction every year (Kruglyakova and Stepanov, op. cit.); considering that at present the potential value of a species exceeds 140 million dollars (as biologists, may we really estimate the value of a species? Isn't the value of a species inestimable?), the irreversible loss of only 18 species of industrial fish in the north-western part of the Black Sea will approximately cost 2.5 billion dollars (in the year 2000 the conventional potential cost of the biological species,

calculated in accordance with the national world product, will rise to approximately 500 million dollars). Thus, the inaction cost is much higher than the expenses necessary for the building of AR, especially when these are built for optimization, through an economic-ecological approach.

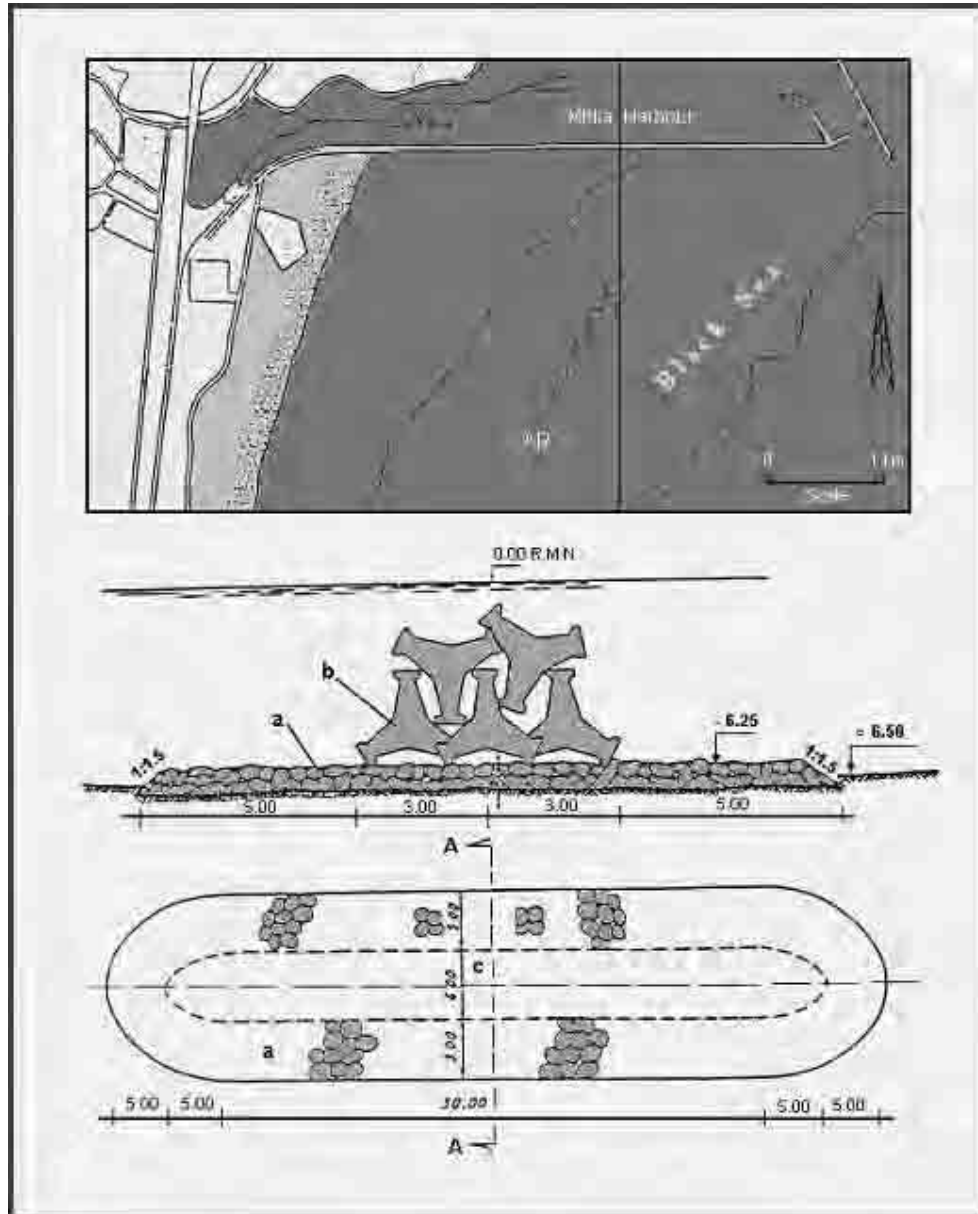


Fig. 7.2.9: Experimental AR built out of stabilopods in the Northern Sector of Mamaia Bay: C-sketch of location and the arrangement of AR units in the form of T, V and I letters; B- cross section (A-A): a – assorted raw stone (100-450 kg per piece) forming the floor layer; b – stabilopods of 45 KN per piece; R.M.N. – Black Sea benchmark; A – plan section: a – assorted row stone (100 – 450 kg per piece) forming the floor layer; c- zone for installing stabilopodes. Dimensions are given in meters.

(3) Marine natural reserve Vama Veche – 2 Mai

The marine natural reserve Vama Veche – 2 Mai is situated in the extreme south of Romanian coast. This particular reserve covers an area of 5000 ha between 2 Mai and Romanian – Bulgarian Border. Offshore, the reserve covers the area between isobaths of 2 m and 20 meter depth.

In this reserve are preserved one of the most interesting benthic associations from the entire western Black Sea coast. The bottom of the sea is covered by limestone rocks with sand “islands”. The bottom association is dominated by bivalves – mussels and *Brachyodontes lineatus* – both species developing large populations with important values of density and biomass. On the hard substratum are present characteristic species of molluscs – *Gibbula divaricata*, *Middendorfia caprearum*, *Lepidochiton cinereus*, small sessile polychaetes – *Spirorbis laevis*, rare isopods like those of *Eurydice* genus, tanaids – *Tanais cavolini*. On the coarse sand bottoms we find shells like *Mesodesma corneum*, *Mya arenaria*, *Cardium edule*, *Chione galina* etc. crustaceans - *Upogebia pusilla* or vagile polychaetes - *Ophelia bicornis*. A particular feature is offered by the presence of sponges – *Halichondria panacea* and *Suberites carnosus*. Algal associations are characterized by the presence of large areas covered by algae. Between common species like those of *Ceramium*, *Enteromorpha*, *Polysiphonia*, *Bryopsis*, *Porphyra*, etc., here are present *Corallina mediterranea* – a red algae find only here and who offer microhabitat conditions for another species – crustaceans, marine snails, nematods, nemertean, polychaetes - and *Cystoseira* – *C. barbata*, *C. bosporica*.

In the littoral sands a very interesting and particular invertebrate fauna is also present. Here, studies carried out by biologists in the last years reveal some surprises like the presence of some interstitial species of coelenterates (mentioned for the first time for the entire Black Sea area) - *Stylocoranella* (Paraschiv, Gomoiu, 2001) or turbelarians (*Monocelis lineata*, *Archylina endostyla*) and polychaetes (*Syllis hyalina*, *Grubea tenuicirrata*) (Paraschiv et al, 2001). From this reason, the research must continue and the area requires an integral protection in order to preserve the entire biodiversity. From this area was also mentioned another immigrant species – the American blue crab *Callinectes sapidus* who spread to the north in the past years (Gomoiu, Skolka, 1997).

(4) Summary

- The littoral area situated between Cape Midia at north and Vama Veche at south is represented by two major types of shores: 1) shores with shallow waters and sand bottoms, without cliffs, situated in Mamaia, Eforie Nord – Eforie Sud, Vama Veche areas and 2) shores with rocky and sand bottoms bordered by cliffs 20 – 30 meters high.
- The benthic invertebrate associations are dominated by shells (Bivalve) – *Mya arenaria* – north-atlantic soft-shell clam in northern part of the littoral and *Mytilus galloprovincialis* – the Black sea mussel in the southern and central part of the littoral, in waters with rocky bottoms or in the front of the beaches protected by jetties or artificial reefs. The shells of these two species formed the major part of the sediments on the beaches and contribute to the changes in the structure of the beaches.
- Biodiversity is particularly high in the southern part of Romanian littoral, on the hard substratum. In this region is situated one of the most important protected areas of the entire Black Sea basin – Vama Veche – 2 Mai marine reserve. Extended on 5000 ha, between the isobaths of 2 and 20 meters and having a 7 km long shoreline, this unique

area preserve one of the most rich benthic associations in the western part of the Black Sea. The protection of this particular habitat is essential for the preservation of the marine biodiversity.

- The shore protection measures would take account not only of the hydrologic characteristics of the coastal waters. Very important in this point of view is also the protection of the marine fauna. The human impact increased in the past decades and any measure that we will take in the future must consider that in this part of the coast are present the benthic associations with particular importance for the whole Black Sea biodiversity.

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7.2.3 Land Use in Constanța County

All data listed in Tables 7.2.11 and 7.2.12 is taken from Environmental Protection Agency Constanța Report on the State of Environmental Factors in Constanța County, 2004 and 2005, with minor modifications for total and percentages.

Table 7.2.11: Land use in Constanta County in 2004 and 2005 (units: ha)

Crt. No.	Category	Public Property ¹⁾	Private Property ¹⁾	Total County ¹⁾	Total County ²⁾
1.	Arable land	8648	480252	488900	487988
2.	Pastures	4163	60342	64505	61607
3.	Hay fields	0	0	0	0
4.	Vineyards	719	10740	11459	11464
5.	Orchards	624	2824	3448	3454
6.	Total agricultural	14154	554158	568312	564513
7.	Forests	35443	241	35684	38820
8.	Waters	31978	13839	45817	45817
9.	Roads and railways	11090	2096	13186	13138
10.	Courtyards and constructions	12610	16913	29523	29530
11.	Unproductive land	10043	4763	14806	14301
12.	Total not agricultural	101164	37852	139016	141606
13.	Total land	115318	592010	707328	706119

¹⁾ – 2004 data; ²⁾ – 2005 data

Table 7.2.12: Balance sheets of urban territories in the Project interest area

Constanța Municipality

Functional zone	Surface, ha	Surface, %
Residential zone (low and high buildings)	1265	21.25
– small individual and collective houses	800	13.44
– big collective houses (residential districts)	465	7.81
Public institutions and services	335	5.63
Green spaces, parks, sports and agreement, shelter belts	263.24	4.42
Industrial	269.71	4.53
Agricultural units	147.45	2.48
Special destinations	90	1.51
Railways associated land	315	5.29
Roads associated land	385	6.47
Shipping associated land – harbour area (water surface not included)	1100	18.48
Technical and public utilities	–	–
Town management and transports	95	1.60
Urban land permanently underwater	76.76	1.29
Non structural land	–	–
Urban agricultural land (vacant spaces – gardens, agricultural land, accidental storage)	1045	17.56
Urban forests	–	–
Tourism (including beach area)	215	3.61
Mixed zone (storage, wholesale trade)	350	5.88
Total urban land	5952.16	100

Mangalia Municipality

Functional zone	Surface, ha	Surface, %
Residential zone (low and high buildings)	218.24	11.05
Public institutions and services	325.01	16.46
Green spaces, parks, sports and agreement, shelter belts	49.24	2.49
Industrial	160.79	8.14
Agricultural units	145.52	7.37
Special destinations	208.46	10.55
Railways associated land	13.25	0.67
Roads associated land	32.00	1.62
Shipping associated land	6.00	0.30
Technical and public utilities	2.90	0.15
Town management	12.26	0.62
Urban land permanently underwater	–	–
Non structural land	84.32	4.27
Urban agricultural land	171.00	8.66
Urban forests	546.00	27.65
Total urban land	1974.99	100

Eforie

Functional zone	Surface, ha	Surface, %
Residential zone (high buildings)	11	1.28
Individual houses (low buildings)	128	14.93
Public institutions and services	59	6.88
Green spaces, parks, sports and agreement, shelter belts	110	12.83
Industrial	61	7.12
Agricultural units	–	0.00
Special destinations	4.82	0.56
Railways associated land	9	1.05
Roads associated land	52.25	6.09
Shipping associated land – harbour area (water surface not included)	–	0.00
Technical and public utilities	3	0.35
Town management	7	0.82
Urban land permanently underwater	4.22	0.49
Non structural land	–	0.00
Urban agricultural land (vacant spaces – gardens, agricultural land, accidental storage)	253.03	29.51
Urban forests	–	0.00
Resort and touristic area	155	18.08
Total urban land	857.32	100.00

7.2.4 Population at the Romanian Black Sea Coast

At July 01, 2003 the total population of the Constanța County was 713,563 people, out of which 504,681 people in urban areas (National Institute of Statistics, 2004) (see Figure 7.2.910). The age structure of the population was as follows:

- 0 - 14 years: 133,436 people – 18.70%;
- 15 - 64 years: 510,198 people – 71.50%;
- >64 years: 69,929 people – 9.80%.

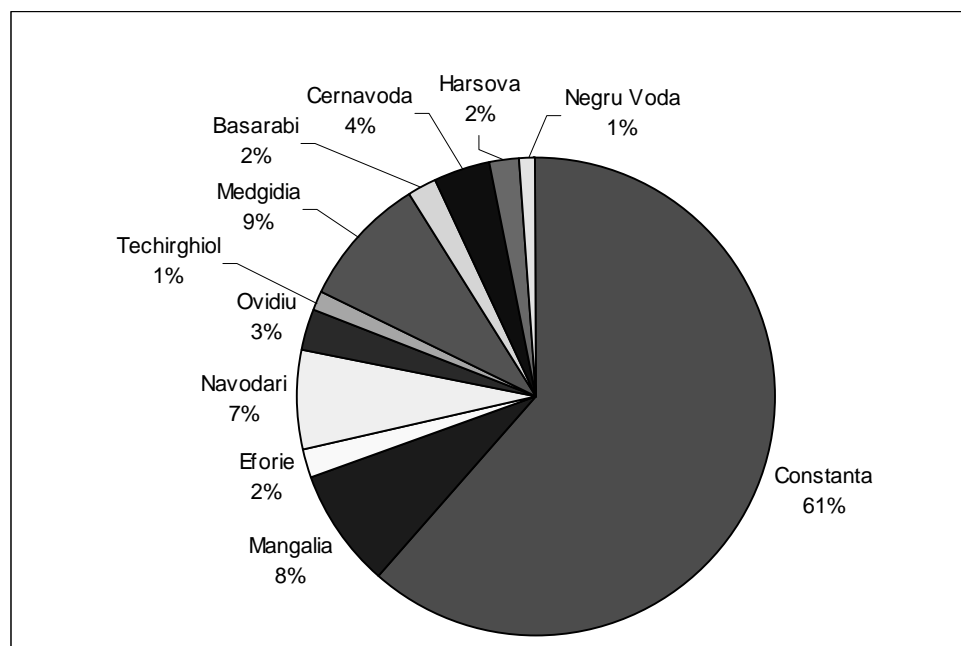


Fig. 7.2.10: Urban population in Constanța County (2003)

Besides Romanian in the Constanța County live also some minorities. An approximate ethnic structure indicates (data from the March 2002 census):

- Romanian – 650,769 – 91.20% (this includes also the Romano-Macedonians);
- Turks – 24,295 – 3.40%
- Tatars – 22,834 – 3.20%;
- Rroms (Gipsies) – 6,422 – 0.90%;
- Russian Lipovans – 5,708 – 0.80%;
- Others – 3,535 – 0.50%.

Beginning from 1990 the population of Constanța County marked a slow but continuous decrease, similar to the general decrease recorded at national level (Figure 7.2.10).

In Constanța County human population is concentrated in the coastal area (Figures. 7.2.11 and 7.2.12). This represents a high demand for the “marine” resources and services and, in the same time a high potential of ecological pressures upon the coastal environment.

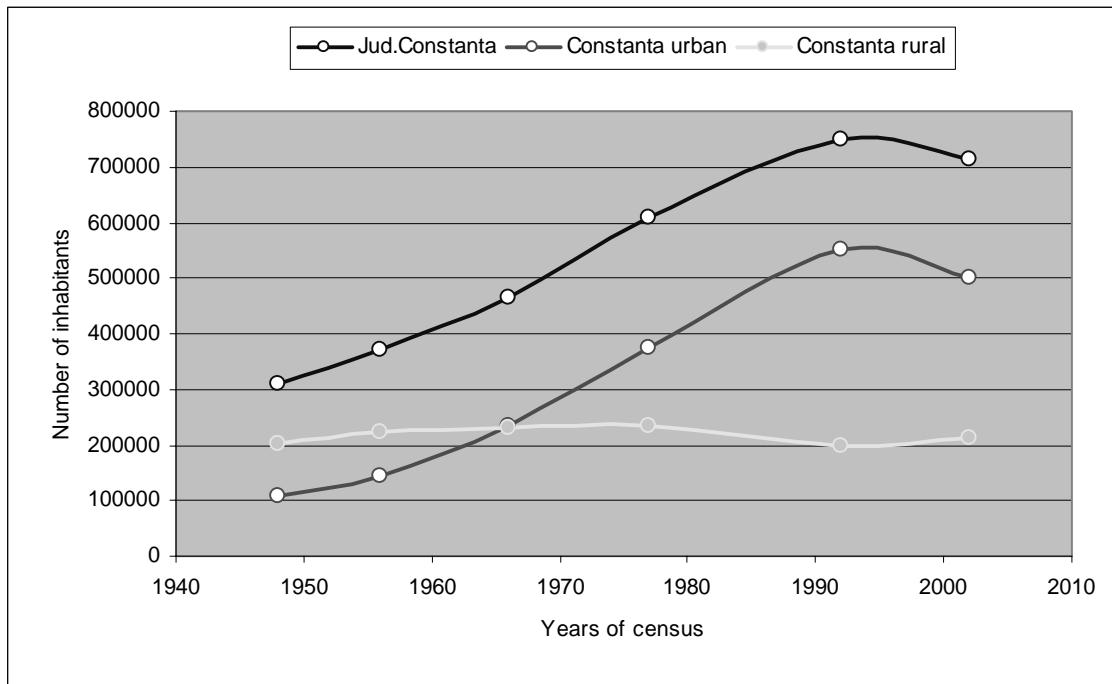


Fig. 7.2.11: Dynamics of human population in Constanța County

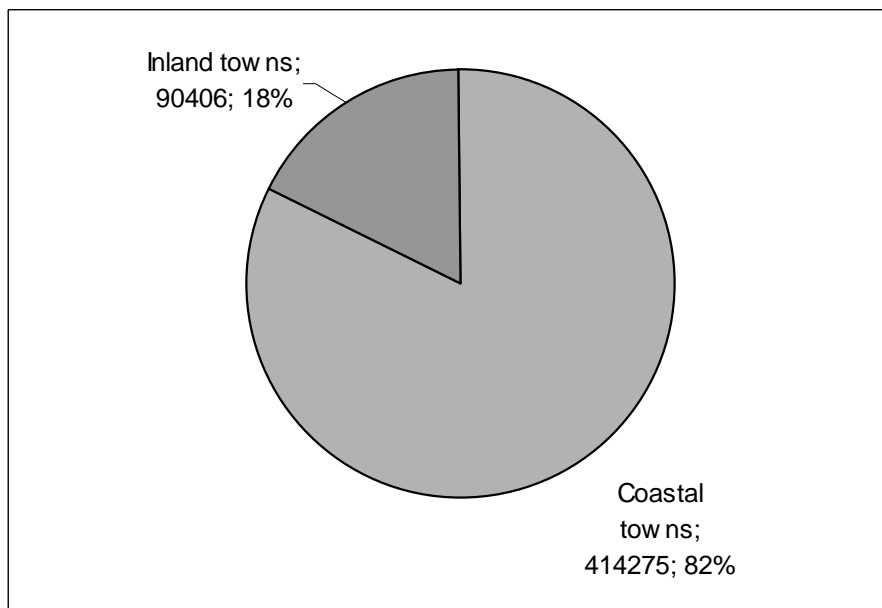


Fig. 7.2.12: Distribution of urban population of Constanța County (2003) (Number; %)

7.2.5 Waste (solid waste collection/disposal system)

The wastes produced in Constanța County are classified in the EPAC Report on the State of Environmental factors in Constanța County for 2004 in:

- urban wastes and similar wastes from commerce, industry and institutions;
- production wastes, further separated in dangerous and non-dangerous wastes;
- wastes generated by medical activities;
- muds from waste-waters processing and industry generated.

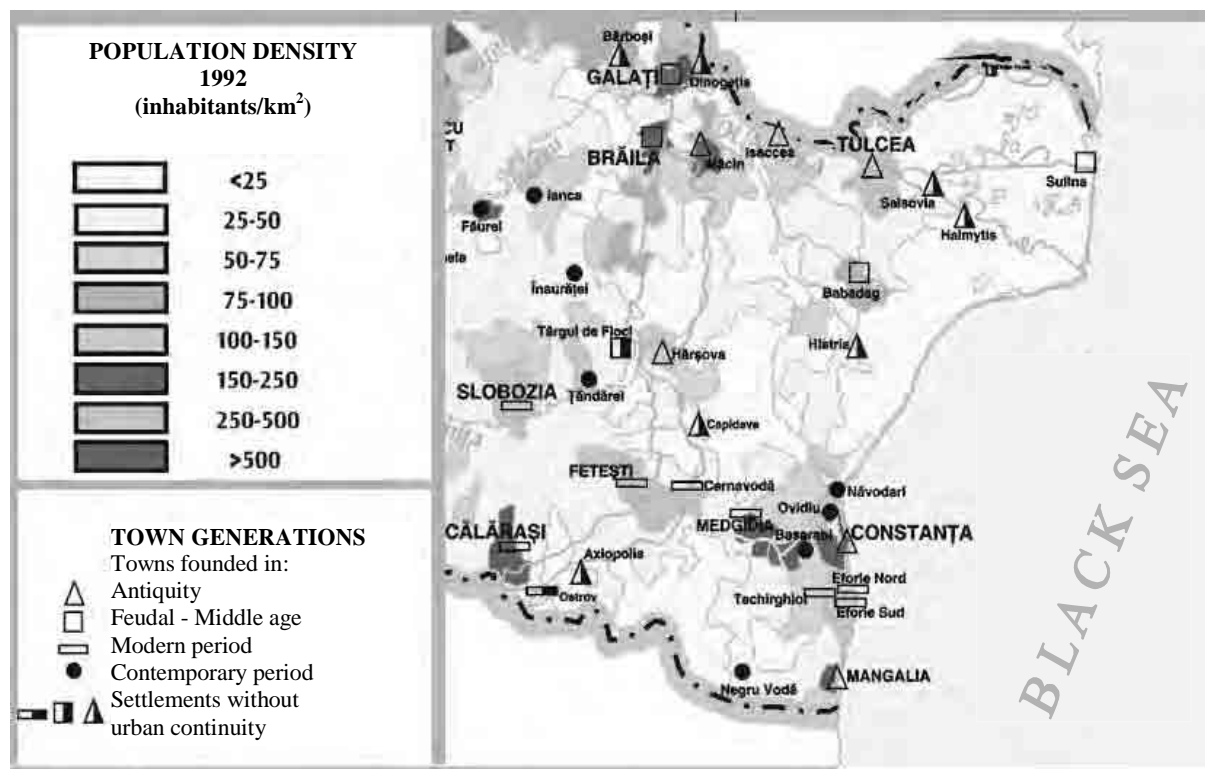


Fig. 7.2.13: Population density in Dobruja (1992 data)

The total quantity of urban wastes and similar wastes from commerce, industry and institutions and muds from waste-waters processing produced in 2004 arises to about 400000 tons, increasing in 2005 to 525321 tons (Table 7.2.11).

A part of the recyclable wastes, including paper/cardboard, plastics, metals etc., are collected and capitalized by several economical agents from Constanța County. The total quantity of wastes capitalized in 2004 was 33324.89 tons, out of which 30,553.7 tons were represented by metals. In 2005 a total of 10218.5 recyclable wastes (excluding metals) were collected, 9209.9 tons being capitalized.

Beginning from 2005 a sorting installation for recyclable wastes from domestic wastes, with a sorting capacity of 9 tons/hour is functioning in Constanța County. No such installations were in use before this date.

The non-capitalized wastes are stored in waste dumps which will be presented later.

The quantity of industrial wastes produced in the Constanța County amounted to 144,932.56 tons in 2004 and 162496 tons in 2005. The dangerous wastes represented 42,371.86 and respectively 20860 tons, most of them coming from the petrochemical industry; approximately 50% of them were capitalized in 2004, the percentage of capitalization increasing to 76% in 2005. The non-dangerous industrial wastes (102,560.7 tons – 2004 and 141636 tons – 2005) were represented mostly by metallic and wood wastes, about 50% being capitalized.

The quantity of municipal wastes generated each year increased steadily in the last years, both *per capita* and as total quantity and the increase is likely to continue. EPAC estimates a 1.5%

yearly increase of the *per capita* generated wastes over the next eight years (EPAC, 2005). At the same time the collection index remained quite stable over the last six years (0.963-0.968); the quantity of collected wastes increased at the same rate with the generated wastes but the quantity of uncollected wastes increased at the same rate, too.

Table 7.2.13: Urban and similar wastes from commerce, industry and institutions and muds from waste-waters produced in 2004 and 2005 (EPAC 2004, 2005⁽¹⁾)

Crt. No.	Waste type	Quantity, tons	
		2004	2005
1.	Urban wastes and similar wastes from commerce, industry and institutions	365472.83	394948
1.1.	Mixed domestic wastes collected from the population	250957.3	251349
1.2.	Mixed similar wastes collected from commerce, industry and institutions	63055.28	56524
1.3.	Urban and similar wastes collected individually (exclusive wastes from constructions and demolitions)	5125.2	2133
	– paper and cardboard	3078.5	
	– glass	–	
	– plastic	1096.9	
	– metal	946.8	
	– wood	3	
	– biodegradable	–	
1.4.	Wastes from public services	29162.85	6559
1.5.	Others	–	64560
1.6.	Not collected wastes	12047	13823
2.	Muds from urban waste-waters processing units	8865.85	14511
3.	Wastes from constructions and demolitions, out of which	21094	12131
3.1.	Inert wastes	–	
3.2.	Mixed wastes	21094	
Total generated wastes		395432.68	421590

(¹ – Due to errors in the calculations some data from 2005 were modified)

Beginning from May 2004 most of the wastes generated by the medical units of the County are incinerated by SC ECO FIRE SISTEMES SRL Constanța, the quantity incinerated up to the end of the year being 34 tons. In 2005 from the total of 158 tons of wastes generated by the big medical units 80% were burned in the authorized incinerator, 20% being incinerated in their own crematories.

Besides the muds from the municipal waste-waters treatment units, a quantity of 12,117.4 tons of muds in 2004 and 243.5 tons in 2005 were produced by the industry, notably food industry and oil refinery.

The non-capitalized wastes are stored in wastes dumps. Out of the 10 municipal dumps existing in the Constanța County only two are ecological. One of them is situated in the middle of the area of interest for the project – the ecological dump for domestic and industrial wastes from Costinești, operated by SC TRACON SRL. The dump provide services for 53,000 inhabitants from Costinești, Amzacea, Agigea, Cumpăna, Eforie, Techirghiol, Tuzla, Topraisar; 70,000 – 100,000 tourists are seasonally added to the number of the serviced people.

The wastes from Constanța municipality are stored in the other ecological waste dump, situated at Ovidiu and operated by SC TRACON SRL. The waste dump from Mangalia, situated at app. 500 m from the Mangalia Lake is partly modernized.

The only other waste dump situated in the interest area is the waste platform from South Eforie, situated on the shore of the Tuzla pool. The platform serves app. 16,000 people and will be closed in 2006.

Also of interest for the area are the dump for muds from domestic and industrial waste-water purification stations RAJA Constanța, with 3,190 tons of mud stored and the mud dump belonging to SC ROMPETROL RAFIANRE SA situated on a location crossed by the past natural waterway of Năvodari and Corbu lakes discharging into the sea, with a surface of 2.47 ha, which will be closed in 2006.

Besides these municipal dumps, 8 industrial dumps belonging to economic agents were catalogued in 2004, only 4 still functioning in 2005.

7.2.6 Traffic and Social Infrastructures

For transport, in the county of Constanța, networks of railways, roads, rivers, maritime and air transport have been established. The railway network is 392 km long, out of which 129 km electrified double-track railway. The public roads totalize about 2,300 km, out of which 510 km are brought up to date and 847 km with light asphaltic lining. The river transport is carried out on the Danube between the ports Ostrov-Cernavoda and Harsova and on the Danube-Black Sea Canal which, through the waterway Danube-Main-Rhine, communicates with the North Sea.

Table 7.2.14: Public Roads as of 31st December 2003

CONSTANȚA COUNTY	km
Public Roads - total	2,307
Out of which:	
– Modernized	506
– With light asphalt road covers	896
From the total public roads:	
National Roads	465
Out of which:	
– Modernized	440
– With light asphalt road covers	25
County and communal roads	1, 842
Out of which:	
– Modernized	66
– With light asphalt road covers	871
Density of public roads per 100 Km² of territory	32.6

Within the transport system of the county, the most important role is played by the maritime transport relying on the ports of Constanța, Mangalia and Midia. The main parameters of the port Constanța are: 3,222 hectares; sea walls 18 km; depth between 7 and 22.5 m; transport capacity 237 million tons per annum. The port of Constanța has enormous possibilities of taking over the traffic of goods in transit, advantage to which the facilities offered by the Danube-Black Sea Canal are added. The Rhine- Main- Danube Canal created a real waterway of European navigation, the port of Constanța being its south - eastern extremity. The navigable distance Rotterdam - Constanța is reduced by about 3,000 km.

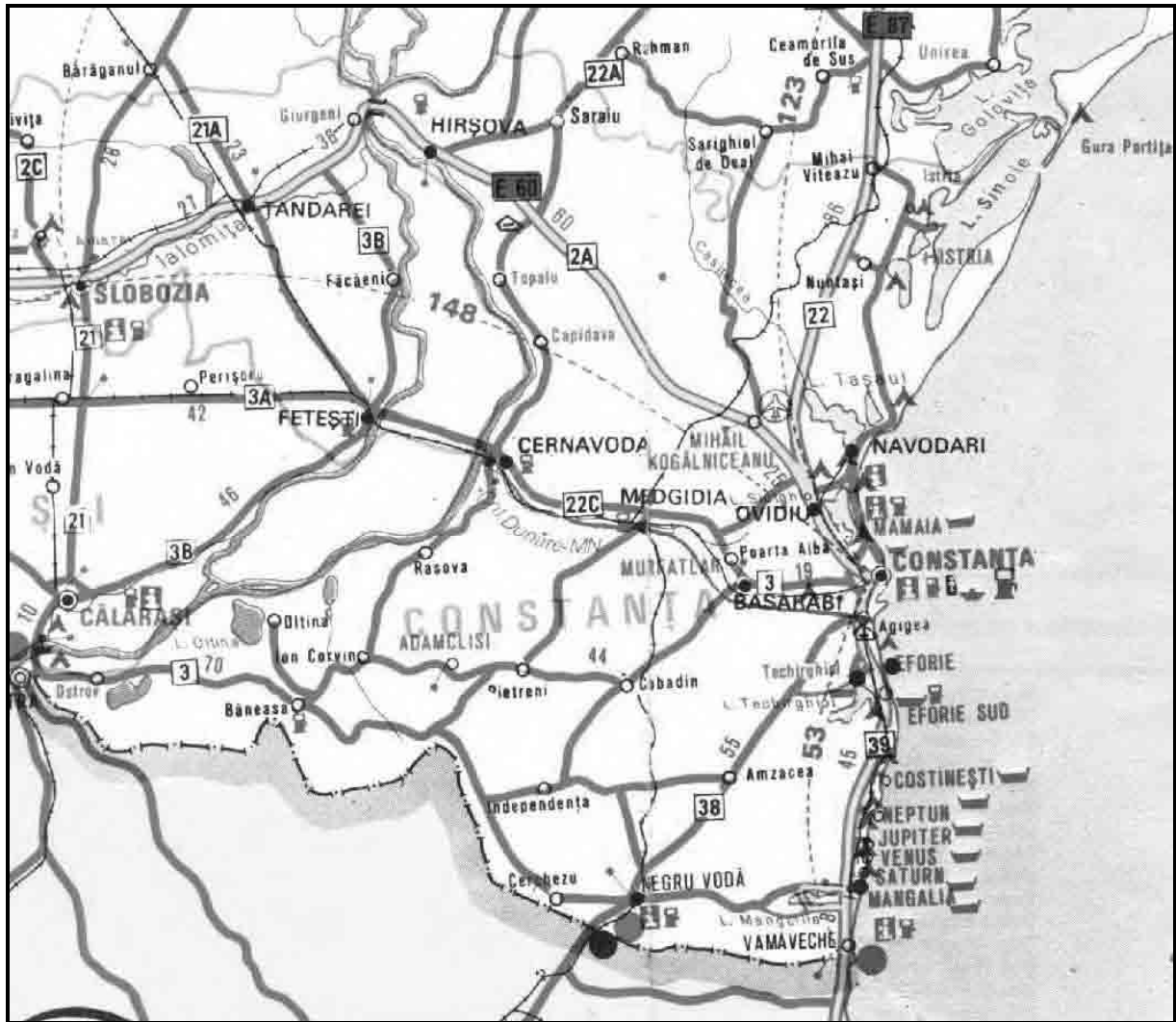


Fig. 7.2.14: Roads map of Constanța County
(http://www.ici.ro/romania/images/turism/r_constanta.jpg)

7.2.7 Coastal Fishing

At the Romanian coast, fishing is one of the oldest activities, mentioned in the “*Halieuticon*” a poem written by the Roman Poet Ovidius, exiled from Rome at Tomis (Constanța). This activity is developed mostly in the Northern half of the Romanian shore where the sturgeon and Danube shad fisheries are concentrated; in the Southern part artisanal fishing is prevalent thanks to goby fish populations living on the hard rocky bottoms. Local population practice

goby fishing in the shallow waters, usually under 10 m depths, using row boats and, sometime, directly from the shore sitting on the seawalls.

According to data published by FAO the main characteristic of the Romanian fishery sector are as listed in Table 7.2.15. Fishing rights might have been respected by custom, although they are not guaranteed by law. Stationary fishing exists, using passive gears in thirty fishery locations along the littoral between Sulina and Vama Veche, in the coastal waters of 5 to 10 m depth.

Table 7.2.15: The main characteristics of the Romanian fishery sector

No	Feature	1989	1999
1	Country area (thousand km ²)	237.5	237.5
2	Sea area up to 200 m depth (thousand km ²)	32.04	32.04
3	Length of coast line (km)	245.12	245.12
4	Population (millions)	23.21	22.86
5	Fish capture (thousand tonnes)	267.63	16.94
6	Fish intended for domestic market (thousand tonnes)	168.7	16.42
7	Import of fish and fish products (thousand tonnes)	0.18	70.27
8	Export of fish and fish products (thousand tonnes)	27.24	1.62
9	Fish consumption (kg/capita) [1]	7.23	2.11
10	Meat consumption (kg/capita)	35.44	47.27
11	Fish consumption as compared to meat consumption (%)	20.4	4.46
12	Ratio between the added value in the fishery sector and the Gross Domestic Product (%)	0.12	0.001
13	Staff employed in the fishery sector	14 304	24 250
	Open sea fishery	4 618	140 [2]
	– Marine fishery	846	511
	– Inland waters fishing	915	10 646
	– Aquaculture	3 015	1 602
	– Fish processing	1 642	3 595 [3]
	– Retail and wholesale trade	865	5 360 [4]
	– Related services	2 403	2 396 [5]

[1] The fish consumption calculated according to the FAO methodology (the weight of fish and other water organisms captured, the processed products transformed into live weight + imports - exports).

[2] On shore employees.

[3] Approximately 85% of them are processing imported raw material.

[4] Importers regularly or partly involved in fish and fish products trading.

[5] Boats and vessels refurbishment, design and manufacture of fishing gears, production of fish processing equipment, installation and facilities, ice plants, packaging, storing, and scientific research.

Between 1960 – 1970 there were 26 fish species of commercial interest at the Romanian coast (*Squalus acanthias*, *Raya clavata*, *Dasyatis pastinaca*, *Acipenser stellatus ponticus*, *Huso huso*, *Acipenser guldenstadti colchicus*, *Sprattus sprattus phalericus*, *Alosa kessleri pontica*, *Engraulis encrasicolus ponticus*, *Belone belone euxini*, *Odontogadus merlangus euxinus*, *Mugil cephalus*, *Mugil auratus*, *Mugil saliens*, *Atherina mochon pontica*, *Pomatomus saltatrix*, *Trachurus mediterraneus ponticus*, *Mullus barbatus ponticus*, *Sarda sarda*, *Scomber scombrus*, *Gobius batrachocephalus*, *Gobius melanostomus*, *Gobius cephalarges*, *Gobius fluviatilis*, *Psetta maeotica*, *Platichthys flesus luscus*), having catches of tens or hundreds thousand tons. After 1980, only 5 species are more important (*Sprattus sprattus phalericus*, *Alosa kessleri pontica*, *Engraulis*

encrasicholus ponticus, *Odontogadus merlangus euxinus* *Trachurus mediterraneus ponticus*). At the end of '70s the fishing collapsed for some sensible species (*Scomber scobrus*, *Sarda sarda*, *Pomatomus saltator*), as well as for *Thunnus thynnus* and *Xiphias gladius*. Demersal fishes, affected by chronic phenomena of hypoxia and anoxia at the benthic level, appeared in catches with drastic reduced productions (turbot landings for example, dropped from 334 tons in the '60s, to 172 tons in the '70s and to only 12 tons in the '80s at the Bulgarian coast).

In the decade of 1989 – 1999 Romanian fish production diminished by 16 times. The most recent data we have referring to Romanian coastal fisheries are from 2004. On the basis of this data some general aspects characterize in a sufficient measure the state of Black Sea fisheries from Romania:

- Main fishing effort is represented by 41 giant pound nets (net traps installed in near shore waters), 16 beach nets (catching by surrounding the fish shoals), 3143 long lines (hooks endowed), 230 gill nets and 9 vessels – operational coastal fishing trawls.
- The total fish catches volume in 2004 was 1,831 tons, out of which 481 (~ 25%) tons resulted from the fishing with stationary tools and 1,350 tons from the active fishing; this volume is with 19.9% higher than those realized in 2003, but is with 13.4% smaller than in 2002 and with 26% smaller than in 2001 and 2000.
- Total admissible captures (TAC) for the main commercial species is maintained at the level of the years 2000 – 2003, that is 10,000 tons for sprat, 2,000 tons for anchovy, 100 tons for horse mackerel, goby fish and *Atherina*, 50 tons for Danube shad; only the TAC for turbot and spiny dogfish suffered a reduction to the 50 tons.
- Natural mortality is at normal level, being 0.475 for sprat, 0.961 for anchovy and 0.610 for horse mackerel.
- Indicators of impact for fish population in 2004 were as follows:
 - 92% species have the stocks out of security limits; this is a stationary situation demonstrating that the fish resource requires an international management;
 - 24% from the catches are complementary species in the Romanian sea fishery; this value is similar with those of the last years;
 - Generally, there are no changes in the size class structure (age, length) of the majority of species found in catches in the last years; a slight increase of greater classes of size could be a sign of some reduction of fishing pressure.

Actual ecological state of the main commercial fishes from the Romanian sector of the Black Sea differs from one species to another:

- Clear tendency of recovery for anchovy;
- Slight betterment for the stocks of *Pomatomus* (bluefish), *Mugil* (mullet) and *Trachurus* (horse mackerel);
- Almost normal natural fluctuations and a relatively good stock of sprat;
- Goby fish populations, being very prolific and having a rich supply of food represented by epibiotic organisms attached to hard substrate, including the seawalls, are in prosperous ecological state, representing an important source of subsistence for local population.

Top predators such as dolphins have seriously declined in abundance. Predatory fish, including mackerel, blue fish and bonito which used to seasonally enter from the Sea of Marmara (also subject to heavy pollution and fishing), now rarely penetrate into the waters to

the north and west of the Black Sea. Stocks of these species can be considered depleted, although (as for a number of other stocks) not necessarily by fishing alone.

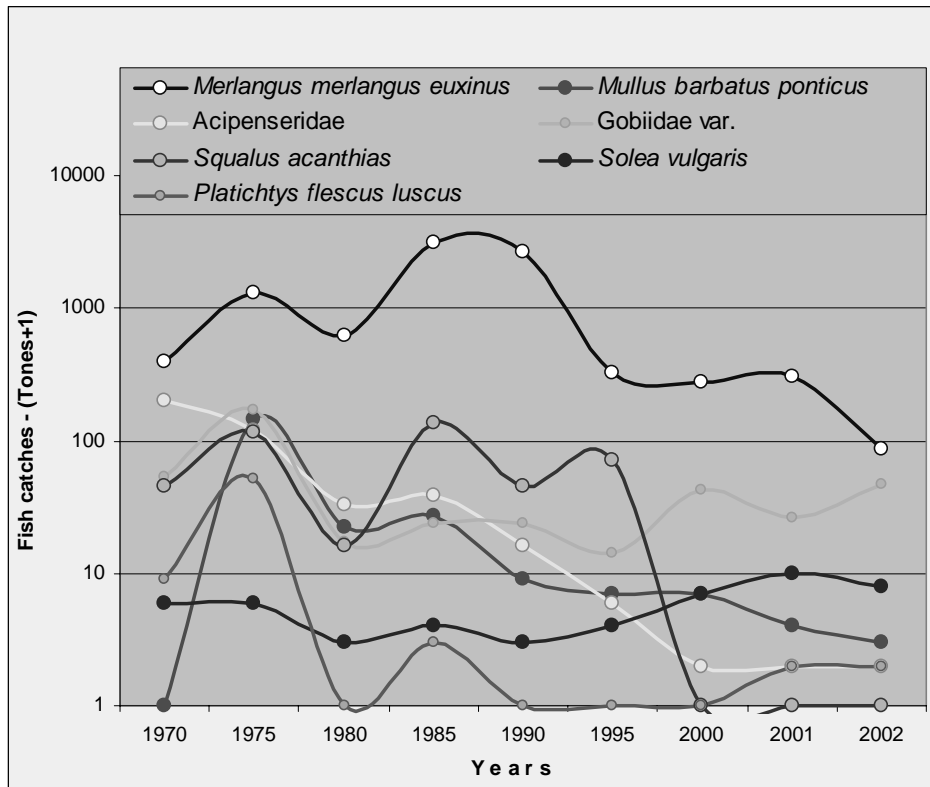


Fig. 7.2.15: Fish species catches dynamics at the Romanian Black Sea Coast

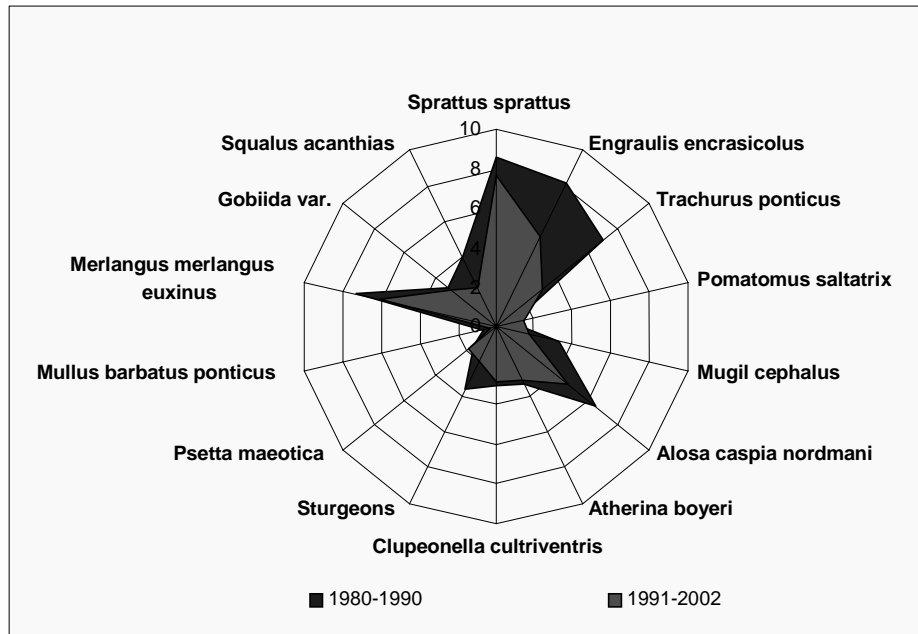


Fig. 7.2.16: Multiannual catches [tons - (Ln N+1)] of main fish at the Romanian Black Sea Coast (redrawn after Radu et al., 2004)

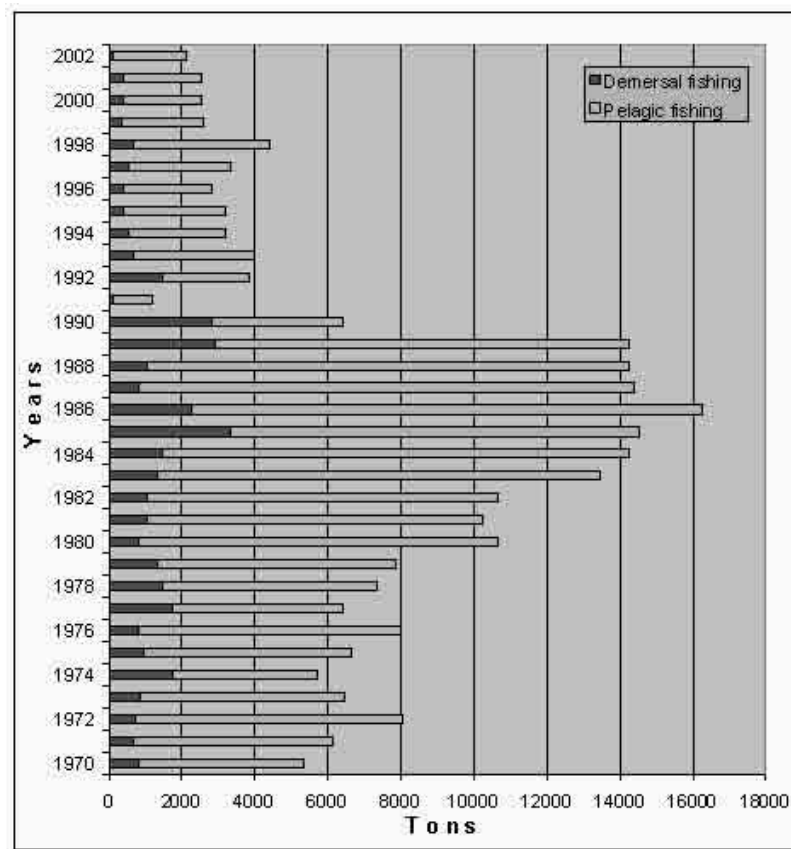


Fig. 7.2.17: Dynamics of fishing catches in the Romanian Black Sea Waters during the period of 1970 - 2002

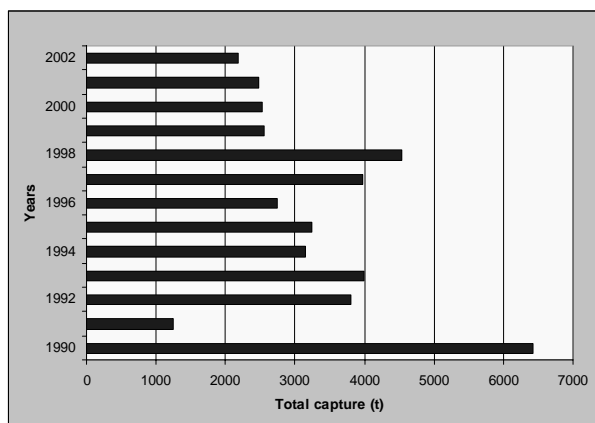


Fig. 7.1.18: Total capture (tons) realized in Romanian zone of the Black Sea, in 1990-2002

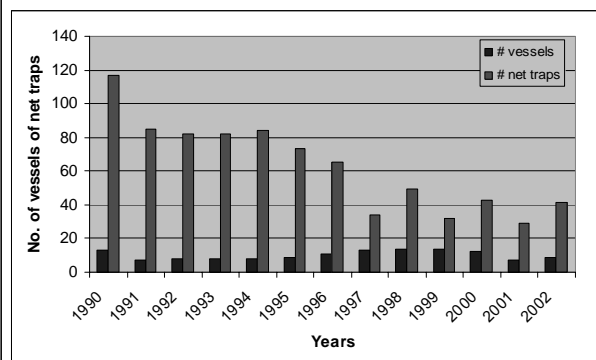


Fig. 7.1.19: Evolution of fishing effort at the Romanian Black Sea Coast

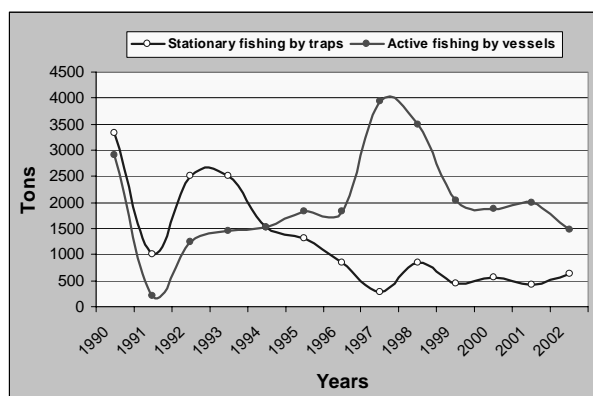


Fig. 7.2.20: Dynamics of total fish catches at the Romanian Coast of the Black Sea

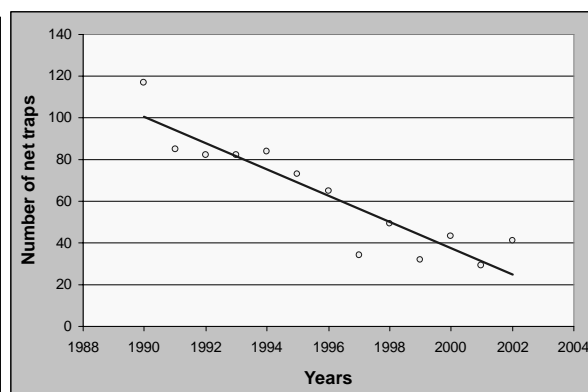


Fig. 7.2.21: Fishing effort for the stationary catches at the Romanian Black Sea Coast between 1990-2002

7.2.8 Architectural and Archeological Heritage

(1) General features of Constanța County

- ❑ Geographical situation: it is situated in the south-eastern part of Romania, between the Danube and the Black Sea, in the south of Dobrogea;
- ❑ Neighbours: in the east-the Black Sea; in the west-Ialomîța; in the north-Brăila, Tulcea; in the south- Bulgaria;
 - ❑ Surface: 7,071 square km;
 - ❑ Population: 746,000 inhabitants;
 - ❑ Towns: CONSTANTA – capital of the county (with 348,000 inhabitants, big harbour of the country, industrial, trade, cultural and university centre, spa and famous archaeological point); Basarabi; Cernavodă; Eforie; Hârșova; Mangalia; Năvodari; Negru Vodă; Ovidiu; Techirghiol. relief: the structure is that of a plateau (100-200 m in height), belonging to the Southern Dobrogea Plateau and to the Central Dobrogea Plateau (the Casimcea Plateau), decreasing from south to north, towards the Carasu Valley and from the Danube to the Black Sea's shore;
 - ❑ Climate: it is continental with excessive influences – very hot and dry summers, cold winters, north-eastern strong winds, the rainfalls are rare and not uniformly distributed;
 - ❑ Watercourses: with short rivers which get drained during the hot season, the most important ones are located in the north: Casimcea, Carasul, or short hydrographic networks flowing towards the Danube (Topolog), or towards the lakes along the Black Sea's shore (Casimcea). On the Carasu valley, the Danube-Black Sea Chanell was dug over a distance of pe 64. 2 km.

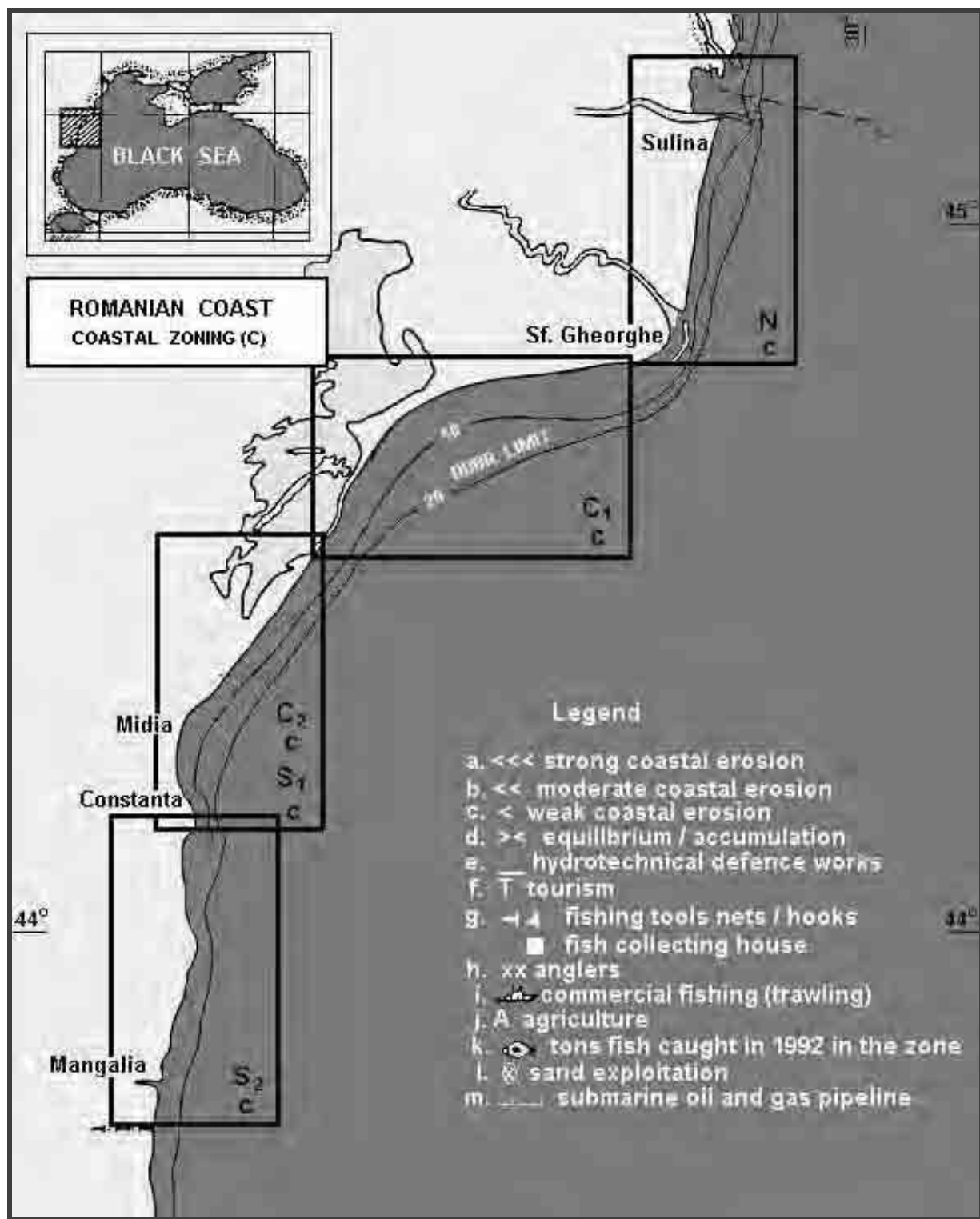


Fig.7.2.22: Ecological zoning of the Romanian coastal area of the Black Sea – general view and legend (Gomoiu, 1997)

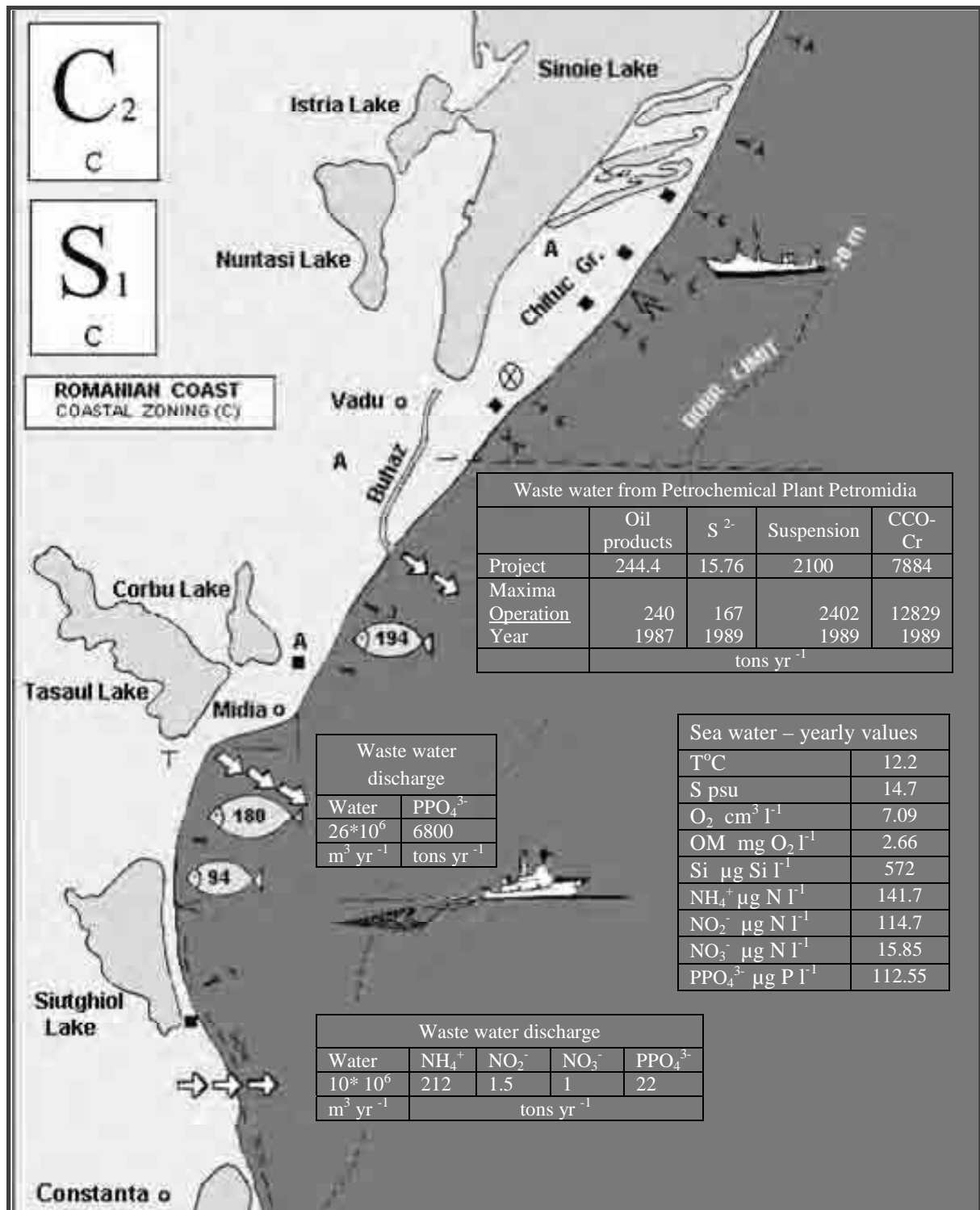


Fig. 7.2.23: Ecological zoning of the Romanian coastal area of the Black Sea – C_{2c}, S_{1c} Zones (Gomoiu, 1997).

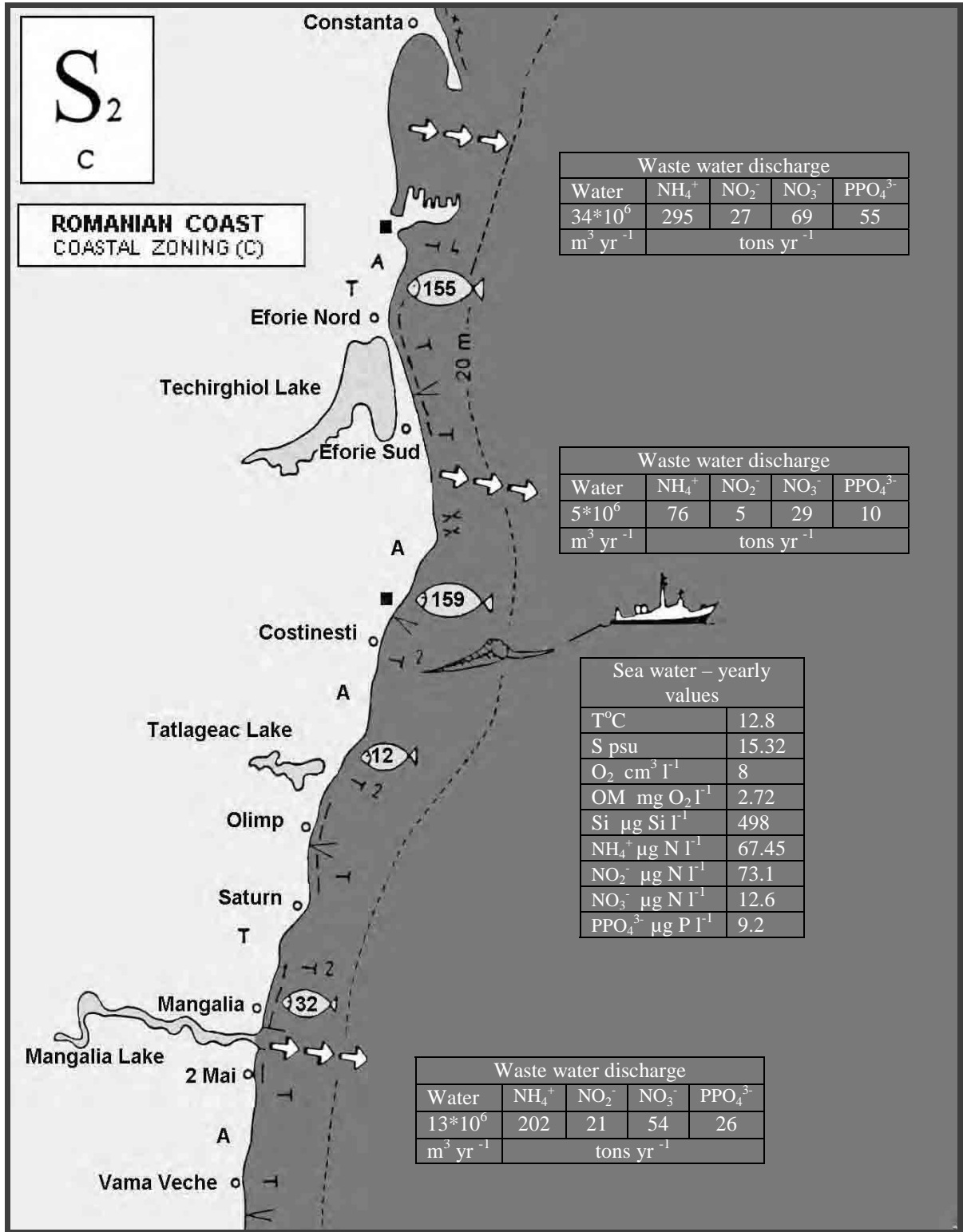


Fig. 7.2.24: Ecological zoning of the Romanian coastal area of the Black Sea – S₂c Zone (Gomoiu, 1997)



Fig. 7.2.25: Map of Constanța County

(2) Touristic sites¹

(a) Romanian seaside

Black Sea's beach, “a promise land”, stretches in Constanta county on a surface of more than 100 km (out of a total of 244 km representing the Romanian border with the Black Sea). The wonderful Romanian seacoast benefits of the special charm given by the Black Sea (the third European sea in terms of surface, and the second one in what concerns the depth, with reduced salinity of 17-18‰ at the shore and the water temperature of 20-25°C). There are no streams, dangerous plants or animals in the Black Sea's waters. The sea platform decreases smoothly from the coast (on a strip of 100-200 m) towards the open sea (the water is not very deep, 1-2 m), thus eliminating all the risk factors. The climate is mild, summer days are long and warm, sun shines in July 10-12 hours a day, and the average temperature is of 24°C, and 11°C (the annual average temperature). During the hot season the temperature on the beach goes up to 45°C, but the sea breezes rich in aerosols diminish the scorching heat. The seacoast is covered with very fine sand. Many romantics like to admire the beautiful sunlights.

From Mamaia till Mangalia, only one city seems to be stretching, a complex resort. Along the seaside one can choose a resort according to his wishes: Năvodari, Mamaia, Constanta, Eforie Nord, Eforie Sud, Costinești, Techirghiol, Olimp, Neptun, Jupiter, Cap Aurora, Venus, Saturn,

¹ Pictures of several archeological and touristic sites are shown in the photo gallery in Annex G.1.3.

Mangalia, 2 Mai. Constanța county is the first in Romania in what regards the accommodation facilities, more than 150,000 rooms (about 45% of the total number in Romania). The county also concentrates about 60% of the international touristic rush in the country. The specific feature of this picturesque universe is given by various factors (a very pleasant environment, the elegance of the hotels, many possibilities for spending the time, natural healing factors). This region is a real oasis of relaxation and health.

(b) Lakes

- **Techirghiol** – it is the richest lake with therapeutic mud in Romania. The mud is composed of organical elements mixed with mineral substances and represents the main element used in the treatment of various diseases, making the spa a very demanded one. Techirghiol is also the greatest salt lake in our country (11.7 square km). This river-sea lake (once a sea-gulf) is nowadays a faunistic preserve (more than 124 species of birds live here, many of them rare ones). The lake is also a leisure centre, offering boats and motor boats;
- **Bugeac**-river liman, important fishing centre on the right bank of the Danube;
- **Oltina**-river liman, important fishing centre on the right bank of the Danube;
- **Corbu**-sea-river liman, nautical sports can be practised, very important due to its therapeutic mud;
- **Tascau**-sea-river liman, nautical sports can be practised, very important due to its therapeutic mud;
- **Tatlageac**-sea-river liman, nautical sports can be practised, very important due to its therapeutic mud;
- **Sinoe**-sea lagoon, former sea gulfs, today important for fishing;
- **Siutghiol**-sea lagoon, former sea gulfs, today important for fishing.

(c) Caves

The Caves of Gura Dobrogei – complex preserve (spelaeological, paleontological, geological, faunistic) situated near the villages of Limanu and Targusor, made up of three caves (Limanu, Liliecilor and La Adam, famous due to its Quaternary fauna) hosting colonies of bats.

(d) Preserves and mountains of nature

- Seacost Dunes – Agigea, (8 km south of Constanța), natural preserves of sea dunes represented by a plateau of 8-10 m formed by the continuous deposition of sand. Floristic preserve hosting about 120 species of plants peculiar to the Romanian Black Sea coast;
- The Hagieni Forest – forest preserve between Hagieni and Albesti, it is famous due to its beautiful landscape and to the flora and fauna curiosities – the huge turtle, many species of spiders. It is an attraction point for visitors.

(3) Historical vestiges

(a) General

- Tomis Fortress – Constanta (first half of the 6th century B.C.), the Greek colonists from Milet founded the harbour-town of Tomis. Many vestiges of the ancient town

can be seen today: “Butchers’ Tower” rebuilt during the times of Iustinianus, the roman perimeter wall from the 3rd century A.D., large ancient pottery, exhibited in a beautiful archaeological park;

- Roman Building with Mosaic – Constanta, unique monument this side of Europe, realized in the 3rd-4th centuries A.D. The mosaic, on the terrace of a Roman trade building has an impressive size of 2,000 square m. The harmony of the colours, rendered more delicate by passing of the time, the beauty of the geometric and floral motifs delight the visitors;
- Callatis Fortress – Mangalia, colony founded by the Dorians arrived from Pontic Heracleea in the 6th century B.C.; it developed in the 4th-3rd centuries B.C. Vestiges of exceptional scientific and touristic interest were discovered here (a thesaurus, graves, Roman aqueducts). Here it was preserved the oldest document in Latin in the Southeastern Europe (an inscription dated 72 B.C.);
- Capidava Fortress – Dacian settlement from the 1st century B.C.-1st century A.D., then Roman camp reinforced by the Emperor Trajan;
- Genovese Lighthouse – Constanța, it was built between 1858-1860 by an English company;
- “Hunchiar” Mosque – Constanța (in Moor style 1867-1868).

(b) Religious building

- Mosque – Constanța, it was built in 1910, in Moor style in the place of the old mosque from 1822. It is an exact copy of the great Konia mosque from Anatolia (Turkey). It has beautiful inner wall paintings. The minaretul (50 m in height) offers a wonderful landscape of the town and harbour;
- Orthodox Cathedral – Constanța, it was built between 1883-1895, in the style of the old Wallachian architecture, with inner wall paintings made by D. Mircea;
- Metamorfosis Greek Church – Constanța (1865-1867);
- Esmahan Sultan Mosque – Mangalia (1590), in Moor style;
- “Saint George” Orthodox Church – Constanța (1905-1911), with wall paintings made by Nicolae Tonitza.

(b) Cultural building

- Museum of National History and Archaeology – Constanța, one of the richest museums in the country, with collections of prehistorical, Greek, Roman, Bizantine, Medieval archaeology. Among the statues exhibited here, the most famous are that of Fortuna Goddess and Pontos God (protectors of the town), the Glycon snake;
- Museum Complex of Natural Sciences – Constanța, with the Aquarium, Delphinarium, Planetarium and Astronomic Observatory. The aquarium exhibits more than 100 species of fish of the Black Sea and of other season of the world;
- Art Museum – Constanța, with valuable works (painting, sculpture and graphics) belonging to famous artists: Nicolae Grigorescu, Theodor Aman, Ion Andreescu, Theodor Pallady, Corneliu Baba, Dimitrie Paciurea, Ion Tuculescu, Ion Jalea, Vida Gheza;
- Museum of the Sea – Constanța, with a rich collection of sea fauna from the world oceans;

- ❑ Museum of Folk Art-Constanța, Dobrogea ethnographical collection, folk art, pottery, texture, rugs;
- ❑ Navy Museum – history of the Romanian Navy and commercial fleet.

(c) Monuments and statues

- ❑ Ovidiu's Statue – Constanța, the Latin poet Publius Ovidiu Naso was born in 43 B.C. and exiled in Tomis in 8 A.D., where he died after 9 years. It was here that he wrote his "Sad poems" and the "Pontics", although he acknowledged the help and admiration given to him by the natives. The statue was made by the sculptor Ettore Ferrari (1887);
- ❑ Eminescu's Statue – Constanța, it was made by the sculptor Oscar Han in 1930 and placed on the sea shore, as the poet wished in his famous poem "I Have an Only Wish", Paul Anghel said about it: "his face, looking serene over the blue infinity meeting the sky, seems to be the vary face of longing".

(4) Short overview on the early history of Dobrogea

The Black Sea Coast, especially the land laying between the Danube River and the Sea, shelters a rich archeological treasure. It has been archeologically proved that in the Dobrogea, the Paleolithic epoch is 120,000 years old. In the Gura Dobrogea, Cheia and Adam caves, flint blades, spear points, and animal fossil remnants were found which certify this fact. Much better represented is the Neolithic epoch during which matriarchal kindred tribes have given rise to several material cultures, each with its known specific character. The most frequent cultures on the territory between the Lower Danube and the Black Sea would be at *Hamangia*, *Gumelnita* and *Boian*.

The discoveries of some deposits of bronze implements at Calfa, Nastradin, Techirghiol Gura Dobrogei and so on elucidate some historical aspects from the end of the Bronze Age and the beginning of the Iron Age, about which very little had been known so far. In this epoch the signs of the decay of matriarchal tribes, and the passing over to patriarchal tribes are more and more evident. Within the Iron Age, the phenomenon of the transition to a new social order, the slave system, is accentuated. A great contribution in that sense is made by the Greeks who, between the VII and the V centuries B.C., settled down on the Dobrogean shores of the Black Sea and founded the three towns, *Histria*, to the south-west of the Sinoe Lake, *Tomis* - the present Constanta, and *Callatis* - Mangalia.

The Greek colonists carried on intense commercial exchanges, bringing handicraft wares and taking cereals, animals, slaves, and so on from the Thraco-Getic native population. The Greek colonies developed considerably between the fifth and the first centuries B.C. They accumulated riches, which enabled them to build, within the settlement walls, palaces, temples, paved streets, aqueducts, porticoes, harbour installations, and so on. They could, likewise, buy with heavy cash the various barbarian chieftains who were attacking them for plunder.

Towards the end of the old era, however, the Roman danger could no-longer be stemmed; after several unsuccessful attempts, the Romans knew how to benefit from the dissensions among the successors of the Dacian king Burebista, from Dobrogea, and occupied this territory for well over six consecutive centuries. Already from the first years of the new era,

the Latin poet *Publius Ovidius Naso* was exiled to Tomis. Here, he lived between 9 - 17 A.D. and wrote *the Sad* and *the Pontici*, containing valuable information about our ancestors.

The Roman domination of the Dobrogea has left most important traces. After the vast action of organizing their domination, carried out in the first century A.D., at the beginning of the second century they built the great Triumphal Adamclisi Monument, for commemorating their victory over the Dacians, following the 101 – 106 A.D. wars. The evidence of material culture which comes to light throughout Roman Dobrogea – *Lower Moesia* – shows the vast Romanizing and exploitation activity undertaken upon the native population.

As from the middle of the third century A.D. the crises within the empire deepens still further. Social dissatisfactions coupled with attacks by migratory tribes or without them would have led to the liquidation of the Roman domination in the Dobrogea. Thus, the attacks of the Goths in the middle of the III century, of the Huns, in the second half of the fourth century, and particularly those of the Avars at the end of the VI century, shook the very foundations of the Roman-Byzantine authority at the mouths of the Danube. The conquering armies withdrew and the Dobrogea remained free.

The Slavonian tribes, which settled down in that region, have been assimilated by the Rumanian people resulting from the mixture of the Dacian native population and the Romans. Between the IX and the XIX centuries, the Dobrogea passes in turn under the domination of the Pecenegians, Tartars and Turks. The latter ruled over Dobrogea until 1878, when it became again for ever Romanian.

The Constanta-Mangalia itinerary. The starting point of the most important ways of access in the region, Constanța is the oldest town in the country - the ancient Tomis, founded about the beginning of the VI century B.C. Until the III century B.C., it developed in close dependence upon either Histria or Callatis, but, as from the middle of this century, it became the most important center on the western coast of the *Black Sea (Pontus Euxinus)*. During the Roman period it knew a still greater prosperity, a fact proved by the great archaeological discoveries made here in the last decades. We do not know too well its historical evolution during the early feudal epoch. We know, however, that as from the XV century, it became a Turkish village, under the name of Küstendje. It was to develop in the XVIII and XIX centuries.

(5) Archaeological objectives

a) *The archaeological park*, at the intersection of the "Ferdinand Boulevard " with the "Scarlat Varnav Street". Here one may see a large archaeological map of the Dobrogea, as well as numerous elements of Greco-Roman art and architecture. A large portion of the Tomidian enclosure wall, built at the end of the III century A.D., likewise appears.

b) *The Roman edifice with mosaic* on the sea-wall facing the modern harbour, in the Ovidiu place. The edifice had been a large building with 2,000 sq.m. of mosaic, of which about 600 sq.m., have been preserved to this day. The mosaic is remarkable for its colouring and the variety of its ornamental motives. In the substructure there are 11 vaulted rooms, former stores and warehouses. The whole is connected with the commercial life of the ancient harbour.

c) *The archaeological museum of the Dobrogea region*, a true picture of the historical evolution in ancient times of the territory between the Lower Danube and the Black Sea. In

the courtyard there are numerous sarcophagi and funeral monuments, various architectural fragments and particularly, alongside the museums building, scores of inscription in Greek or Latin. The visit of the museum represents a real lesson on the high cultural potential of the coastal zone, partially recovered and exhibited on the museum, partially which is still borrowed in the sediments bordering the sea, waiting the moment to be discovered.

After stopping a short while in front of the map, where historical explanations are given, the visit of the museum is continued with the rooms containing exhibits ranged according to epochs, the Paleolithic, Neolithic and the Greco-Roman slavery ones, each with several compartments, agriculture, commerce, transports, constructions, art and so on.

The variety of capitals, the ornaments in the treasure room, the component elements of the 24 sculptural monuments—which were discovered in the '60s - and among which the most notable are the Fortuna-Pontos group, the fantastic snake, aedicula, and so on., they all retain one's attention.

After the handicraft sector illustrated with glass vases, Tanagra statuettes, bronze coins, vases, one penetrates into the "*Ovidius*" room, dedicated to the memory of the great poet.

The visit at the museum ends with the early feudalism room, in which ceramic pottery from *Castelu* and *Capidava* are exhibited and especially noteworthy are the copies of wall drawings and inscriptions from the Murfatlar settlement.

Along the road leading from Constanța to Mangalia, the *Stratonis* Greco-Roman call center, near the Tuzla lighthouse, the Greek harbor *Parthenopolis*, near the Libertatea village and the *Callatis* stronghold, over which lays now Mangalia, are all worth knowing. The stronghold was founded by the Greeks at the beginning of the V century B.C., it subsequently developed considerably, mainly by the commerce with grain.

In 312 B.C. it led the anti-Macedonian revolt of the western Pontic colonies. The same historical circumstances, which characterize the entire region, occurred during the Roman domination. On several occasions it was likewise demolished and rebuilt anew. During the feudal period it became a Turkish townlet, and its toponymic modification took place, passing through the forms of *Pancala* or *Pangala*, coming to be known, in the XVIII century under the name of *Mangalia*.

Ancient monuments: The Tomb with papyrus — now restored, near the highway from Constanta to the seashore. To the south of the tomb, a portion of the enclosure wall and the remains of a V—VI centuries Roman-Byzantine construction may be seen; likewise the archaeological museum where valuable items are lodged : ceramic potteries, earthen or stone statuettes, capitals (see the capital with ram heads), friezes, bas-reliefs, and so on.

Likewise within the Mangalia town, there is the well-known Hellenistic tomb near the 2 *Mai* village, and the vaulted tomb. An important architectural monument of Mangalia is the *Emahan Sultan* mosque, dating from the XVIII century (now restored).

7.3 Initial Environmental Examination of Coastal Protection Plan

7.3.1 Overview of Projects under Coastal Protection Plan

(1) Sectors to be implemented with coastal protection and rehabilitation works

The overall plan for protection and rehabilitation of the Southern Romanian Black Sea shore has been described in Chapter 5. The study area extending from Cape Midia to Vama Veche has been divided into seven sectors and twenty sub-sectors as listed in Table 5.2.1 and shown in Figure 5.2.1. Coastal protection and rehabilitation projects are contemplated for not the all sectors but the selected ten sub-sectors as listed in Table 7.3.1. The Sectors of Tuzla, Costinești, 23 August, and Limanu are not provided with coastal protection and rehabilitation works. The reasons for no implementation are several; the threat of beach erosion is not so acute, the benefit of the project there does not seem large enough, or the ecological value is too high to be impaired by project implementation. Please refer to Figures 5.6.2 and 5.6.4 and Table 5.8.2 for the timing of project implementation.

Table 7.3.1: List of sub-sectors with plans of coastal protection and rehabilitation projects

Sector	Sub-sector No.	Sub-sector name	Implementation phase	Implementation Period	Remarks
I. Constanța	I-3	Mamaia North	I – 1	1st – 4th years	
	I-4	Mamaia Center	I – 1 to I – 3	1st – 4th years	
	I-5	Mamaia South	I – 1	1st – 4th years	
	I-6	Tomis North	I – 2	5th – 10th years	
	I-6'	Tomis Center	I – 3	11st – 14th years	Part of I-6 & I-7
	I-7	Tomis South	II	After 15th year	Southern part of I-7
II. Eforie	II-1	Eforie Nord	I – 1 & I – 3	1st – 4th years	
	II-2	Eforie Middle	I – 2	5th – 10th years	
	II-3	Eforie Sud	I – 3 & II	11st – 14th years	
VI. Mangalia	VI-1	Olimp – Venus	II	After 15th year	
	VI-3	Saturn – Mangalia	II	After 15th year	

Note: Project implementation is separated in the first stage (1st to 14th years) and the second stage (after 15th year), and the first stage is divided into three phases.

(2) Areas where coastal protection works are executed

The proposed plan of coastal protection and rehabilitation is to replace some of existing shore protection facilities such as groins and breakwaters, to extend new jetties into the sea, to build submerged breakwaters, and to increase the beach area by placing a certain volume of sand on beach and in the sea. Coastal protection and rehabilitation works are executed in the water area from the shore to the depth of up to 5 m. The alongshore distance of one project varies from one to several kilometers, depending on the project site. The cross-shore distance is less than 400 m from the shore.

No land area will be touched upon, except for a restricted area of construction yard and roads for transport of construction materials by dump trucks and others.

(3) Types of construction works

Facilities to be installed in the coastal protection and rehabilitation works are listed below.

- 1) Jetties and groins to be extended offshore from the shore;
- 2) Rehabilitation of deteriorated old groins;
- 3) Rehabilitation of offshore breakwaters in Mamaia;
- 4) Submerged wide-crested breakwaters;
- 5) Beach fill

The construction of the first category is carried out from the land side by employing various equipments such as backhoes and crawler cranes. A jetty is a long solid structure and a groin refers to a short one, although the difference is somewhat subjective. First, rubble stones of various sizes are placed in the water until they emerge above the water so that a longitudinal mound of rubble stones is built into the sea. Then construction equipments move on top of the mound and extend it gradually with supply of further rubble stones. The side slopes of the rubble mound are protected with large stones or concrete blocks that weigh several tons. The crown of jetties and groins are paved with a thick concrete slab to provide a walkway for people enjoying the sea and fishing.

Rehabilitation of deteriorated old groins is carried out in a similar manner. The majority of the existing groins and other structures are planned to be demolished and removed for the sake of safety of people enjoying new wide beaches and enhancing water circulation to mitigate water pollution. The materials of demolished structures will be recycled as the core materials of new facilities.

Rehabilitation of deteriorated offshore breakwaters in Mamaia and construction of new submerged breakwaters are executed by working vessels such as crane barges, backhoes on barges, hopper barges etc. Rubble stones and concrete blocks are loaded in hopper barges at a certain quay and transported to the offshore construction site by tugboats. They are heaped up on the seabed up to the designated elevation into a specified shape of mound, which is protected by large concrete blocks against wave actions.

Beach fill is carried out by bringing sand from the outside and place it on the beach and in the sea. The source of beach fill sand is presently considered either the riverbed of the Danube or the seabed at the eastern offshore of Midia Port. A possibility remains of using the sand from maintenance dredging off the entrance of the Sulina Channel. When the river sand is used, it will be dredged by crane barges, transported by hopper barges via the Danube – Black Sea Canal and unloaded at some quays around Constanța. Then it will be carried by dump trucks to the beach to be nourished, unloaded on the beach, and pushed into the sea by bulldozers.

When the sea sand is used, it will be dredged by some trailing hopper suction dredge such as the Dunărea of the River Administration of the Lower Danube, Galati. She will store sand in her hopper and navigate from Midia Port to the offshore of beach fill site. Then she will eject sand to the beach through floating pipelines activated by her pumps.

(4) Volume of expected construction materials

The major components of construction materials are sand, stones, concrete blocks, and fresh concrete. Table 7.3.2 lists the approximate volumes of annually expected construction materials: the volumes are calculated as the simple average over the project period.

Table 7.3.2: Average volumes of construction materials per year

Stage	Phase	Period	Stone (m ³)	Stabilopod (piece)	Fresh concrete (m ³)	Concrete blocks (piece)	Beach fill sand (m ³)
First	First	4 years	45,000	4,700	650	1,400	166,000
	Second	5 years	25,000	4,600	220	1,300	182,000
	Third	5 years	34,000	8,900	160	1,300	171,000
Second	–	15 years	34,500	4,000	70	1,200	115,000

Note: The volume of stone and beach fill sand is increased by 30% from the net volume in consideration of loss etc. during construction works

Stones and beach fill sand will be transported by dump trucks of 16 ton loading capacity, which can carry about 10 m³ of stones or sand. The added volume of stones and sand of 211,000 m³ in the first phase of the first stage indicates 21,000 trips of trucks per year. On the assumption of 200 working days per year, the average truck movement will be 105 trips per day for total of the two project sites.

(5) Expected changes of the coast by implementation of the plan

Brief description is made of the expected changes of the respective coastal sectors by implementation of the coastal protection plan as below.

(a) Mamaia South

The narrow beach in front of Hotel Parc will be broadened to the width of 100 m. The deteriorated offshore breakwaters will be raised to the elevation of +2.40 m above the datum level so that they will become slightly more visible than the present ones. Beaches immediately north of the newly filled area may be eroded slightly, but they have adequate width presently and the effect of slight erosion will not be noticeable.

(b) Tomis areas

The northern and center areas, which are devoid of sandy beaches, will be provided with a wide beach. The rehabilitation works of the dangerous cliff there can be initiated with ample space at the foot of cliff. People can walk on top of new jetties for the distance of about 200 m from the shore, beyond which the jetty crests are covered with armoring stabilopods. Submerged wide-crested breakwaters are invisible for people on beaches and do not disturb the ocean view. This feature applies to all the sectors with project implementation.

(c) Eforie Nord

The narrow beach in the north of the marina “Yacht Club Europa” will be expanded to a beach of 100 m wide, including the area in front of Restaurant Acaplco, which has no beach presently. The widened beach area will provide ample space for the cliff rehabilitation works.

(d) Eforie Middle

Beaches are widened so that any threat of breaching of sand bars in front of Lake Techirghiol will be averted.

(e) Eforie Sud

Beaches are widened and present closely-arranged short groins will be replaced by widely-spaced long jetties. This will mitigate the water pollution problem there.

(f) Olimp – Venus

The major change is disappearance of closely-arranged groups of short groins and mitigation of the water pollution problem, although the proposed timing of project implementation is the second stage after 2021. Wide beaches will be created along the areas of Jupiter, Aurora, and Venus, where only small beaches exist between the groins.

(g) Saturn – Mangalia

Changes here are similar with the Olimp – Venus area. The central part without beach presently will enjoy the presence of a wide beach.

7.3.2 Environmental Examination at the Basic Study Stage

(1) Scoping Results at the Basic Study Stage

The members of the study team discussed on the impacts of the project that may be induced on the environment and the society, and the team filled the scoping checklist table based on the results of discussions. Then the team revised the table by taking the results of stakeholder meetings into consideration. The twenty three items in total were classified into two groups; 10 items as “B” (some impact expected) and the remaining 13 items as “D” that indicate no necessity of IEE or EIA (no expected impact), as listed in Table 7.3.3; the environmental items from the previous JICA guidelines were used in this scoping.

Table 7.3.3: Initial scoping of environmental impact items

Environmental Items	Evaluation	Reason for evaluation
1 Resettlement	D	No impact is expected.
2 Economic Activities	D	No impact is expected since the fishing ground is located offshore from the project site.
3 Traffic and social infrastructures	B	Possibility of impact on traffic according to the site of barrow pits or transportation method of sand and rocks.
4 Split of Communities	D	No impact is expected.
5 Cultural Property	D	No impact is expected since historical ports such as Tomis and Mangalia are not included in the Project.
6 Water Rights and Rights of Common	B	Fishing rights might be respected by custom, although they are not guaranteed by law.
7 Public Health Condition	D	No impact is expected since construction workers will be local residents.
8 Waste	B	Generation of construction waste and debris.
9 Hazards (Risk)	D	Positive impact is expected since erosion risk will be reduced by implementing the projects.
10 Topography and geology	B	Change of coastal features.
11 Soil erosion	D	No impact is expected because no borrow pits of soil is planned.
12 Groundwater	D	No impact is expected.
13 Lake/River	D	No impact is expected.
14 Sea/Coastal zone	B	Sand mining by dredging and beach fill project may cause some changes on coast.

Environmental Items	Evaluation	Reason for evaluation	
15	Flora and Fauna	B	There exists a nature reserve in part of the project site. Possibility of impact of dredging work on benthic organism such as seaweeds and shells.
16	Climate	D	No impact is expected.
17	Landscape	B	Possibility of deterioration of aesthetic harmony by the appearance of jetties and offshore breakwaters.
18	Air pollution	B	Possibility of dust from dump trucks.
19	Water contamination	B	Possibility of turbidity when dredging sand from the seabed for beach nourishment and installing jetties and breakwater.
20	Soil contamination	D	No impact is expected.
21	Noise and vibration	B	Possibility of noise and vibration caused by operation of construction equipment and moving of dump trucks.
22	Ground subsidence	D	No impact is expected.
23	Offensive odor	D	No impact is expected.

Note: Evaluation classification

A: Serious impact expected

B: Some impact expected

C: Not clear

D: IEE or EIA is not necessary (no expected impact)

(2) Present Situation of Impact Items

The ten items having been evaluated as “B” in Table 7.3.3 were examined for the situation prevalent at the time of the basic study as listed in Table 7.3.4.

Table 7.3.4: Present situation of impact items

Environmental Items	Evaluation	Present Situation	
3	Traffic and social infrastructures	B	<ul style="list-style-type: none"> ● The target area is at the distance of three-hour car drive or train ride from Bucharest. A traffic infrastructure is comparatively good. The traffic jam only happens in the beach resort area in summer.
6	Water Rights and Rights of Common	B	<ul style="list-style-type: none"> ● Fishing rights might have been respected by custom, although they are not guaranteed by law. ● Stationary fishing exists, using passive gears in thirty fishery locations along the littoral between Sulina and Vama Veche, in the coastal waters of 5 to 10 m depth.
8	Waste	B	<ul style="list-style-type: none"> ● The solid waste collection and transportation to the final disposal site (a sanitary landfill site is located at Ovidue 8 km away from Constanta) is outsourced to a private company by the local government of Constanta. ● Waste disposal problems are generated by a sudden influx of additional population in summer. This short-term pressure may exceed the capability of sewage system and rubbish collection system. Tourism activities may contribute to the pollution on beaches, not only with the usual food, paper and cigarette butts, but also occasionally with dangerous items such as broken bottles.
10	Topography and geology	B	<ul style="list-style-type: none"> ● The southern Romanian Black Sea shore from Cape Midia to Vama Veche is divided into the northern and southern sectors in the present study. The northern sector is defined to cover the area from Cape Midia to Cape Constanța, which is a coast of sandy beach. The southern sector extends from Cape Constanța to Vama Veche, which is a combination of barrier beaches and sea cliff coasts with narrow beaches.
14	Sea/Coastal zone	B	<ul style="list-style-type: none"> ● Currently the coastal zone of Romania is eroded on beaches and cliffs. Some protection works have been done but not effective enough.

Environmental Items		Evaluation	Present Situation
15	Flora and Fauna	B	<ul style="list-style-type: none"> ● Presently, there are 27 protected areas in the Constantza County, divided in floristic, faunistic and mixed reserves, geological and marine points. ● In the south of the Constantza County there can be found a series of forestry reserves, very important from the floristic and faunistic point of view. ● There exists a nature reserve (Vama Veche - 2Mai Marine aquatorium) in the south of the project site. ● Techirghiol Lake will be included in the Ramsar Convention site. ● On the Romanian coast there are estimated 9 endangered species, 6 vulnerable species and 5 species threatened by extinction.
17	Landscape	B	<ul style="list-style-type: none"> ● There are visually significant historical buildings on the hill behind Tomis Port. ● A lot of tourists spend the summer vacation enjoying sunbathing and sea bathing on beaches. ● Natural and man-made landscapes have deteriorated significantly in the southern coast of Romanian due to the natural process of beach erosion and wave actions.
18	Air pollution	B	<ul style="list-style-type: none"> ● Some factories in Constanta are included in the list of the industrial units that release frequently materials in excess of the maximum admissible concentrations of air quality parameters. For Bucharest and Constanta a special regulation prescribes the use of fuel oil with a sulfur content of less than 1%.
19	Water contamination	B	<ul style="list-style-type: none"> ● The pollutant loads of the Danube River have led to the increase of the nutrients, heavy metals and pesticides concentrations in marine sediments. The general trend of these concentrations along the Romanian sea-shore of the Black Sea is the decrease from the north toward the south. Another category of pollution sources is human activities in the southern area of the littoral (industrial and municipal waste water, port activities, and fishery). ● The studies by the National Institute for Marine Research and Development "Grigore Antipa" show that the most important changes over the last two decades have been the increase of eutrophication, particularly in the littoral zones. Black Sea fisheries have been seriously damaged as a result of eutrophication, over-fishing and the unintentional introduction of alien species. ● There are five main treatment plants, of which four plants are municipal waste water ones (Constanța Nord and Sud, Eforie Sud and Mangalia) and one industrial one of Petromidia (Năvodari). The first project approved by EU-ISPA Management Committee with EBRD co-financing is the Rehabilitation of the Waste Water facilities in Constanta. (Main Report)
21	Noise and vibration	B	<ul style="list-style-type: none"> ● Noise pollution can be generated by many sources (vehicles, halyards on yacht masts, visitors themselves, certain activities such as motor boating, water skiing, disco).

(3) Envisioned Mitigation Measures

The Study team evaluated the severity of impacts for the ten items with the rating of "B" and envisaged the mitigation measures as listed in Table 7.3.5.

Table 7.3.5: Impact severity and envisaged mitigation measures

Likely Impacts	Rating	Impact severity (e.g. magnitude, area extent, duration, frequency, reversibility, likelihood of occurrence)	Envisaged mitigation measures
3. Traffic and social infrastructures	B	<ul style="list-style-type: none"> ● Possibility of impact on traffic according to the site of borrow pits or transportation method of sand and rocks. ● There are any risks of traffic accidents which could affect human health. 	<ul style="list-style-type: none"> ● Proper signal control and information dissemination ● Rearrangement of the transport system, e.g., route selection considering traffic congestion. ● No use of borrow pits for soil on land
6. Water Rights and Rights of Common	B	<ul style="list-style-type: none"> ● Fishing rights might be respected by custom, although they are not guaranteed by law. ● Impacts on the fishery through the restriction fishing rights for occupancy of the fishing grounds. <p>Impacts on the existing water use, such as bathing and fishing.</p>	<ul style="list-style-type: none"> ● An available resolution will be discussed by the consultation with the stakeholders. ● Adoption of turbid water prevention method. ● Sea bathing will not be affected at all, because any construction will be conducted off season.
8. Waste	B	<ul style="list-style-type: none"> ● Generation of construction waste and debris. ● Aquatic life and birds would be affected by polluted water when the waste flows into the sea. ● Degradation of value of fishery products polluted by odor from spilled oil. 	<ul style="list-style-type: none"> ● The intended construction plan makes use of all the materials of existing facilities to be recycled into new facilities. Therefore the generation of construction material will be kept as minimal. ● No waste will be thrown away into the sea. ● Every care will be taken to minimize to oil spill from working vessels.
10. Topography and geology	B	<ul style="list-style-type: none"> ● Change of land features at borrow pits. ● Change of the coast lines due to coastal erosion or sedimentation. 	<ul style="list-style-type: none"> ● There will be no borrow sites on the land. New beach fill and jetties will be designed as not deteriorate land features.
14. Sea/ Coastal zone	B	<ul style="list-style-type: none"> ● Sand mining by dredging may take place. ● Decrease or extinction of benthos due to dredging. 	<ul style="list-style-type: none"> ● Effect on benthos etc. by sand mining is expected as temporarily because the fauna will soon return to the dredged area from the neighboring area after the completion of construction as proved in many experiences. ● The same will be applied to the area where new beach fill will be carried out.
15. Flora and Fauna	B	<ul style="list-style-type: none"> ● There exists a nature reserve in part of the project site. ● Possibility of impact of dredging work on benthic organism such as seaweeds and shells. 	<ul style="list-style-type: none"> ● No project will be undertaken in the nature reserve area. ● The effect of sand mining and beach fill will be temporarily and will not be persistent. ● Monitoring before and after operation will be carried out.
17. Landscape	B	<ul style="list-style-type: none"> ● Possibility of deterioration of aesthetic harmony by the appearance of new jetties and offshore breakwaters. 	<ul style="list-style-type: none"> ● Design of new facilities will be made with full consideration to aesthetic aspects of the beaches seen from the shore.
18. Air Pollution	B	<ul style="list-style-type: none"> ● Possibility of dust from borrow pits and dump trucks. ● Air pollutants emitted from various sources, such as construction machines and vehicle traffic will affect ambient air quality. 	<ul style="list-style-type: none"> ● Proper maintenance of construction equipment such as dump trucks.
19. Water contamination	B	<ul style="list-style-type: none"> ● Possibility of turbidity when dredging sand from the seabed for beach nourishment and installing jetties and breakwater. ● Soil runoff from the bare lands resulting from earthmoving activities. ● Effluents from various facilities. 	<ul style="list-style-type: none"> ● Adoption of turbid water prevention method if the Romanian regulations so requires because the effect is temporarily. ● No countermeasures will be required for soil conservation because the project will not involve any soil removing works.
21. Noise and vibration	B	<ul style="list-style-type: none"> ● Possibility of noise and vibration caused by operation of construction equipment and traffics of dump trucks. 	<ul style="list-style-type: none"> ● No construction activities during the nighttime ● Adequate instructions for truck drivers for safe and noise-free traffics

Note: Rating Criteria:

A: Serious impact is expected.

B: Some impact is expected.

(4) Alternatives Including “Do-nothing” Option

The study area has been divided into twenty sub-sectors as presented in Fig. 5.2.1 in **5.2.1**. After examining the need of coastal protection, the state fo beach utilization, the requirement of environmental protection and other factors, the alternatives of the coastal protection and rehabilitation plan, which includes “do-nothing option,” were prepared for individual sub-sectors as listed in Table 5.7.2 in **5.7.3**.

The coastal protection plan for the Southern Romanian Black Sea shore is to provide the project planning for all the sub-sectors that require protection and rehabilitation of shore area. The sub-sector of 2 Mai to Vama Veche, however, has been deleted from the site of possible project implementation, because of the presence of the marine natural reserve. In the present study, the word “alternative” does not include any implication of site selection, because all the sub-sectors have to be given the shore protection and rehabilitation plans even though the timing of implementation will differ from one area to another. The word “alternative” is used in the Study to indicate various combinations of shore protection facilities for a given area to obtain the most efficient and reasonable solution. Table 5.7.2 in **5.7** has been prepared with this meaning of “alternatives.”

7.3.3 IEE for Each Coastal Unit

To facilitate the initial environmental examination (IEE), it was made for each of the eight coastal units of the following:

- (1) Năvodari and Mamaia,
- (2) Tomis North and Tomis South (Cape Singol to Cape Constanța)
- (3) Eforie Nord to Eforie Sud
- (4) Tuzla North and Tuzla South
- (5) Costinești
- (6) 23 August
- (7) Mangalia
- (8) Limanu

Figure 7.3.1 shows a map of these coastal units of the study area.

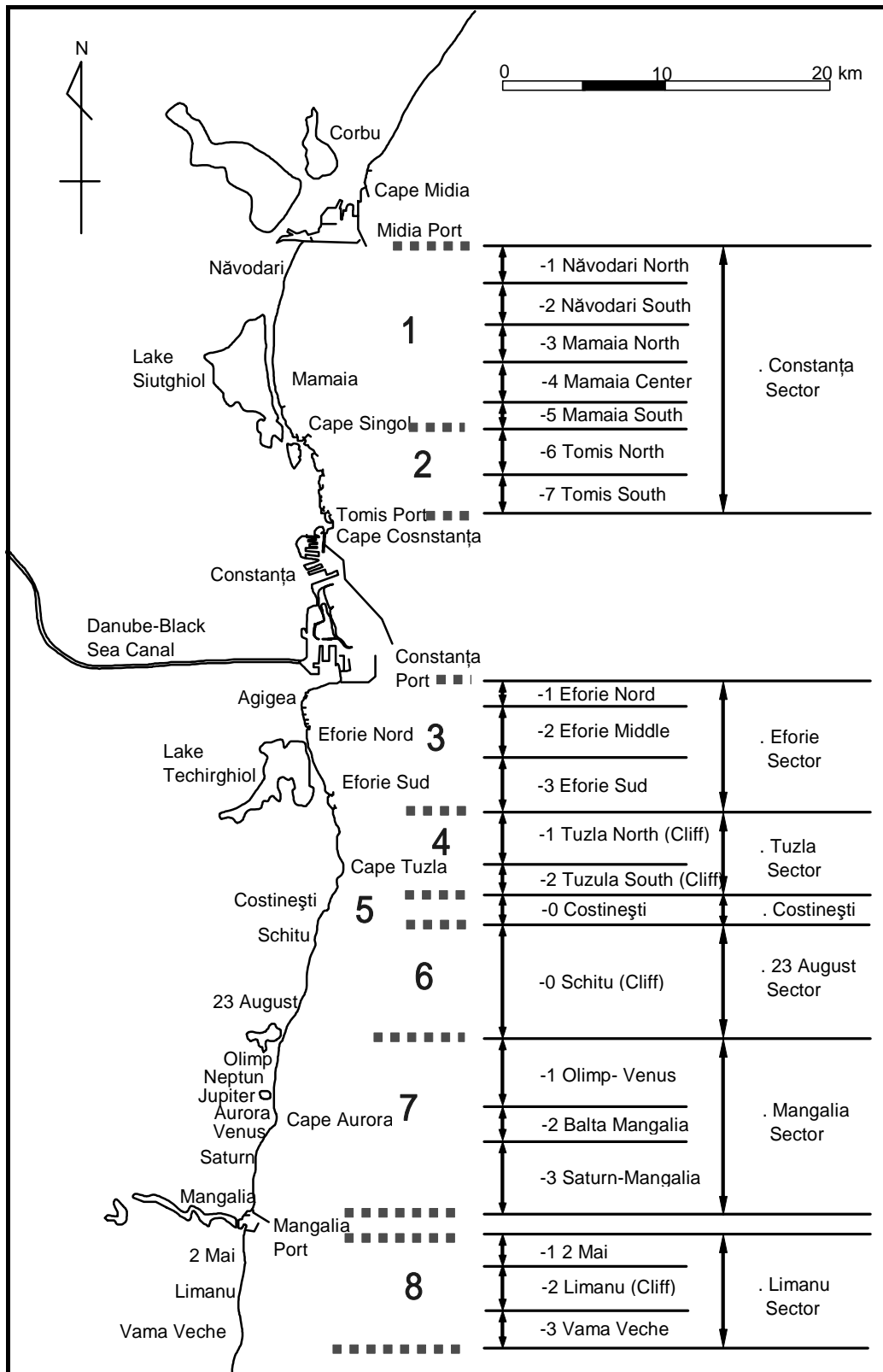


Fig. 7.3.1: Map of each coastal unit of the study area

The environmental impact was evaluated from the viewpoint of the type of impact, temporal extent, spatial extent, mitigability and monitoring as listed in Table 7.3.6. The classification of the evaluation item is as follows.

- Type of Impact – Direct, Indirect and Cumulative;
- Temporal Extent – During Construction and After Construction;
- Spatial Extent – Widespread and Local;
- Mitigability – Fully and Partially;
- Monitoring Possibility – Fully and Partially.

Table 7.3.6: Analysis of environmental impact parameters

No.	Environmental Impact Item	Type of Impact			Temporal Extent		Spatial Extent		Mitigability		Monitoring Possibility	
		Direct	Indirect	Cumulative	During Construction	After Construction	Widespread	Local	Fully	Partially	Fully	Partially
7	Misdistribution of benefit and damage		X	X		X		X		X		X
8	Cultural heritage	X			X			X		X	X	
9	Local conflict of interests		X	X		X		X		X		X
10	Water Usage or Water Rights and Rights of Common	X			X			X		X	X	
17	Coastal Zone (Mangroves, Coral reefs, Tidal flats, etc.)			X		X	X			X		X
18	Flora, Fauna and Biodiversity	X	X	X	X	X	X	X		X		X
20	Landscape	X				X		X		X	X	
22	Air Pollution	X			X			X		X	X	
23	Water Pollution	X			X			X	X		X	
25	Waste	X			X			X	X		X	
26	Noise and Vibration	X			X			X		X	X	
29	Bottom sediment	X			X			X	X			X

Note: X indicates “applicable.”

Table 7.3.6 applies to all the coastal units in this project. The table facilitates to make a mitigation plan and a monitoring plan. The environmental impact items No. 23, No. 25 and No. 29 can make mitigation measures fully possible. Classification with the type of impact, temporal extent and spatial extent enables to make a monitoring plan easy in setting the points, frequency and period of sampling.

Table 7.3.7 lists the main features for evaluating the impact and the coastal units in which the environmental impact items are applicable. The structures and the land use in the study area to evaluate impact were shown as a keyword which would help us to decide the impact level. The facility planning is not made for the coastal units 4, 5, 6, and 8. However, IEE was carried out for all the 8 units on the assumption that the similar facility plan as the present shore protection plan will be made in some distant future.

Table 7.3.7: Main features for evaluating impact and its corresponding units

Impact Item No.	Main features	Units with countermeasures	No countermeasures
7	Hotel, shop	Units 1, 2, 3, & 7	Unit 8
8	Cultural assets	Unit 7	-
9	Hotel, shop	Units 1, 2, 3, & 7	Unit 8
10	Fishing harbor	-	Units 4, 5, & 6
17	Beach	Units 1, 2, 3, & 7	Units 4, 5, 6, & 8
18	Protected area	-	Unit 8
20	Tourist spot	Units 1, 2, 3, & 7	Unit 8
22	Residential area	Units 1, 2, 3, & 7	Units 4, 5, 6, & 8
23	Offshore	Units 1, 2, 3, & 7	Units 4, 5, 6, & 8
25	Residential area	Units 1, 2, 3, & 7	Units 4, 5, 6, & 8
26	Residential area	Units 1, 2, 3, & 7	Units 4, 5, 6, & 8
29	Offshore	Units 1, 2, 3, & 7	Units 4, 5, 6, & 8

The Graded Impact Matrix of each unit has been prepared as listed in Table 7.3.8 for the case with implementation of countermeasures against coastal erosion and Table 7.3.9 for the case of zero option. It is to be noted that usually this step is not a part of IEE but rather a part of EIA. However, this is carried out just to evaluate characteristics of the eight coastal units. The weighting factor for evaluation of the impact was set at five levels to various impact items as described below, in consideration of the importance of human health, social property, biodiversity and primary productivity. Because there is no scientifically correct weighting method, the weighting levels were rather subjectively set through discussion with a few Romanian experts in environmental problems.

The environmental impact items assigned respective weighting factors are as follows:

Weighting factor 5:

- Air Pollution: human health
- Water Pollution: human health

Weighting factor 4:

- Cultural heritage: social property, during construction
- Water Usage or Water Rights and Rights of Common: social property, during construction
- Flora, Fauna and Biodiversity: biodiversity, during and after construction
- Landscape: social property, locally spatial extent

Weighting factor 3:

- Coastal Zone (Mangroves, Coral reefs, Tidal flats, etc.): social property, cumulative impact
- Waste: less impact on human health, during construction
- Noise and Vibration: less impact on human health, during construction

Weighting factor 2:

- Local conflict of interests: indirect and local impact
- Bottom sediment: during construction, local impact

Weighting factor 1:

- Misdistribution of benefit and damage: indirect and local impact

Then, the possible impact in case of no action was evaluated with four degrees (-3: Severe impact, -2: Moderate impact, -1: Low impact, 0: No impact) for the 12 items evaluated as "B" in Table 7.5.6 in 7.5; the evaluation was made with the results of consultation with stakeholders for each coastal unit. The evaluation of the degree of impact was also made with consideration of the major features listed in Table 7.3.7 and the content of construction works. The individual figure for each item in each coastal unit was multiplied by the weighting factors. After these multiplications were done, the values of the 12 items were summed up for each coastal unit.

The result of Graded Impact Matrix for Zero Option is listed in Table 7.3.9. The degree of impact of each coastal unit in the case of "Zero Option" was decided based on the current state of coastal area; loss of beach area by erosion and danger of cliff collapse accelerated by deterioration of shore protection facilities. In case of the unit 8, implementation of certain countermeasures were assumed for the purpose of illustrating the environmental impact there as listed in Table 7.3.8.

A few comments are necessary to explain the reason of assigning the degree of impact in each item in Tables 7.3.8 and 7.3.9.

The item No.7 (Misdistribution of benefit and damage):

Obviously, the main direct beneficiaries of the works will be the hotel owners, whose profits will most probably increase. However, increased profits mean increased taxes and, indirectly the entire community in the area will benefit from the works. Thus the impact of the works on Misdistribution of benefit and damage will be limited, being moderate at most.

The item No.8 (Cultural heritage):

At the moment there are no known sites related to cultural properties submerged below water. There are some suspicions concerning the Mangalia area, but nothing really documented. As such the impact degree in unit 7 was set -1 and to 0 for all the other units.

The item No.9 (Local conflict of interests):

The local conflict of interest is mainly determined by the misdistribution of benefits. As such the expected impact will be moderate at most.

The item No.10 (Water Usage or Water Rights and Rights of Common):

The impact will be low. The littoral fishing with stationary tools represents only 25% of the total capture and most of the tools are located north of the study area while most fishing grounds for recreational boat fishing are situated outside the workplace. Use of part of fishing harbors situated in Units 4, 5, and 6 for the construction site may cause some inconvenience to fishermen and cause a minor negative impact on fishing activities.

The item No.17 (Coastal Zone (Mangroves, Coral reefs, Tidal flats, etc.)):

In general a project may cause coastal erosion onto neighboring beaches and/or changes in marine conditions owing to construction of structures. However, the projects envisaged in the

present coastal protection plan are all contained in the coastal sediment sells of their own as described in **7.3.1 (1)**, and there will be no impact onto the neighboring beaches as indicated with 0 degree of impact.

The item No.18 (Flora, Fauna and Biodiversity):

The project may exercise low impact on benthos and benthic plants and marine biodiversity around the area concerned. However, the impact degree in the coastal unit 8 was specially assessed as -4 due to presence in the area of the marine reserve of 2 Mai and Vama Veche where no project will be implemented. There is expected a positive effect of hard structure construction in the sea on biodiversity of benthos, as described in **7.2.2 (2)**.

The item No.20 (Landscape):

In general, a project of coastal protection and rehabilitation may deteriorate aesthetic harmony in beaches by installation of hard structures. However, in the case of the present coastal protection plan, jetties of 200 to 400 m are located with a mutual spacing of 700 to 1,200 m and offshore structures of detached breakwaters are submerged below the water. Thus the impact on aesthetic harmony is considered as minimal without mitigation.

The item No.22 (Air Pollution):

The air pollution will be limited to the exhaust fumes of the equipment used for the execution of works and transport of materials.

The item No.23 (Water Pollution):

The main sources of water and sediment pollution may be the sand used for beach refill and minor accidental spills of fuel and other oil products from the equipment. However, the sand mined from the riverbed of the Danube is saturated with water and do not contain silty components, and will produce little water pollution in beach fill operations. The sand mined from the seabed off Midia Port will contain a certain percentage of silty components and some silt protection measures will be employed to mitigate the water pollution.

Table 7.3.8: Graded Impact Matrix

	Environmental Parameters	Weighting	Unit 1		Unit 2		Unit 3		Unit 4		Unit 5		Unit 6		Unit 7		Unit 8	
			Deg-ree	Grad-ed value	Deg-ree	Grad-ed value	Deg-ree	Grad-ed value	Deg-ree	Grad-ed value	Deg-ree	Grad-ed value	Deg-ree	Grad-ed value	Deg-ree	Grad-ed value	Deg-ree	Grad-ed value
7	Misdistribution of benefit and damage	1	D	-2	D	-2	D	-2	D	0	D	0	D	0	D	-2	D	-2
8	Cultural heritage	4	0	0	0	0	0	0	0	0	0	0	0	0	-1	-4	0	0
9	Local conflict of interests	2	-2	-4	-2	-4	-2	-4	0	0	0	0	0	0	-2	-4	-2	-4
10	Water Usage or Water Rights and Rights of Common	4	-1	-4	-1	-4	0	0	-1	-4	-2	-8	-2	-8	-1	-4	-1	-4
17	Coastal Zone (Mangroves, Coral reefs, Tidal flats, etc.)	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	Flora, Fauna and Biodiversity	4	-1	-4	-1	-4	-1	-4	-1	-4	-1	-4	-1	-4	-1	-4	-4	-16
20	Landscape	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	Air Pollution	5	-1	-5	-1	-5	-1	-5	-1	-5	-1	-5	-1	-5	-1	-5	-1	-5
23	Water Pollution	5	-1	-5	-1	-5	-1	-5	-1	-5	-1	-5	-1	-5	-1	-5	-1	-5
25	Waste	3	-1	-3	-1	-3	-1	-3	-1	-3	-1	-3	-1	-3	-1	-3	-1	-3
26	Noise and Vibration	3	-1	-3	-1	-3	-1	-3	-1	-3	-1	-3	-1	-3	-1	-3	-1	-3
29	Bottom sediment	2	-1	-2	-1	-2	-1	-2	-1	-2	-1	-2	-1	-2	-1	-2	-1	-2
	Total Graded Value			-32				-28					-30					-44
																		-36
																		-30
																		-44

Table 7.3.9: Graded Impact Matrix – “Zero Option”

Environmental Parameters	Weighting	Unit 1		Unit 2		Unit 3		Unit 4		Unit 5		Unit 6		Unit 7		Unit 8	
		Deg-ree	Grad-ed value	Deg-ree	Grad-ed value	Deg-ree	Grad-ed value	Deg-ree	Grad-ed value	Deg-ree	Grad-ed value	Deg-ree	Grad-ed value	Deg-ree	Grad-ed value	Deg-ree	Grad-ed value
	W	D	W*D	D	W*D	D	W*D	D	W*D	D	W*D	D	W*D	D	W*D	D	W*D
7	1	-2	-2	-2	-2	-2	-2	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2
8	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	2	-2	-4	-2	-4	-2	-4	-1	-2	-1	-2	-1	-2	-2	-4	-2	-4
10	4	-2	-8	-2	-8	-2	-8	-1	-4	-1	-4	-1	-4	-2	-8	-2	-8
17	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Graded Value			-18		-18		-18		-9		-9		-9		-18		-18

The item No.25 (Waste):

The project may not yield construction waste and debris, because the materials used in the project are sand, stones, concrete blocks etc., which are all duly placed in the water as designed. Deteriorated existing structures such as groins are demolished and removed, but the demolished parts are recycled as the core materials of new jetties and detached breakwaters.

The item No.26 (Noise and Vibration): The project may yield noise and vibration that may disturb residents, mainly owing to the traffics of dump trucks carrying beach fill sand, stones, and concrete blocks on roads. Working of backhoes, bulldozers, and other construction equipment on beaches and in the sea will not disturb residents, because the construction sites are away from residential areas.

The item No.29 (Bottom sediment):

The project is not expected to cause contamination of bottom sediment (sand) apart from water pollution by turbidity during beach fill operations, because the construction materials are sand, stones, and concrete that do not contain any harmful materials to contaminate the bottom sediment. Nevertheless, the degree of low impact is assigned for all the units in case with implementation of countermeasures.

Minimal impact was expected on all the items. In most cases the impact will be temporary; limited to the period of construction.

The figures of total graded values in Table 7.3.8 and Table 7.3.9 show the relative ones without carrying a meaning of its own. The larger the absolute value becomes, the higher the environmental impact becomes. The total graded value differs with respect to each unit depending on weighting and environmental parameters. Therefore, to give the difference among total graded values better visualization, the impact score was derived by allocating -10 to -1 in proportion to the ascending order of the total graded value of (-44) to (-9).

As a result of existence of marine reserve, the greatest impact due to project implementation should be expected in the coastal unit 8; the existence of hotels will determine the greatest impact for the zero option in units 1, 2, 3, 7 and 8 as listed in Table 7.3.8.

The selection of the priority project sites described in 6.2 has been made on the basis of the category-wise ranking among the twenty sub-sectors. Four categories of coastal protection, beach utilization, economical feasibility of project implementation, and needs for promotion of regional development. The selection was not for a priority project that excludes the competitive sites but for the priority in the timing of the commencement of construction works. Although the IEE was not directly utilized in the priority project site selection, the result listed in Table 7.3.10 supports the selection of Mamaia and Eforie Sectors as the priority project sites. For the ranking of severity is 1 at all the units of 1, 2 and 3 for the case of zero option, while it is 3, 3 and 5 for the case of project implementation at the units 1, 2, and 3, respectively.

Table 7.3.10: Impact score and ranking of 8 coastal units

Unit							
1	2	3	4	5	6	7	8
Năvodari and Mamaia	Tomis North and Tomis South	Eforie Nord to Eforie Sud	Tuzla North and Tuzla South	Costinești	23 August	Mangalia	Limanu
Sub-sectors							
I-1	I-6	II-1	III-1	IV-0	V-0	VI-1	VII-1
I-2	I-7	II-2	III-2			VI-2	VII-2
I-3		II-3				VI-3	VII-3
I-4							
I-5							
Project implementation							
Impact Score (Proportional allotment of total graded values)							
-7	-7	-6	-5	-6	-6	-8	-10
Ranking (Order of severity)							
3	3	5	6	4	4	2	1
Zero Option							
Impact Score (Proportional allotment of total graded values)							
-3	-3	-3	-1	-1	-1	-3	-3
Ranking (Order of severity)							
1	1	1	2	2	2	1	1

7.3.4 Collection of Beach Fill Sand and Transport

The proposed plan of coastal protection demands the supply of sand for beach fill in a quantity of about 1,900,000 m³ in the period from 2007 to 2020, and about 1,300,000 m³ after 2021. Supply sources of beach fill sand are considered as follows, as described in **7.3.1 (3)**:

- 1) Impounded sand deposit in the east of Midia Port
- 2) Sand in the riverbed of the Danube

Impact degree is shown in Table 7.3.9. A few comments are necessary to explain the reason of assigning the degree of impact in each item in Table 7.3.9.

The item No.10 (Water Usage or Water Rights and Rights of Common):

The impact on fishing activities both in the Danube and Midia Port will be low. The littoral fishing with stationary tools represents only 25% of the total capture and most of the tools are located north of the study area while most fishing grounds for recreational boat fishing are situated outside the workplace.

The item No.16 (Hydrological Situation):

A certain impact on the river course of the Danube is expected according to an opinion expressed at the Bucharest stakeholder meeting; "EIA for collection of beach nourishment sand from the River Danube is necessary because there is a possibility that the transformation

of the river course will be caused". The impact is estimated to affect wave-induced currents around the Midia Port due to the change of the bottom topography by dredging, but execution of dredging in a thin layer over a wide area will almost mitigate such impact. Impact degree for Zero Option was evaluated by considering the negative impact on smooth navigation of ships on the Danube.

The item No.18 (Flora, Fauna and Biodiversity):

The impact is estimated to affect benthos and benthic plants and marine biodiversity both in the river and the sea concerned.

The item No.22 (Air Pollution):

The air pollution will be caused mainly during transport of materials by dump trucks.

The item No.23 (Water Pollution):

The main sources of water pollution may be the sand during dredging and minor accidental spills of fuel and other oil products from the dredging boat. However, the sand from the riverbed of the Danube sinks down fast, and will produce little water pollution during dredging operations. The sand from the seabed off Midia Port will contain a certain percentage of silty components and some silt protection measures will be employed to mitigate the water pollution.

The item No.26 (Noise and Vibration):

The project may yield noise and vibration that may disturb residents, mainly owing to the traffics of dump trucks carrying beach fill sand on roads.

According to the laboratory staff of Galati REPA, the harmful materials of bottom sediment of the Danube have not been detected by regular monitoring. The radioactive material does not exist in the sediment because the accident has not happened at the nuclear power plant located in the upstream. However, it is necessary to sample bottom sediment together with benthos and benthic plant at several locations because the existing information is scarce.

To answer the question if the sand mining affects the river channel conditions adversely, it needs to be examined through the analysis of the past records of river bathymetry and the prediction of river flow and sediment transport regime.

In the case of a dump truck running on unpaved road, the powder dust affects residents. The noise and the vibration generated from a truck also affect residents especially when running in the urban area. Therefore, it is important to arrange the transport system from an environmental point of view.

7.3.5 Mitigation Measures

Table 7.3.12 lists the environmental issues that are to be subjected to the mitigation measures proposed. The environmental issues that have been related to high or moderate impacts in Table 7.3.8, Table 7.3.9 and Table 7.3.10 are put into evidence with the risks mitigation measures proposed. Apele Romane will be in charge of implementing the mitigation measures. A special attention will be given to the measures for warning and intervention in case of emergency and accidental pollution. A special action plan must be drawn up at the EIA stage. This action plan includes the measures that should be taken to prevent or to stop the accidental water pollution.

Table 7.3.11: Assessment of impact degree

Environmental impact item		Danube River		Midia Port	
		Sand mining	Zero option	Sand dredging	Zero option
7	Misdistribution of benefit and damage	0	0	0	0
8	Cultural heritage	0	0	0	0
9	Local conflict of interests	0	0	0	0
10	Water Usage or Water Rights and Rights of Common	-1	0	-1	0
16	Hydrological Situation	-2	-2	-2	0
17	River and Coastal Zone	0	0	0	0
18	Flora, Fauna and Biodiversity	-2	0	-2	0
20	Landscape	0	0	0	0
22	Air Pollution	-2	0	-2	0
23	Water Pollution	-1	0	-2	0
25	Waste	0	0	0	0
26	Noise and Vibration	-2	0	-2	0
29	Bottom sediment	0	0	0	0

Range of Score

-3 Severe impact

-2 Moderate impact

-1 Low impact

0 No impact

Table 7.3.12: Mitigation plan

Phase	Impact item	Activities and impacts	Mitigating Measure	
Const- ruction	7	Misdistribution of benefit and damage	● Impacts on the existing water use, such as sea bathing and recreational fishing.	
	9	Local conflict of interests	● Any construction is conducted off season so that sea bathing cannot be affected at all.	
	10	Water Usage or Water Rights and Rights of Common	● Impacts on the existing water use, such as sea bathing and recreational fishing.	● Any construction is conducted off season so that sea bathing cannot be affected at all.
			● Fishing rights might be respected by custom, although they are not guaranteed by law. ● Impacts on the fishery through the restriction fishing rights for occupancy of the fishing grounds.	● Adoption of turbid water prevention method.
		● Degradation of value of fishery products polluted by odor from spilled oil.	● Every care will be taken to minimize oil spill from working vessels and other equipments.	
		● Possibility of turbidity when dredging sand from the seabed for beach nourishment and installing jetties and breakwater.	● Adoption of turbid water prevention method if the Romanian regulations so requires because the effect is temporarily.	

Phase	Impact item	Activities and impacts	Mitigating Measure
18	Flora, Fauna and Biodiversity	<ul style="list-style-type: none"> ● Fishing rights might be respected by custom, although they are not guaranteed by law. ● Impacts on the fishery through the restriction fishing rights for occupancy of the fishing grounds. 	<ul style="list-style-type: none"> ● Adoption of turbid water prevention method.
		<ul style="list-style-type: none"> ● Possibility of impact of dredging work on benthos and benthic plant. 	<ul style="list-style-type: none"> ● Monitoring before and after operation will be carried out. ● Effect on some of benthic fauna by sand mining is expected as temporarily because the fauna will soon return to the dredged area from the neighboring area after the completion of construction as proved in many experiences. ● The same will be applied to the area where new beach fill will be carried out.
		<ul style="list-style-type: none"> ● Aquatic life and birds would be affected by polluted water when the waste flows into the sea. 	<ul style="list-style-type: none"> ● No waste will be thrown away into the sea.
		<ul style="list-style-type: none"> ● Possibility of turbidity when dredging sand from the seabed for beach nourishment and installing jetties and breakwater. 	<ul style="list-style-type: none"> ● Adoption of turbid water prevention method if the Romanian regulations so requires because the effect is temporarily.
22	Air Pollution	<ul style="list-style-type: none"> ● Possibility of dust from dump trucks. 	<ul style="list-style-type: none"> ● Watering work on the street.
		<ul style="list-style-type: none"> ● Air pollutants emitted from various sources, such as construction machines and vehicle traffic will affect ambient air quality. 	<ul style="list-style-type: none"> ● Proper maintenance of construction equipment such as dump trucks.
23	Water Pollution	<ul style="list-style-type: none"> ● Degradation of value of fishery products polluted by odor from spilled oil. 	<ul style="list-style-type: none"> ● Every care will be taken to minimize oil spill from working vessels and other equipments.
		<ul style="list-style-type: none"> ● Possibility of turbidity when dredging sand from the seabed for beach nourishment and installing jetties and breakwater. 	<ul style="list-style-type: none"> ● Adoption of turbid water prevention method if the Romanian regulations so requires because the effect is temporarily.
25	Waste	<ul style="list-style-type: none"> ● Aquatic life and birds would be affected by polluted water when the waste flows into the sea. 	<ul style="list-style-type: none"> ● No waste will be thrown away into the sea.
		<ul style="list-style-type: none"> ● Generation of construction waste and debris. 	<ul style="list-style-type: none"> ● The intended construction plan makes use of all the materials of existing facilities to be recycled into new facilities. Therefore the generation of construction material will be kept as minimal.
26	Noise and Vibration	<ul style="list-style-type: none"> ● Possibility of noise and vibration caused by operation of construction equipment and traffics of dump trucks. 	<ul style="list-style-type: none"> ● No construction activities during the nighttime ● Adequate instructions for truck drivers for safe and noise-free traffics

Phase	Impact item		Activities and impacts	Mitigating Measure
	30	Accidents	<ul style="list-style-type: none"> ● Possibility of impact on traffic according to transportation method of sand and rocks. ● There are any risks of traffic accidents which could affect human health. 	<ul style="list-style-type: none"> ● Proper signal control and information dissemination ● Rearrangement of the transport system, e.g., route selection considering traffic congestion.
Operat- ion	7	Misdistribution of benefit and damage	<ul style="list-style-type: none"> ● A certain misdistribution is inevitable at the priority project site(s) among residents, fishermen, hotel owners, shop owners etc. 	<ul style="list-style-type: none"> ● The misdistribution should be mitigated through taxation and other civil means.
	17	River and Coastal Zone	<ul style="list-style-type: none"> ● Change of the coast lines due to coastal erosion or sedimentation. 	<ul style="list-style-type: none"> ● Shoreline survey will be carried out after construction of new facilities.
	20	Landscape	<ul style="list-style-type: none"> ● Possibility of deterioration of aesthetic harmony by the appearance of new jetties and offshore breakwaters. 	<ul style="list-style-type: none"> ● Design of new facilities will be made with full consideration to aesthetic aspects of the beaches seen from the shore.

7.4 Environmental Management Plan (EMP)

7.4.1 Environmental Monitoring

The environmental monitoring plan will be presented with description of the items of impacts to be monitored, specification of the timing and locations of the monitoring activities, and recommendation for the agency responsible for execution of the monitoring. The cost for the environmental management and monitoring will also be described. Table 7.4.1 lists the content of the environmental monitoring plan. Among various parameters, the survey of benthos and benthic plant is needed to check any change by construction works and to confirm their recovery after the project. The cost for each parameter is a preliminary estimate, which should be re-examined when the project is undertaken.

7.4.2 Preliminary Environmental Management Plan (EMP)

The institution in charge of environmental management is DADL which is subordinated to Apele Romane. Galati Regional EPA is the authority responsible for environmental agreement and authorization.

The training of the personnel involved in the operation on the environmental facilities and monitoring system will refer to all regulation works provided by the project. The content of the training program is listed in Table 7.4.2. The Preliminary Environmental Management Plan (EMP) is summarized in Table 7.4.3.

The cost for executing EMP is mainly incurred from the monitoring program. The tentative annual monitoring cost is Euro40,000 for the construction phase and Euro10,000 for the operational phase on the basis of Table 7.4.1. DADL will be responsible for implementing environmental monitoring with the involvement of related organizations.

Table 7.4.1: Environmental monitoring plan

Phase	Parameter	Monitoring	Locations	Timing	Implementation Agency	Yearly cost (Euro)
Construction	Sea bathing and recreational fishing	- Follow state of construction works	Project sites	Weekly	Apele Romane	-
	Fishing grounds	- Follow turbid water prevention	Project sites	Monthly	Apele Romane	-
	Value of fishery products	- Interview to fishermen	Fishing harbors	Monthly	Contractor	-
	Benthos and benthic plant	- Sampling survey and identification test	Project and dredging sites	Twice a year	Biologist	14,000
	Aquatic life and birds	- Visual inspection	Project sites	Monthly	Biologist	5,000
	Dust from dump trucks	- Visual inspection	Transport route	Weekly	Contractor	-
	Air pollutants	- Check of machine maintenance record	Project sites and camp	Weekly	Apele Romane	-
	Turbidity of sea water	- Visual inspection	Project and dredging sites	Weekly	Contractor	-
	Water quality (Turbidity, DO, pH)	- Using measuring instrument	Project and dredging sites	Bi-monthly	Survey company	5,000
	Sediment quality (Heavy metals, Organochlorines, PAHs and Total hydrocarbons)	- Sampling and analysis	Dredged sand for beach nourishment	Twice a year	Survey company	8,000
	Waste and debris	- Visual inspection	Project sites and camp	Weekly	Apele Romane	-
	Noise and vibration	- Noise and vibration measurement	Transport route	Three times a year	Survey company	8,000
	Traffic accidents	- Check of driving diary and traffic safety education	Driver post	Weekly	Apele Romane	-
Sub-total						40,000
Operation	Misdistribution of benefit and damage	- Interview survey	Project sites	Once a year	Survey company	800/ year
	Local conflict of interests	- Interview survey	Project sites	Once a year	Survey company	800/ year
	Change of coast line	- Shore line survey	Project sites	Once a year	Survey company	1,600/ year
	Benthos and benthic plant	- Sampling survey and identification test	Project and dredged sites	Twice a year	Biologist	6,800/ year
	Sub-total					

Table 7.4.2: Training program

Instructor	Subject	Training mode	Location	Planned term
Project Manager	- Targets and Objectives	- Lectures	Constanta	Beginning of construction
Traffic officer	- traffic safety	- Lectures - Works in situ	Constanta	3 times a year
EPA technical manager	- Environmental monitoring - Environmental education	- Lectures - Study tours	Constanta	Beginning of construction, Once a year

Table 7.4.3: Preliminary Environmental Management Plan (EMP)

No.	Action	Required preparation
PLANNING PHASE		
1	Specific environmental management plan	Working group
2	Improvement to perform the activities	Training plan
3	Obtaining environmental consent	EIA and other necessary documents
4	Improvement of the local people to collaborate on environmental management	Regular meeting
CONSTRUCTION PHASE		
5	Restrict working hours, cover haul trucks carrying fill material, require mufflers on equipment, provide information to public	Prepare construction phase information program
6	Provide traffic management plan and signage where needed	Contract specification
7	Provide information to public	Contract specification
8	Prohibit discharge or disposal of any construction material into water	Contract specification
9	Monitoring of works and environmental quality	Contract specification
OPERATION PHASE		
10	Monitoring plan elaboration	Routine monitoring manual
11	Watching beach sand and water quality for water users	Coordination with stakeholders

7.5 Consultations with Stakeholders

7.5.1 Process of Organizing the Stakeholder Meetings for the Coastal Protection Plan

A total of nine stakeholder meetings were held so far: three in Bucharest and six in Constanta.

For initiation of the first stakeholder meeting, stakeholders were selected in consultation with Apele Romane according to the following criteria;

- Individuals or groups who have views about cooperation projects, including local stakeholders;
- Residents, tourists, hotel owners, farmers, fishermen, etc. on whom this project may cause impacts;

- University professors and researchers whose research sites are included in the Southern Romanian Black Sea Coast;
- Environmental NGO members whose fields of action are included in the Southern Romanian Black Sea Coast;
- International aid agencies as observers.

Many members of the National Committee of the Coastal Zone (NCCZ) were recommended to join the stakeholder meeting by Apele Romane. Participants are classified as coming from the following groups:

- A. Governmental – central and local structures
- B. Water National Agency, Transports, Civil engineering, Tourism
- C. Scientific Research: marine geology and geo-ecology, environment protection and engineering,
- D. Design Institutes
- E. NGOs: professional and civil society
- F. International aid agencies

The lists of participants are given in G.2 of Volume 3, “Supplementary Information on Stakeholder Meetings”.

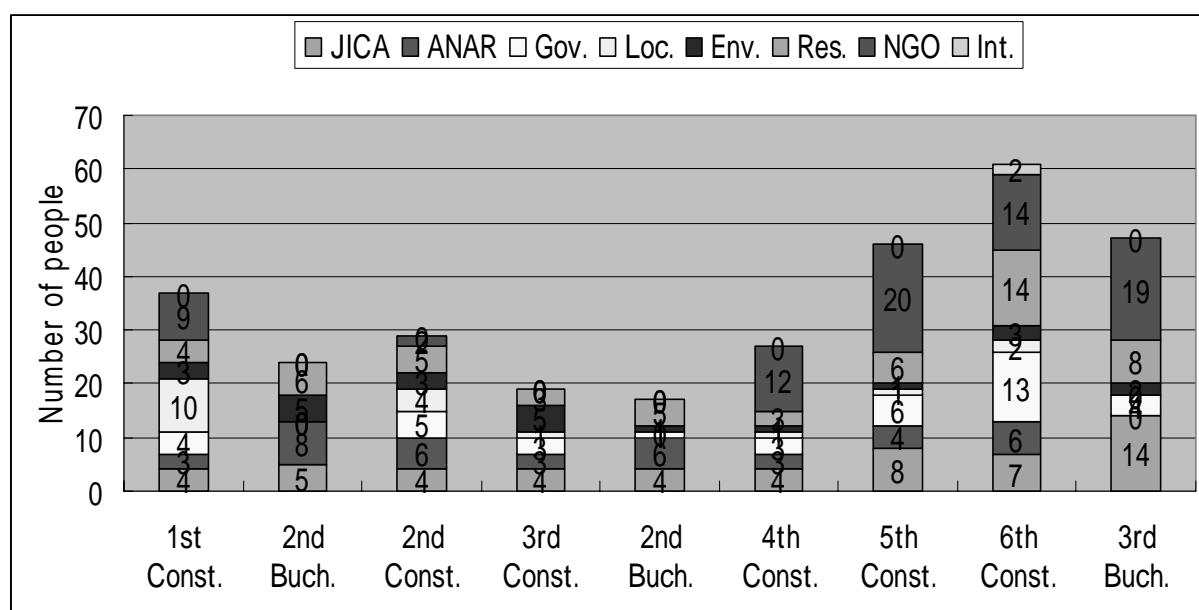


Fig. 7.5.1: Attendance at the nine stakeholders meetings

7.5.2 Progress of the Stakeholder Meetings

The progress of the first five stakeholder meetings is summarized in Table 7.5.1. Apele Romane sent the invitation letters to stakeholders, set up the meeting room, provided refreshment, made a presentation in Power Point in Romanian language. The team supported Apele Romane through preparation of slides, drawing up the scoping checklist, drawing up the minutes, making a videotaped record, taking photos and recording voices.

The main opinions and suggestions from stakeholders for the first five meetings are as follows:

1. The effects of the project could be negative for some local people or companies, but they are certainly positive for the entire community.
2. This project will consider also to the assurance strategy of the coastal zone, because of its contribution to the protection and rehabilitation of the coastal zone, beaches infrastructure and also the hotel zone.
3. Regarding the sand nourishment around the Romanian littoral, we should be very careful about the sand grain size because we may destroy the habitats if they are covered by silt and mud.
4. Environmental impact assessment would be necessary?; it is not absolutely necessary to have long jetties and a part of it is to be submerged.
5. Mamaia beach should have short submerged groins, even their construction is not easy and looks very expensive – JICA team will study the proposals.

Table 7.5.1: Progress of the stakeholder meetings (1)

Stakeholder meetings:	1st Stakeholder Meeting at Constanta	1st Stakeholder Meeting at Bucharest	2nd Stakeholder Meeting at Constanta	3rd Stakeholder Meeting at Constanta	2nd Stakeholder Meeting at Bucharest
Date:	June 15th, 2005	June 17th, 2005	November 2nd, 2005	November 24th, 2005	November 25th, 2005
Structure/Major interest of the participants:	16 from A 6 from B 4 from C 1 from D 2 from E (12 from G)	6 from A 7 from B 6 from C 3 from D 1 from E (8 from G)	14 from A 3 from B 3 from C 2 from E (13 from G)	6 from A 5 from C 1 from F (10 from G)	1 from A 6 from B 4 from C 1 from D 1 from E (8 from G)
	A. Governmental - central and local structures B. Water National Agency, Transports, Civil engineering, Tourism C. Scientific Research: marine geology and geoecology, environment protection and engineering, D. Design Institutes E. NGOs: professional and civil society F. International aid agencies G. Apele Romane, Study Team				
Number of participants:	41	35	35	22	21

Stakeholder meetings:	1st Stakeholder Meeting at Constanta	1st Stakeholder Meeting at Bucharest	2nd Stakeholder Meeting at Constanta	3rd Stakeholder Meeting at Constanta	2nd Stakeholder Meeting at Bucharest
Date:	June 15th, 2005	June 17th, 2005	November 2nd, 2005	November 24th, 2005	November 25th, 2005
Draft (Agenda)	<ul style="list-style-type: none"> • Explanation of purpose and contents of the project • Explanation of necessity of the project • Scoping discussion • Questions and answers ● Discussions and conclusions 	<ul style="list-style-type: none"> • Explanation of project necessity • Explanation of purpose and contents of the project • Scoping discussion • Questions and answers • Discussions 	<ul style="list-style-type: none"> • Explanation of coastal protection plan • Scoping discussion • Questions and answers • Discussions 	<ul style="list-style-type: none"> • Discussions upon Selection of Priority Project Sites • What is the Environmental Impact Assessment? • Discussions regarding the possible impacts upon society and environment, due to the implementation of the project in the priority sites. • Discussions regarding the usefulness or uselessness upon EIA in the priority sites proposed for the project. • Other aspects. 	<ul style="list-style-type: none"> • Discussions upon Selection of Priority Project Sites • Discussions regarding the possible impacts upon society and environment, due to the implementation of the project in the priority sites. • Discussions regarding the usefulness or uselessness upon EIA in the priority sites proposed for the project. • Other aspects.
Questionnaires	+	+	+	+	+
Impact Evaluation	+	+	+	+	+
Photos	+	+	+	+	+
Recording on videotape	+	+	+	+	+
Score and ranking of sub-sectors	-	-	+	+	+
Presentation:	<ul style="list-style-type: none"> • The study on protection and rehabilitation of the Southern Black Sea shore in Romania • JICA Guidelines for Environmental and Social Considerations 	<ul style="list-style-type: none"> • Presentation of local stakeholders and the Japanese and Romanian working teams • The study on protection and rehabilitation of the Southern Black Sea shore in Romania • Explanation of project necessity • JICA Guidelines for Environmental and Social Considerations 	Tentative Facility Plan for Protection and Rehabilitation of Southern Romanian Black Sea Shore	<ul style="list-style-type: none"> ● Selection of Priority Project Sites for Protection and Rehabilitation of Southern Romanian Black Sea Shore ● EIA – Environmental Impact Assessment – Prof. M.-T. Gomoiu 	Rehabilitation and Coastal Protection Project of Southern Black Sea zone regarding the Touristic Romanian Littoral from Midia to the Bulgarian border.

Stakeholder meetings:	1st Stakeholder Meeting at Constanta	1st Stakeholder Meeting at Bucharest	2nd Stakeholder Meeting at Constanta	3rd Stakeholder Meeting at Constanta	2nd Stakeholder Meeting at Bucharest
Date:	June 15th, 2005	June 17th, 2005	November 2nd, 2005	November 24th, 2005	November 25th, 2005
Content of Slides	<ul style="list-style-type: none"> • Beneficiary of the Project • Financial Support • Technical Study Team • Romanian • Consultants • Objectives of the Project • Duration of the Project • Coastal Protection Plan • Methodology of Planning • Examples of Shore Protection Facilities in Japan • Preliminary Design of Priority Projects • Stakeholder Meetings 	<ul style="list-style-type: none"> • Explanation of purpose and contents of the project • Policy of JICA • Objectives • Basic Principles regarding Environmental and Social Considerations 	<ul style="list-style-type: none"> • Classification of Shorelines • Barrier Beach • Beach in front of Cliff • Cliff without Beach Utilization • Sediment Characteristics • Origin of Beach Sand • Trend Analysis of Shoreline Position • Major Causes of Beach Erosion • Estimate of Future Shoreline Change - Mamaia 2025 • Various Types of Shore - Protection Facilities • Example of seawall protecting cliff in Japan • Tentative Plan of Facility Placement – policies • Possible Sand Mining Site • Discussions on Scoping of 30 items which may have impact on the Coastal Protection Project for the Southern Romanian Black Sea Shore 	<ul style="list-style-type: none"> • Purpose of Priority Project Site Selection • Division of Coastal Area into Sub-Sectors • Elements for Selection of Priority Project Sites • Beach Use Conditions during Summer Season • Shoreline Changes and Causes of Beach Erosion • Estimate of Future Shoreline Changes • Tentative Plan of Facility Placement and Cost Estimate • Selection of Priority Project Sites • Tentative Plan for Priority Projects 	<ul style="list-style-type: none"> • Presentation contains the two priorities projects proposal motivation, • Selection of implementation elements, and • Beach utilization conditions during the summer season, • Shoreline position changes and their causes, and • JICA's proposed solutions regarding the erosion and pollution mitigation and the estimation costs.
Discussions:	<ul style="list-style-type: none"> • general erosion phenomenon of the coast, gravity of the phenomenon mostly in the south part of the littoral • Study for Protection and Rehabilitation of the Southern Romanian Black Sea Shore have the following objectives : <ul style="list-style-type: none"> - establishing the coastal protection plan for the Southern part of Romanian Black Sea shore, between Capul Midia and Vama Veche, - drawing up of a 	<p>Ministry of Environment and Waters Administration have initiated the project;</p> <ul style="list-style-type: none"> • the project needs also the implementation of UE recommendation regarding integrated management of the coast zone <p>This strategy should have a perspective vision regarding a durable development of the Romanian coast zone</p> <ul style="list-style-type: none"> • to include it into governmental strategy policies this strategy 	<ul style="list-style-type: none"> • in Costinesti areas there is not erosion and a dramatic erosion is taking place in Mamaia South, i.e. 2 m/year - the erosion estimation over years by 2025 that the area around Hotel Parc & Perla Mamaia will disappear (in case that nothing will be done). • comments about the New Road construction (promenade) along the shore proposed by the City Hall of Constanta • the road should be built on shore 	<ul style="list-style-type: none"> • The whole area will be provided with plans for protection and rehabilitation projects in due course. • Because of the limitation in available fund, implementation of all projects at the same time is not feasible. • A few projects sites have to be selected for early project implementation. • Selection of priority project sites is not the selection among the alternative sites for a single project. 	<ul style="list-style-type: none"> • to draw the attention regarding the two erosion causes effects, i.e.: micro and macro scales effects • Studies agreed on by the Danube's countries (already mentioned at Ministry) mention that the erosion process is due to a macro scale process with two principal causes: <ul style="list-style-type: none"> - the sediment quantity diminution - the Danube river waters deterioration between 1959 and 1989 and the Black Sea organisms diminution • the erosion is the

Stakeholder meetings:	1st Stakeholder Meeting at Constanta	1st Stakeholder Meeting at Bucharest	2nd Stakeholder Meeting at Constanta	3rd Stakeholder Meeting at Constanta	2nd Stakeholder Meeting at Bucharest
Date:	June 15th, 2005	June 17th, 2005	November 2nd, 2005	November 24th, 2005	November 25th, 2005
	<p>feasibility study and</p> <ul style="list-style-type: none"> - provide assistance for the implementation of the solutions. • Main Principles of the study regarding the social and environmental aspects are: <ul style="list-style-type: none"> - creating a study concerning the impact of the proposed study, - measures regarding the social and environmental aspects which have to be implemented in the initial stage of the project • the time frame to come with feasible solutions is too large, referring to the feasibility study that the Japanese team will draw up by the end of 2006 and he asked if there are any other possibilities to find solutions earlier so that the coastal zone conditions shouldn't get worse in the near future. • the main target is to achieve the good status of the coastal zone by 2020 but, after having the study completed, we be able to estimate the costs, we also could make a plan for works to begin and also we will know how much time it will take. • We are having this situation because in last past 15 years there were no protection work of the coast. • JICA representative declare that for the moment they are collecting dates 	<ul style="list-style-type: none"> • The interest will be in solving the principal's coast zone problems regarding coast erosion, pollution, and terrain evaluation. • Cape Midia – Vama Veche zone is the critical erosion pollution zone – the most hotels populated zone, chemical combined Midia Navodari. • The first objectives of the projects: to establish a coast protection plan, Capul Midia – Vama Veche zone, to elaborate a feasibility study until the end of the year, September 2006 and to ensure an administrative assistance for project implementation. • Constanta team and ECOH Corporation team will make the feasibility study • The scope of the meeting is to respect the JICA guide stipulation, to observe the development of countries where they are implementing projects and to consider to the social aspects and environment, to consult the parties of the project regarding decisions, to be correct and proper to the country and also to insure the transparency of the decisions • The scope of the meeting is also to insure the responsibility of the bought parties • The principles of JICA guide: the measure regarding environment and 	<p>not on the beach</p> <ul style="list-style-type: none"> • JICA team does not support a road construction on beaches, in principle, because the international tendencies are looking for the protection and conservation of littoral area. • the cost of beach maintenance by nourishment is about 3,000 to 10,000 Euros with supplementary nourishment in every 3 to 4 years with the volume of 10 cubic meters per linear meter of a beach, according to the cost in EU countries. • the area north of port Midia can be a good source of sand for Mamaia • Bara Sulina cannot be taken it into consideration, because the sand there is supposed to be used for the Danube Delta area • The riverbed of the Danube is a good source of grained sand but it needs an equilibrium study first (the cost looks to be expensive, because of transport). • The continental shelf floor of the Black Sea looks to be a good source of beach fill sand, but unfortunately the sand is covered by very fine sediments such as mud and sand mining there seems to be very difficult and requires some study first. • The Belona area looks to have an abnormal sand circuit from the south to the north (need huge quantity of sand) 	<p>Provision of sufficient protection for the shore sectors under severe beach erosion</p> <p>Creation of broad beaches for future development of summer tourism</p> <ul style="list-style-type: none"> • Remedy of water pollution problem in nearshore zone 	<p>effect of the construction of many dams along the Danube which are limited to the northern units</p> <ul style="list-style-type: none"> • the north breakwater of Midia Port that stops the supply of sand from the northern shore to Navodari-Mamaia beach. The breakwater was started to extend to the depths of minus 10 meters in 1975. • Since then the Mamaia beach suffers from great erosions and the previous government started to build the six detached breakwaters and supply sand from Lake Siutghiol. It was successful for the moment but it proved that the sand grains were too small in diameter, it had little stability, and gradually the shoreline began to retreat. • According to the recent bathymetric survey it becomes clear that there is a lot of sand deposit behind the breakwaters. Originally the breakwaters are building at minus 5 meters depth but now breakwaters depth looks to be only 3 meters. • the JICA study is still ongoing and at Mamaia the sand deposit quantity should be also examined • More attention should be paid to the new constructions works taking into consideration the abrupt changes of beach topography around Belona Marina. • Regarding the sand nourishment dredged from the Danube an impact study is suggested and a parallel study should be made take it into consideration that a huge sand

Stakeholder meetings:	1st Stakeholder Meeting at Constanta	1st Stakeholder Meeting at Bucharest	2nd Stakeholder Meeting at Constanta	3rd Stakeholder Meeting at Constanta	2nd Stakeholder Meeting at Bucharest
Date:	June 15th, 2005	June 17th, 2005	November 2nd, 2005	November 24th, 2005	November 25th, 2005
	<p>and they will have a database; database will be done in October and they could come back then having a report.</p> <ul style="list-style-type: none"> • We will focus on the question of diagnosis, which has to indicate the real situations of existing dikes in this moment and if these constructions proved the reason for which they were built. A selection of these constructions with positive effects should be verified during the development of the project. We should also find out the Japanese team opinion, eventually if this diagnosis will be analyzed faster". • We have some information from Dutch project and we believe that if we will use those information it could be possible to save some time and money; The effects of erosion are very serious for Romania. In the last past 50 years we lost 2.250 Ha and we can not allow to lose more • What JICA is doing is very necessary and it would be good to have a second solution other than Dutch solution. It is good to have two opinions and it is very important that JICA to not having Dutch influences • We have a Low for the coast but this low is not precise and we do not know 	<p>social aspects. These should be implemented from the beginning of the project</p> <ul style="list-style-type: none"> • After the final of the project there will be the monitoring and evaluation of project impacts phase, the information to the parts and taken part to the improvement of organization capacity by system implementation. • In Romania there is not exist a national guide, standard strategy • Regarding juridical aspects, the Japanese experts have concluded: using the implementation of protection works there could be some impacts, moving the houses and replaced into others zones – "colonized" or there are private lands that should be purchased – what this could mean and what is the impact. • Scoping discussion 	<ul style="list-style-type: none"> • For the coastal protection project, we should establish first the priority project sites as a minimal action, because of lack of finance. • Consensus was made among the attendees on the priority projects that the areas of Mamaia South and Eforie Nord are most suitable. • Proposed to take into account a new project of dredging submerged sand bars around Izvoarele (Danube old area) and Cernavoda area, being promoted by the River Administration of the Lower Danube Galati, for another good source of beach fill sand. • Raised the question of necessity to protect the cliff in front of the Tuzla light-tower from erosion, but it was concluded that the cliff erosion there is out of this project. • Local community acknowledgment concerning the necessity of works around the zone can catch their attention (support) concerning the elimination process of shore erosion effects. ONG "Mare Nostrum" Constanta is fully supporting the Project 		<p>quantity is need.</p> <ul style="list-style-type: none"> • no studies until now was made on the impact of stability of Danube riverbed • JICA has collecting information about how much sand and gravel are dredged per years and utilized for the construction works like manufacturing concrete. • JICA is calculating the sand amount needed for the two priority projects nourishment, i.e., Mamaia South and Eforie North, which will be less than the previous estimate, and the project of beach nourishment will take two years instead of one year, though this is depending also by the finances. • an impact study is needed as well a study of the Danube dredging place that can have positive results for navigation on the navigation channel and Cernavoda Power Plant water supply • INCD GeoEcoMar has made detailed studies for about 15 Danube sections in preparation of navigation improvement map plus the different sections bathymetric maps that can be use as good sources of studies. • a comparison between Mamaia South and Eforie North cannot be made because from any point of view, i.e., water circulation, sand supply, wave energy and sediments are totally different., Eforie North should be considered the site that requires the beaches fully supplied by fill sand and of course a permanently sand

Stakeholder meetings:	1st Stakeholder Meeting at Constanta	1st Stakeholder Meeting at Bucharest	2nd Stakeholder Meeting at Constanta	3rd Stakeholder Meeting at Constanta	2nd Stakeholder Meeting at Bucharest
Date:	June 15th, 2005	June 17th, 2005	November 2nd, 2005	November 24th, 2005	November 25th, 2005
	<p>how to respect it. There are a lot of problems regarding coast limits: private and public patrimony</p> <ul style="list-style-type: none"> • It was better that the public zone should be limited from private zone by now 				supply would be necessary.

6. The Danube sand has a good grading and can be as a good source for Eforie Nord nourishment. Concerning Mamaia South beach, Midia can be a good source of sand but the water circulation in this area looks very complicated and should be taken into consideration the sediment and shells accumulations.

All these considerations and opinions were taken into account in the initial environmental examination both of the plan as a whole and of each coastal unit.

The progress of the following two stakeholder meetings is summarized in Table 7.5.2.

Table 7.5.2: Progress of the stakeholder meetings (2)

Stakeholder meetings:	4th Stakeholder Meeting at Constanta	5th Stakeholder Meeting at Constanta	6th Stakeholder Meeting at Constanta	3rd Stakeholder Meeting at Bucharest
Date:	March 10th, 2006	June 6th, 2006	March 9th, 2007	March 12th, 2007
Structure/Major interest of the participants:	NGO: 12 Res.:3 Env.:1 Loc.:1 Gov.:3 Observers:0 ANAR:3 JICA:4	NGO: 20 Res.:6 Env.:1 Loc.:1 Gov.:6 Observers:92 ANAR:4 JICA:8	NGO: 14 Res.: 14 Env.: 3 Loc.: 2 Gov.:13 Observers:16 ANAR:6 JICA:7 Int.:2	NGO: 19 Res.:8 Env.:2 Loc.: 0 Gov.:4 Observers:0 ANAR:0 JICA:14
	H. NGO – NGOs on scientific and civil society, local people, hotel operators as well as journalists I. Res – Scientific research institutions, universities, and design institutes J. Env. – Institutions related to environmental protection K. Loc. – Local authorities such as county, city hall, town hall etc. L. Gov. – Central public authorities and some naval offices M. Observers – University, College and High school students N. ANAR – National Administration of Romanian Waters (Bucharest and Constanța) O. JICA – JICA study team and JICA office in Romania. P. Int.- International aid agencies			

Stakeholder meetings:	4th Stakeholder Meeting at Constanta	5th Stakeholder Meeting at Constanta	6th Stakeholder Meeting at Constanta	3rd Stakeholder Meeting at Bucharest
Date:	March 10th, 2006	June 6th, 2006	March 9th, 2007	March 12th, 2007
Number of participants:	27	138	75	47
Draft (Agenda)	<ul style="list-style-type: none"> Prognosis and Mitigation of Environmental and Social Impacts Possibly Induced by the Coastal Protection Plan for the Southern Romanian Black Sea Shore. Final Evaluation of 30 Impact Items on the Coastal Protection Plan Questions and answers Discussions and conclusions 	<ul style="list-style-type: none"> Confirmation of Priority Sites for Coastal Protection and Rehabilitation Projects on the Southern Romanian Black Sea Shore Explanation of Selection of Priority Project Sites Questions and answers Discussions and conclusions 	<ul style="list-style-type: none"> Preliminary Design of the Priority Project at Mamaia Sud and Eforie Nord Economic Analysis and Management of the Priority Project at Mamaia Sud and Eforie Nord Comments and Discussion on the Priority Project 	<ul style="list-style-type: none"> Geophysical Conditions and Beach Erosion Problems Overall Plan of Coastal Protection and Rehabilitation Feasibility Study of Priority Project at Mamaia Sud and Eforie Nord Comments and Discussion on Coastal Protection Plan
Questionnaires	+	+	+	+
Impact Evaluation	+	+	+	+
Photos	+	+	+	+
Recording on videotape	+	+	+	+
Score and ranking of sub-sectors	-	-	-	-
Presentation:	<ul style="list-style-type: none"> Prognosis and Mitigation of Environmental and Social Impacts Possibly Induced by the Coastal Protection Plan for the Southern Romanian Black Sea Shore <p>Distribution of Consent Form to the stakeholders</p>	<ul style="list-style-type: none"> Selection of Priority Project Sites for Protection and Rehabilitation of Southern Romanian Black Sea Shore 	<ul style="list-style-type: none"> Preliminary Design, Economic Analysis and Management of the Priority Project at Mamaia Sud and Eforie Nord <p>Distribution of Opinion and Comment Form to the stakeholders</p>	<ul style="list-style-type: none"> Geophysical Conditions and Beach Erosion Problems Overall Plan of Coastal Protection and Rehabilitation Feasibility Study of Priority Project at Mamaia Sud and Eforie Nord <p>Distribution of Opinion and Comment Form to the stakeholders</p>
Content of Slides	<ol style="list-style-type: none"> Prediction of future shoreline changes without any further protective facilities COASTAL PROTECTIN PLAN AIMED AT 2020 Coastal Protection Plan and Rehabilitation Projects at Mamaia Sud and Eforie Nord Evaluation of Possible Environmental Impacts Consent Form Environmental Impact Items (JICA) with "B" showing "some impact is expected" 	<ol style="list-style-type: none"> Purpose of Priority Project Site Selection Division of Coastal Area into Sub-Sectors Shoreline Changes and Causes of Beach Erosion Estimate of Future Shoreline Changes Tentative Plan of Facility Placement and Cost Estimate Elements for Selection of Priority Project Sites Beach Use Conditions during Summer Season Selection of Priority Project Sites 	<ol style="list-style-type: none"> General Description of Project Project Objectives and Justification Project Component "A" at Mamaia Sud Project Component "B" at Eforie Nord Recommendations for Project Execution Schedule of Project Implementation Methodological Approach Financial and Economic Analyses Managerial and Operational Framework for the Project 	<ol style="list-style-type: none"> General Description of Project Project Objectives and Justification Project Component "A" at Mamaia Sud Project Component "B" at Eforie Nord Economic Analysis Managerial and Operational Framework Schedule of Project Implementation
Discussions:	<ul style="list-style-type: none"> Environment and Water Management Ministry opened the meeting and started with the first part of the presentation regarding the 	<ul style="list-style-type: none"> The team leader has started discussion by referring to the selection of the two priority sites, i.e. Mamaia South and Eforie North and 	<ul style="list-style-type: none"> The Eforie Yacht Harbor was very well built, in such a way that is protecting the beach from erosion. We have already approved at 	<ul style="list-style-type: none"> I would like to know why you estimated that the project for Mamaia and Eforie will need 4 years to be realized, because I think the intention is

Stakeholder meetings:	4th Stakeholder Meeting at Constanta	5th Stakeholder Meeting at Constanta	6th Stakeholder Meeting at Constanta	3rd Stakeholder Meeting at Bucharest
Date:	March 10th, 2006	June 6th, 2006	March 9th, 2007	March 12th, 2007
	<p>“Prognosis and Mitigation of Environmental and Social Impacts Possible Induced by the Coastal Protection Plan for the Southern Romanian Black Sea Shore”</p> <ul style="list-style-type: none"> • Invitation of local people can be very important for this project development and should be taken into consideration. • The program is available for public consultation on the Ministry of Environment and Water Management website and at the DADL office; everybody is free to convey his opinion within 18 days from the date of announcement. • There was a complaint that the documents are not explicit enough and the discussion is only about a limited number of items. • 13 items with certain impact and 17 items with no impact were explained and discussed among stakeholders. • National Department of Piscicultural Fund complained about the rating of Item no. 10 - Water Usage or Water Rights and Rights of Common — Minimal Impact, i.e. considering that the Impact will not be minimal. • Requested if the Romanian procedure for systems and plans would be taken into consideration. • Insisted for a better explanation of the choice of the two priority zones. • The feasibility study is about the coastal erosions zones except the cliffs, which are requesting additional funds. • Insisted that the Black Sea zone is a total ecological disaster and needs supplementary study. 	<p>invited the attendees to express their objections, questions or comments related to this subject.</p> <ul style="list-style-type: none"> • Mamaia, Navodari-Constanta harbor or from Eforie to Costinesti have a big touristic interest and the areas while the beaches from the cliff zones are less important, but the cliffs stability in these areas is important because they are built-up areas (in the North of Tomis harbor) or areas that are going to be built soon (the area between Eforie Sud and Tuzla). • Why was a more importance given to the Danube dredged sand over the sand dredged from the Black Sea as filling material for the beaches?” • The sustained solution of longer jetties was also motivated by the elimination of the water bad smell in one area. It is possible that in Japan, where the tides are stronger, they create currents favoring the refreshing of the water in the areas between the jetties. But here the tides are less important and it is not thought that this kind of solution will be good. • The beach administrator DADL should stop the illegal removal of beach sand. The sand is used as filling material for paving and in building. • A big quantity of sand dredged from the Danube bed will create a water discharge very similar to the one forecasted for Bistroe channel. But the presented arguments sustain that the quantity of dredged sand will not influence the discharge and will not affect the ecosystem. taking into account that we are talking about a long area Ostrov 	<p>Mangalia a new project regarding one new marina and we are thinking for new projects at Ovidiu-Constanta, Navodari, but I would like to know if your study had already included such an idea.</p> <ul style="list-style-type: none"> • If the sand is dredged from Danube River, can it be transported through Danube channel i.e. Poarta Alba-Midia Channel in order to avoid the road transport with trucks? • For the project to be approved in order to be financed, everything should be done according to a feasibility study prepared according to the Romanian methodology. This methodology requires among other things an analysis of different alternatives, including the operational costs. • I would like to know if the presented solutions can be improved or modified during subsequent stages. For instance, a continuous construction instead of the segmented one could be a better solution? And what if we lower the crests of the submerged structures? • From a technical viewpoint there is one more problem: we should be more than sure that the works will be stopped during the summer period. What will happen with all the equipment during the tourist season? • I would like to know what the durability of the new sand nourishment is. Is it true that, if we use river sand instead of sea sand, the necessary volumes are much smaller? • We should realize that this is a priority project and I believe we can take sand from other sources too. There are hundreds of sand quarries in our country. • As a 	<p>to realize the project as soon as possible?</p> <ul style="list-style-type: none"> • There are some questions regarding the sea sand quality versus river sand quality. It was already proved through analyses and other determinations that the Danube River sand has a better quality than the one from Midia. • Another problem is the transport of the sand. • For a better economical cost evaluation we should take into consideration also the dredging program for the improvement of navigation between Braila and Calarasi. • There are at least several Romanian Experts asking questions about the lifetime of the newly created beaches – i.e. the 20 years estimation may be too optimistic. • Regarding the second stage I insist that will be much better if for some more affected areas such as Mamaia North the design will start earlier.

Stakeholder meetings:	4th Stakeholder Meeting at Constanta	5th Stakeholder Meeting at Constanta	6th Stakeholder Meeting at Constanta	3rd Stakeholder Meeting at Bucharest
Date:	March 10th, 2006	June 6th, 2006	March 9th, 2007	March 12th, 2007
		and Cernavoda. <ul style="list-style-type: none"> The meeting was concluded with the participants' agreement for the two priority sites selections. 	<ul style="list-style-type: none"> recommendation for DADL a brochure with all the details should be written so that everybody could understand and learn more about this project. We don't afford to lose other beaches and if we are losing the tourists, many categories of business are losing. So we have to do something but we should find the best solutions, not necessarily the most expensive. 	

The 4th stakeholder meeting, held in Constanta on March 10, 2006 at DADL, was dedicated to the presentation of the potential environmental and social impacts of the coastal protection plan and of the mitigation measures for limiting/eliminating the impacts. Most of the ensuing discussions were related to the choice of the priority zones and the exclusion from the plan of the cliffs. The assessed impacts for some of the analyzed items were met under discussion, too. The following items were considered as underevaluated:

- Water Usage or Water Rights and Rights of Common – minimal impact estimated;
- Land use and utilization of local resources – no impact estimated;
- Soil contamination – no impact estimated;
- Offensive odor – no impact estimated;
- Air Pollution – no impact estimated;
- Accidents – no impact estimated,

while the item Coastal Zone – Mangroves, Coral reefs, Tidal flats, etc. – minimal impact estimated – was considered as irrelevant, such features being nonexistent at the Romanian littoral.

Some of the observations, such as those concerning the Air pollution, Offensive odor and Coastal zone, were pertinent and were taken into consideration for further analysis.

One of the speakers complained that insufficient attention was paid to the suggestions of the Constanta Cityhall and it was suggested that, besides DADL, local governments should also be involved in the project.

The fifth stakeholder meeting in Constanta (seventh from all stakeholders meetings) was a special, two-days event, held on June 5 and 6, 2006 at the “Ovidius” University and composed from a seminar on the natural conditions at the Romanian littoral and the proposed works for beach rehabilitations (June 5) followed by the stakeholder meeting (June 6).

The main topics of discussions were:

1. Natural Conditions (physical) of The Southern Romanian Black Sea Shore.
2. The Geomorphologic Characteristics of the Southern Romanian Black Sea Shore.
3. The General Plan for Protection and Rehabilitation of the Southern Romanian Black Sea Shore.
4. The Original Evaluation of the Ambient Environment for the Coastal Protection Plan.
5. The Temporary Conditions for establishing the Plan for Protection and Rehabilitation in Mamaia Sud and Eforie Nord.
6. The Methodology for the Economic Analyses regarding the Coastal Plan for Protection and Rehabilitation in Mamaia Sud and Eforie Nord.
7. The Confirmation of the Priority Project Site in the framework of the Coastal Plan for “Protection and Rehabilitation of The Southern Romanian Black Sea Shore”.

➤ Strategy to increase the attendance

Because the attendance at the first six meetings was poor, a more elaborate strategy was adopted in the organization of this meeting. DADL made an announcement in local newspapers twice and sent invitation letters to all NGOs listed in the Table 7.1.12: Romanian NGOs-Coastal and Black Sea Environment (page 7-27 of Volume 1). Invitation letters have also been sent to personal acquaintances of the working team interested in the project.

Also, the team decided to actively ask for participation because the passive way (announcement and invitation letters) apparently was ineffective. The team visited the mayors from seven town halls included in the project area and one of the environmental NGOs, “Oceanic Club” where it was introduced by Prof. Gomoiu, head of GeoEcoMar-Constanta, and requested them for the resident's participation.

As the meeting was done in the hall of a university, the program was posted in the campus and participation from university professors and students was obtained.

➤ Work allotment (DADL and the team)

The team and DADL had a series of meetings for the preparation of ST/M, resulting in the work allotment presented in Table 7.5.3 (DADL and the team).

Table 7.5.3: Work allotment for the stakeholder meeting (DADL and the team)

DADL	The Team
<ul style="list-style-type: none"> - Newspaper announcement - Sending invitation letters - Receptionists - Participation of the debate - Chairman of the debate 	<ul style="list-style-type: none"> - Preparation for agenda and slides of Power Point - Preparation of documents distributed - Hiring a venue and reception desk - Request for attendees by visiting mayors, university professors and NGOs - Receptionists - Making a presentation in Power Point -Recording by video-cameras and IC recorders - Employment of a simultaneous interpreter - Making minutes and participants list

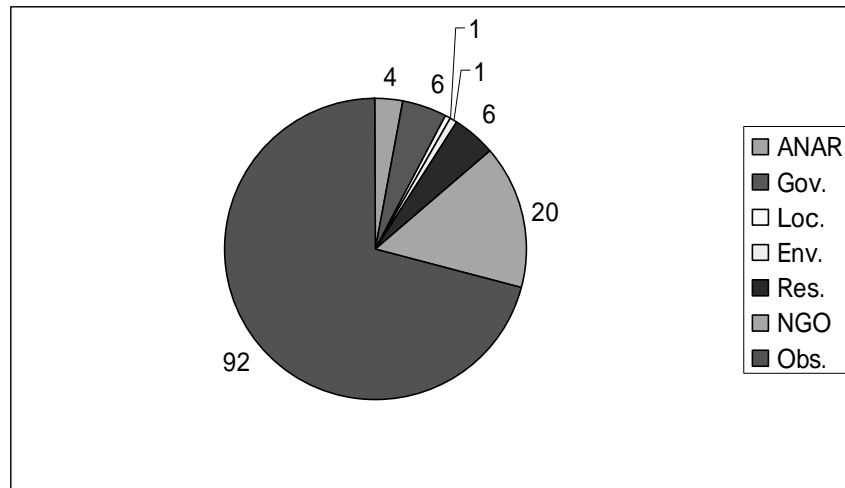


Fig. 7.5.2: Structure and number of the participants to the 5th stakeholder meeting held on 6th June in Constanta

➤ Number of participants

As a result of the adopted strategy the number of participants to the meeting increased considerably (Figure 7.5.2). The stakeholders who attended the meeting were classified in the following categories:

- NGO – NGOs on scientific and civil society, local people, hotel operators as well as journalists (see breakdown of NGOs in Figure 7.5.3)
- Res. – Scientific research institutions, universities, and design institutes
- Env. – Institutions related to environmental protection
- Loc. – Local authorities such as county, city hall, town hall etc.
- Gov. – Central public authorities and some naval offices
- Observers – University, College and High school students
- ANAR – National Administration of Romanian Waters (Bucharest and Constanța)
- JICA – JICA study team and JICA office in Romania.

The comments and opinions expressed at this meeting were unanimously appreciative, the speakers underlining the importance of the project for the promotion of the tourism industry in Romania and considering the method of selecting the priority zones as reasonable and the selection of Mamaia Sud and Eforie Nord well justified. The participation of local people to the seminar and the stakeholder meeting was especially appreciated.

Most questions were related to the causes of cliffs erosion and their exclusion from the project, the preference given to the Danube sand over the Black Sea sand and to some technical aspects of the project.

The mayor from Eforie criticized DADL for not taking any measures against the illegal removal of sand from the Eforie beaches; the sand is used as filling material for paving and in buildings.

The meeting was concluded with the participants' agreement for the two priority sites selections.

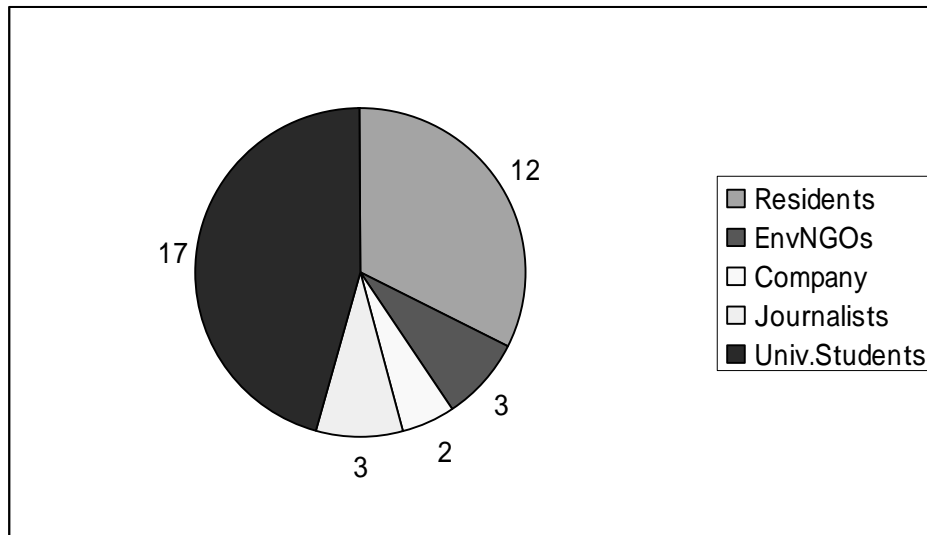


Fig. 7.5.3: Breakdown of NGOs at 5th Constanta stakeholder meeting held on 6th June

The activities of the Study team regarding the environmental and social consideration with respect to the timing of the stakeholder meetings are summarized as listed in Table 7.5.4.

The sixth stakeholder meeting in Constanta (eighth from all stakeholders meetings) was held on March 9, 2007 at the “Ovidius” University and composed from a seminar on preliminary design, economic analysis and management of the priority project at Mamaia Sud and Eforie Nord followed by the stakeholder meeting.

The main topics of discussions were:

1. General Description of the Priority Project at Mamaia Sud and Eforie Nord
2. Project Objectives and Justification
3. Project Component “A” at Mamaia Sud
4. Project Component “B” at Eforie Nord
5. Recommendations for Project Execution
6. Schedule of Project Implementation
7. Methodological Approach
8. Financial and Economic Analyses

The total of 75 people attended the meeting. Strategy to increase the attendance and work allotment was almost the same as the previous Constanta meeting. The first attendance from an international aid agency, USAID is worthy of special mention as well as that of lots of journalists (Fig.7.5.4).

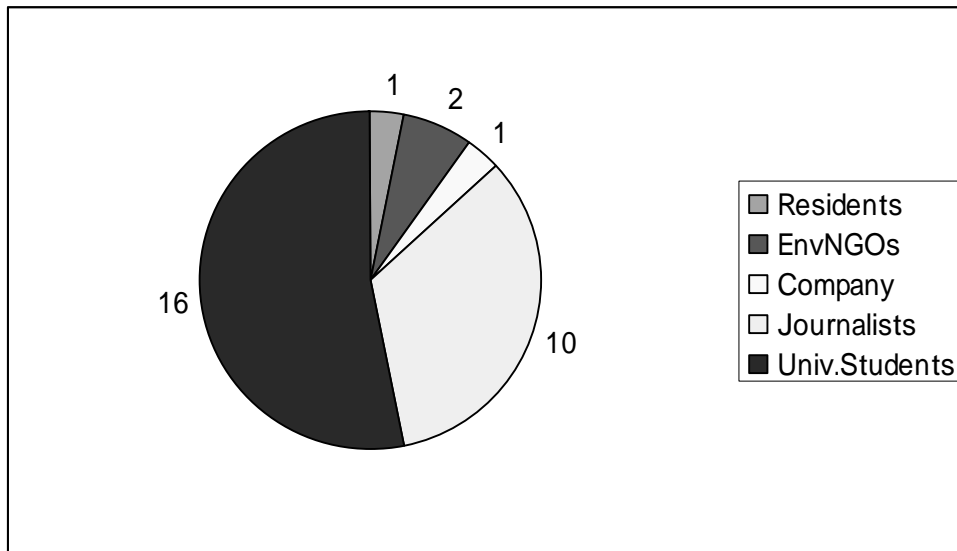


Fig. 7.5.4 Breakdown of NGOs at 6th Constanta stakeholder meeting held on 9th March 2007

The comments and opinions expressed at this meeting were:

1. Is there any construction work proposed during the summer tourist season?
2. If the sand is dredged from Danube River, can it be transported through Danube channel to avoid the road transport with trucks?
3. If we use river sand instead of sea sand, the necessary volumes are much smaller?

The third stakeholder meeting in Bucharest (ninth from all stakeholders meetings) was held on March 12, 2007 at the Inter Continental Bucharest and composed from a seminar on preliminary design, economic analysis and management of the priority project at Mamaia Sud and Eforie Nord followed by the stakeholder meeting.

The main topics of discussions were:

1. General Description of the Priority Project at Mamaia Sud and Eforie Nord
2. Project Objectives and Justification
3. Project Component "A" at Mamaia Sud
4. Project Component "B" at Eforie Nord
5. Economic Analysis
6. Managerial and Operational Framework
7. Schedule of Project Implementation

The comments and opinions expressed at this meeting were:

1. Have you checked the safety of beach fill sand?
2. A problem is the transport of the sand.
3. An alternative to sand transport by dump trucks could be the hydraulic transport. Has the plan owner ever examined such an alternative?
4. Are there some more alternatives to the sand transport by dump trucks other than hydraulic transport by a pipeline?

Table 7.5.4: Environmental activity in each study stage

Stage	Planning	Environmental activity	Stake-holder meeting	Guideline
Basic study	Supply source of sand for beach fill and examination of coastal protection plan	Execution of IEE (TOR for IEE, Selection of stakeholders, Scoping discussion, Collection of existing data, Field reconnaissance, Interview survey, Forecast and evaluation of environmental impact, Mitigation measures)	1st meeting in Constanta 1st meeting in Bucharest	JICA guidelines for environmental and social considerations, EIA regulations of Romania
Coastal protection plan	Facility arrangement plan	Execution of IEE (Scoping scheme, Alternatives, Forecast and evaluation of environmental impact, Mitigation measures, Monitoring plan, etc.) Plan of environmental and social considerations (Examination on mitigation measures) Project evaluation from the viewpoint of environmental impacts	2nd meeting in Constanta	
Selection of priority projects	Consensus building of parties concerned	Comparison from environmental and social viewpoint	3rd meeting in Constanta 2nd meeting in Bucharest	
Execution of F/S	Outline design of protection facilities and decision of construction plan	Execution of environmental impact assessment (EIA) if necessary (Plan of scoping, TOR for EIA)	4th meeting in Constanta 5th meeting in Constanta 6th meeting in Constanta 3rd meeting in Bucharest	

7.5.3 Views on Opinions from Stakeholders

Table 7.5.5 shows Views on Opinions from Stakeholders.

Table 7.5.5 Views on Opinions from Stakeholders

No.	Main opinions from stakeholders	Views of the study team / their reflection in the studies
1.	- This project will consider also to the assurance strategy of the coastal zone. (1 st Bucharest)	- Because of its contribution to the protection and rehabilitation of the coastal zone, beaches infrastructure and also the hotel zone.
2.	- Regarding the sand nourishment around the Romanian littoral, we should be very careful about the sand grain size because we may destroy the habitats if they are covered by silt and mud. (2 nd Constanta)	- Environmental data on water, sediment and benthos quality will be obtained through field survey and laboratory analyses.
3.	- Sedimentation is necessary to be taken as an important item. - The items evaluated as "A" are landscape, noise, and conflict of interest. (3 rd Constanta)	- The great difference between the two impact evaluations of the stakeholders in Constanța is an indication that emotional rather than rational reasons dominated the first evaluation. - The obligation to explain the reason for "A" significantly lowered the participant's subjectivity in assessment for the second evaluation.
4.	- The effects of the project could be negative for some local people or companies, but they are certainly positive for the entire community. (3 rd Constanta)	- Will be taken into account in the initial environmental examination both of the plan as a whole and of each coastal unit.
5.	- EIA for mining of beach nourishment sand from the River Danube is necessary, because there is a possibility that the modifications of the river course may result. - It is pointed out that item "sedimentation" should be selected as an environmental impact item. (2 nd Bucharest)	- There is no "A" evaluation, and 13 items are evaluated with a "B" indicating "some impact is expected" as the result of scoping at the coastal protection planning stage. - All the other 17 items are evaluated "D" showing "no impact is expected".
6.	- Environmental impact assessment would be necessary? (2 nd Bucharest)	- It is not absolutely necessary to have long jetties and a part of it is to be submerged.
7.	- Mamaia beach should have short submerged groins, even their construction is not easy and looks very expensive. (2 nd Bucharest)	- JICA team will study the proposals.
8.	- The Danube sand has a good grading and can be as a good source for Eforie Nord nourishment. - Concerning Mamaia South beach, Midia can be a good source of sand. (2 nd Bucharest)	- The water circulation off Midia looks very complicated and should be taken it into consideration the sediment and shells accumulations.
9.	- The answers of the participants at stakeholder meetings in Bucharest and Constanta are generally	- Either the participants from Bucharest have a better environmental training allowing a more realistic point of view or/and the participants from Constanța, more concerned about

No.	Main opinions from stakeholders	Views of the study team / their reflection in the studies
	<p>inconsistent.</p> <p>(1st, 2nd and 3rd Constanta, and 1st and 2nd Bucharest)</p>	<p>the local environmental issues of the project, worry excessively.</p> <ul style="list-style-type: none"> - Heterogeneous answers could be also a result of misunderstanding the questionnaires offered to the participants. - A campaign of arising public awareness from the littoral localities concerning environmental issues would be necessary in the future. - Despite the differences in answers, the general assessment is that the engineering works to prevent erosions and to expand the beaches will have certainly some impacts, not severe, temporary and limited to the period of works, which should be October – April, outside the touristic season.
10.	<ul style="list-style-type: none"> - Among evaluated items some impacts may occur and “No impact” is not correct. Should be evaluated again. <p>(4th Constanta)</p>	<ul style="list-style-type: none"> - The evaluated items such as air pollution, offensive order and accidents will be taken into consideration for further analysis.
11.	<ul style="list-style-type: none"> - Why more importance is given to the Danube dredged sand over the sand dredged from the Black Sea as filling material for the beaches? <p>(5th Constanta)</p>	<ul style="list-style-type: none"> - The sand dredged from Midia area has a grading mean size of 0.1 mm or less (in this case the sand being very fine, more quantities will be required) instead of the one dredged from Danube which has a grading mean size of 0.3 - 0.6 mm and it is a purely economical point of view but the comparison cost is not over yet.
12.	<ul style="list-style-type: none"> - The coastal protection and rehabilitation plan does not mention about cliff stabilization works at all. Why cliff problems are not included in the plan? <p>(2nd, 3rd, 4th and 5th Constanta)</p>	<ul style="list-style-type: none"> - The present plan is aimed at solving the coastal erosion caused by the actions of waves and currents. Most of cliff erosion and/or collapse originate from penetration of water into soil in the upper part of cliff. With increase of water content in the soil, it becomes heavy and the slope becomes unstable. - Cliff stabilization works are certainly necessary for the welfare of people and the Romanian Government will take initiatives to solve cliff problems in parallel to coastal erosion problems. - Romanian institutions have the capability of planning and designing appropriate cliff stabilization works.
13.	<ul style="list-style-type: none"> - Is there any construction work proposed during the summer tourist season? <p>(6th Constanta)</p>	<ul style="list-style-type: none"> - There will be no construction works at the beach such as placing of beach fill sand and extension and/or rehabilitation of jetties and groins along the beach area from the summer season from the middle of June to the middle of September. - Marine works for rehabilitation of existing breakwaters and construction of submerged breakwaters at the distance of 300 to 500 m from the shore, however, will be continued during the summer season, so as to shorten the construction period.
14.	<ul style="list-style-type: none"> - If the sand is dredged from Danube River, can it be transported through Danube channel to avoid the road transport with trucks? <p>(6th Constanta)</p>	<ul style="list-style-type: none"> - No license for barges transport outside the harbor. - The alternative of bringing the sand to the Ovidiu Harbor was considered but the Ovidiu Harbor is too small and it is difficult to use it. - What we prepared is a feasibility study presenting one idea. - Our proposal is not final, is one of the alternatives.
15.	<ul style="list-style-type: none"> - If we use river sand instead of sea sand, the necessary volumes are much smaller? <p>(6th Constanta)</p>	<ul style="list-style-type: none"> - Generally the required quantity of sea sand is twice the quantity of river sand”.
16.	<ul style="list-style-type: none"> - Have you checked the safety of beach fill sand such as presence of harmful ingredients? <p>(3rd Bucharest)</p>	<ul style="list-style-type: none"> - Yes we did. We took samples of the sea and river sand and analyzed the sediment contents in the laboratory if they include heavy metals and organic pollutants. - The results showed that the sand from the Danube, Cap Midia and Sulina does not contain any harmful material. - Even for PAHs, which seem to be the main pollutant, most of the proposed sources for filling sand, especially the Danube locations, show the concentration level being well below the acceptable limits. The same is valid for cadmium.
17.	<ul style="list-style-type: none"> - An alternative to sand transport by dump trucks could be the hydraulic transport, i.e. use of a dredger for sending the mixture of sand and water through a pipeline laid on 	<ul style="list-style-type: none"> - Yes we did, but we regard that alternative is not advantages over the dump truck transport nor technically feasible. - The pipeline transport of sand requires the following measures: <ul style="list-style-type: none"> 1) An underwater stockpile within the port area, which receives the sand dumped from barges by means of cranes and keeps

No.	Main opinions from stakeholders	Views of the study team / their reflection in the studies
	<p>beach from Midia Port to Mamaia Sud. Has the plan owner ever examined such an alternative?</p> <p>(6th Constanta and 3rd Bucharest)</p>	<p>the sand temporarily until it is pumped out.</p> <p>2) A powerful pump dredger to suck out sand from the underwater stockpile and push it into the pipeline. Because of no availability of Romanian pump dredgers, a search must be made for a foreign dredger outside the country. The cost of dredger mobilization for bringing her to Romania and return her to her mother port must be added.</p> <p>3) One pump dredger cannot send the mixed fluid of sand and water over the distance of 13 km between Midia and Mamaia Sud. A booster pump as powerful as the dredger must be installed every 3 km or at a shorter distance. Smooth simultaneous operation of multiple boosters is technically impossible. The maximum distance of hydraulic transport of sand by a pipeline is 6 km according to the experience of marine contractors in Japan, who have executed numerous operations of large-scale reclamation works.</p> <p>4) A pipeline must be laid out along the distance of 13 km. The pipeline must be removed during the summer season and laid again after the summer season. Some storage facilities must also be secured during the summer season.</p> <p>- The Romanian experience of pump dredging from Lacul Siutghiol for beach fill is not applicable in the present case because of large difference in the transport distance. Because of the third reason mentioned above, it is not possible to adopt the system of hydraulic sand transport from Midia to Mamaia Sud.</p>
18.	<p>- Are there some more alternatives to the sand transport by dump trucks other than hydraulic transport by a pipeline?</p> <p>(6th Constanta and 3rd Bucharest)</p>	<p>- There are three alternatives other than the hydraulic transport.</p> <p>1) Use of sea sand around Midia Port: The volume of beach fill sand is increased by 155,000 m³ to 379,000 m³ and the cost of beach fill is increased by 4.22 million Euros. In addition, an underwater dike of 1,230 m long has to be built with the net construction cost of 2.23 million Euros. The project cost with sea sand, including contingency, engineering service, etc., is increased by 7.24 million Euros to 18.97 million Euros compared to the project cost of 11.53 million Euros with the river sand transported by dump trucks.</p> <p>2) To use Ovidiu Port of the branch canal for unloading the river sand: There is a problem of small handling capacity of the quay area there and difficulty of barge operation because of small canal width. It will require some expansion of quay and apron area with the cost of some three million Euros. The necessity and required magnitude of quay expansion should be examined during the detailed design phase if so required. Because of low efficiency of barge transport through the branch canal, the total cost of sand transport may amount to twice the present cost of 4.72 million Euros. With the increase in the project cost, the economic feasibility should also be re-analyzed.</p> <p>3) To mobilize marine hopper barges of bottom-door type for sand transport from the Danube to the offshore of Mamaia via Agigea: Are required mobilization of marine hopper barges of bottom-door type and a cutter-suction dredger with an attending fleet from some foreign country. The river sand is to be dumped into a pit temporarily dug in the offshore, and a cutter-suction dredger will pump out the sand from the pit and send it through a floating pipeline system to the beach fill area. The cost of mobilization of marine hopper and a dredger will be revealed at the occasion of international bidding, but the total cost of sand transport by marine route will be similar as that of the second alternative.</p>

7.6 Draft Terms of Reference for the Environmental Impact Assessment for the Priority Projects

This draft terms of reference (TOR) was prepared by the Study team referring to the Romanian EIA regulations and submitted to Romanian Government to assist its selection of an authorized environmental consultant for carrying out the EIA procedure.

7.6.1 Necessity of EIA for Priority Projects

Environmental Impact Assessment (EIA) may be a necessary part of the procedure for obtaining the environmental agreement for implementation of a project. The decision if EIA should or should not be performed belongs to the competent authority for environmental protection. A detailed description of the entire procedure has been described in 7.1 “Policy, Legal Aspects and Administrative Framework on Environmental Protection in Romania.” The procedure is initiated by the developer of the project, led by the competent authorities for environmental protection and achieved with the participation of the public central or local authorities.

After the screening stage, if the competent authority for environmental protection decides EIA is necessary, the procedure will pass to the scoping stage. For this purpose, the competent authority for environmental protection will prepare and submit to the developer a guidance regarding the environmental issues that need to be treated in the environmental impact assessment and their extension degree.

The developer, further designated as “employer” will hire a specialized unit, natural or legal persons, independent of the developer of project and certified in the conditions of the law, further designated as “employee”, which will achieve the Environmental Impact Assessment study on the basis of the guidance issued by the competent authority for environmental protection and present the results of the report that is submitted to the competent authority for environmental protection.

According to Annex no.2 of the Government Decision 918/2002, coastal protection and rehabilitation projects are termed as the projects for which it has to be determined the necessity of achieving the environmental impact assessment [art. 10 – k)]. For preparation of a possible undertaking of EIA, a draft Terms of Reference for the Environmental Impact Assessment are drawn up on the basis of current Romanian regulations regarding EIA. The main regulations relevant for the subject are established through the Governmental Decision 918/2002 and Orders 860/2002, 863/2002, 864/2002 and 210/2004.

7.6.2 Draft Terms of Reference for the Environmental Impact Assessment

The draft terms of reference is contemplated as in the following:

- 1) The object of the contract between the employer and the employee will be the performance of the Environmental Impact Assessment study for the works within the framework of the project for protection and rehabilitation of the Southern Romanian Black Sea shore in Mamaia South and Eforie North and to draw the report presenting the results of the study.

- 2) The study shall be prepared on the basis of data and information on the project supplied by the employer and environmental data and information available in the archive of the employee and in the public domain of Romania.
- 3) The study shall use all the adequate data from previous documents such as the Initial Environmental Examination report on the coastal protection plan for the southern Romanian Black Sea shore, the relevant technical reports and memorandums etc. Relevant international information on the use of low-crested coastal defense structures will be used as well for the environmental impact assessment.
- 4) Up to date environmental data on water, sediment and benthos quality shall be obtained through field survey and laboratory analyses done by the employee. The water, sediment and benthos sampling should be done on a transect perpendicular to the shore for each considered unit. The standard water depths for sampling stations should be 0 m, 1 m, 3 m and 5 m. Two supplementary sampling stations should be done in each unit on the 5 m isobath, at the North and South extremities of the project site. Sediment sampling will be done using a Van Veen type grab and special care shall be taken to avoid contamination, especially with oil products. The water analyses should include at least nutrients, dissolved oxygen, pH, Eh, turbidity and Total Petroleum Hydrocarbons (TPH). Sediment analyses will include heavy metals, TPH, PAH and organochlorine pesticides. Biological analyses will include:
 - determination of macrofauna species
 - determination of meiofauna groups
 - evaluation of population size: density and biomass
 - assessment of size classes structure of filtering epibiotic species
- 5) Comparative laboratory analyses shall be performed on sand from the three potential sand sources – Danube riverbed, the seabed around Midia Port, and the sandbar off the Sulina Channel entrance to clarify which sand is more adequate from an environmental point of view for use as beach refill. The number of sampling stations for the sand from the Danube riverbed will depend on the length of the dredged sector. At least four sampling stations for the testing of sand quality shall be performed in the area around Midia Port and the Sulina Channel, respectively. Sediment sampling will be done with a Van Veen type grab (both areas) and if need be with a gravity corer or a multicorer (Midia Port area). Laboratory analyses should include:
 - chemical analyses: heavy metals, TPH, PAH and organochlorine pesticides;
 - biological analyses: as for the previous point;
 - sieve analysis for grain size distribution.
- 6) The employee shall prepare the report presenting the results of the Environmental Impact Assessment study.
- 7) The report shall have the general standard content stipulated by the Romanian regulations, adapted to the specific characteristics of the project and respecting the guidance of the competent authority for environmental protection. The following is a tentative table of content of the report:
 1. GENERAL INFORMATION
 2. TECHNOLOGICAL PROCESSES
 - 2.1. Production Technological Processes
 - 2.2. Decommissioning Activities

3. WASTE

4. POTENTIAL, INCLUDING TRANSBOUNDARY IMPACT ON THE ENVIRONMENTAL COMPONENTS AND MEASURES TO REDUCE IT

4.1. Water

- Water supply
- Waste water management
- Impact prognosis
- Measures for reducing the impact

4.2. Air

- Sources and produced pollutants
- Air pollution prognosis
- Measures for reducing the impact

4.3. Soil (sediments)

- Soil pollution sources
- Impact prognosis
- Measures for reducing the impact

4.4. Subsoil geology

- Impact prognosis
- Measures for reducing the impact

4.5. Biodiversity

- Impact prognosis
- Measures for reducing the impact

4.6. Landscape

- Impact prognosis
- Measures for reducing the impact

4.7. Social and economical environment

- Measures for reducing the impact

4.8. Cultural and ethnical conditions, cultural heritage

5. ANALYSIS OF THE ALTERNATIVES* – the report will include the following:

- Description of the alternatives, as following: another moment for starting the project, other technical and technological solutions, measures for reducing the impact on the environment, etc., indicating the reasons which have lead to the made choice.
- Review of the magnitude of the impact, the duration, the reversibility, the viability and the efficiency reducing measures for each alternative of the project and for each environmental component.

* The alternatives include; to do something and to do nothing.

6. MONITORING – An environmental monitoring plan shall be supplied, indicating the environmental components to be monitored, the periodical character, the parameters, and the site chosen for monitoring each factor.

7. RISK CASES

8. NON TECHNICAL CHARACTER SUMMARY

8) The report shall be prepared in close cooperation with the employer who will supply all the project-related data necessary for the report.

9) The report shall be written in English and Romanian.

10) The report shall be delivered to the employer in 20 (twenty) hard copies and one electronic copy.

- 11) The employee shall give full assistance to the employer in the public presentation of the EIA report.
- 12) If necessary, the employee, in close cooperation with the employer should integrate the public suggestions into the EIA Report.

7.7 Summary and Conclusions

The present chapter 7 deals with the environmental and social implications related to the execution of the project for "Protection and Rehabilitation of the Southern Romanian Black Sea Shore in Romania".

The chapter was structured in 6 main parts, according to JICA guidelines:

- Policy, Legal Aspects and Administrative Framework on Environmental Protection in Romania
- Description of Environmental Conditions in the Coastal Units of the Southern Romanian Black Sea Shore
- Initial Environmental Examination of Coastal Protection Plan
- Environmental Management Plan (EMP)
- Consultation with Stakeholders
- Draft Terms of Reference for the Environmental Impact Assessment for the Priority Projects

The first part briefly describes the Romanian and Local Environmental Policy and the administrative framework related to environment conservation. Environmental quality criteria for the main environmental compartments (water, air, soil, noise and vibration) are also presented. For the moment the quality criteria for water, regulated by order 1146/2002, do not include specific criteria for coastal waters. A new order, in preparation at the Ministry of Environment and Water Management, will fill in the gap modifying at the same time the older criteria for surface waters.

The subchapter includes a presentation of the main laws/guidelines related to the environmental impact assessment and a detailed description of the Romanian EIA and SEA procedures, which the project will have to follow. The SEA procedure was already initiated at the beginning of March by the Water Department of the Ministry of Environment and Water Management, notifying the Environmental Department of the same ministry on the start of the elaboration of the plan or program and carrying out of its first version. The first version of the plan was made available to the public on the ministry's website at the following address:

<http://www.mmediu.ro/ape/studiuMareaNeagra.htm>.

The second part offers a detailed discussion of the environmental conditions in the coastal units of the Romanian Black Sea shore. The discussed topics included:

- environmental pollution (soil, water, air, noise and vibration);
- ecosystems (officially protected areas, environmentally vulnerable areas, species of precious flora and fauna, vegetation), covering besides an ecological characterization of the sectors proposed for beach rehabilitation an analysis of the potential role and

ecological effects of artificial reefs (AR) constructed on the coastal sandy bottoms of the Black Sea (Romania) based on existing literature;

- land use in Constanța county;
- population at the Romanian Black Sea coast;
- waste (solid waste collection/disposal system);
- traffic and social infrastructures;
- coastal fishing;
- architectural and archeological heritage.

The general conclusions inferred from the analysis of pollution state at the Romanian littoral of the Black Sea are as follows:

- the TPH pollution chronically affects several environmental compartments: soil, water and sediments. Locally, in some hotspots, the concentrations may reach acute levels.
- the POP (PAH and organochlorine pesticides) concentration indicate moderate pollution, with concentrations generally similar to those met in other parts of the world;
- heavy metal pollution, both of marine water and near-shore sediment, does not represent a problem for the littoral;
- eutrophication has undergone a marked decrease, at the moment the nutrient concentrations being rather similar to those of the pre-eutrophication period.

The ecosystems analysis identified two major types of shores in the littoral area situated between Cape Midia at north and Vama Veche at south:

1. shores with shallow waters and sand bottoms, without cliffs, situated in Mamaia, Eforie Nord – Eforie Sud, Vama Veche areas and
2. shores with rocky and sand bottoms bordered by cliffs 20 – 30 meters high.

The benthic invertebrate associations are dominated by shells (Bivalve) – *Mya arenaria* – north-Atlantic soft-shell clam in northern part of the littoral and *Mytilus galloprovincialis* – the Black sea mussel in the southern and central part of the littoral, in waters with rocky bottoms or in the front of the beaches protected by jetties or artificial reefs. The shells of these two species formed the major part of the sediments on the beaches and contribute to the changes in the structure of the beaches.

Biodiversity is particularly high in the southern part of Romanian littoral, on the hard substratum. In this region is situated one of the most important protected areas of the entire Black Sea basin – Vama Veche – 2 Mai marine reserve. Extended on 5000 ha, between the isobaths of 2 and 20 meters and having a 7 km long shoreline, this unique area preserve one of the most riches benthic association in the western part of the Black Sea. The protection of this particular habitat is essential for the preservation of the marine biodiversity.

The functions and ecological effects of the artificial reefs (hereinafter abbreviated as “AR”) in shallow-water zones with sedimentary bottoms can be summarized as follows:

- 1) An increase in the biological carrying capacity of marine environment in the arranged zone through:
 - substratum diversification (the appearance on the sandy bottoms of hard substrata which can vary in form and structure and have a great capacity to become more complex after being populated with algae, mussels, *Balanus*, etc.);

- the creation of surfaces available for epibiontic organisms (the primary surface of artificial reefs must be several times greater than the constructed surface, and the secondary surface realized by epibiontic organisms becomes even greater);
- the extension of the space to be inhabited by benthic organisms;
- the creation of places for attraction, shelter, feeding and reproduction for numerous fishes (Gobiida, Labrida, Mugilida, etc.).

The habitat diversification, the complex stratification and the achieved spatial heterogeneity implicitly lead to the enrichment of ecological diversity in the arranged sector due to the appearance of a rich complex of epibiontic species and of demersal fishes.

- 2) The purification of coastal waters through:
 - biofiltration — the main epibiontic forms are powerful filtrators (filter-feeding) and the AR represent a real filtrating barrier;
 - bioaccumulation (at least macrophyte algae can assimilate part of the nutrients);
 - the increase in the amounts of oxygen due to the photosynthetic activity of the macrophytes which will settle on the AR.
- 3) The conversion of the existing rich primary trophic base (which is practically lost causing secondary pollution) into the biomass utilized by man (mussels) and demersal fish. After the death of calciferous forms, the broken shells enter in the sedimentary processes (a sand source for beach supply).
- 4) Coastal protection, especially when the barriers of AR are considerably long. Beach erosion can be limited or stopped by the concrete structure which takes over and dissipates the flux of the incidental energy of the waves. At the same time sheltered zones are formed, with conditions suitable for mariculture development; installations or cages for cultivating some organisms could be easily adapted under the protection of the AR (Gomoiu, 1986 b).

A rough estimation of the ecological consequences of the building out of 4.5 tons stabilopods a 100 m long section of artificial reefs at Mamaia, based on the comparative analysis of data existing in the literature, led to the following conclusions:

- By building AR out of stabilopods, the populated surface increases 4 - 65 times (the algae have not been counted — they are an ideal substratum for microphytes and protection for invertebrates and fishes); the habitat extends and diversifies.
- The specific diversity increases; besides the main sessile forms (*Mytilus*, *Mytilaster*, *Balanus*) there can appear species of Porifera, Hydroida, Bryozoa, incrustant Polychaeta (*Mercierella*, *Pomatoceros*, *Spirorbis*, etc.), Tunicata (*Botryllus*, *Molgula*), etc.; numerous fishes are certain to school around the AR (go as we mentioned above at present rich populations of goby fish especially *Gobius melanostomus* Pallas and *G. batrachocephalus* Pallas appeared in the places where the jetties of the new ports were built).
- The energy dissipated today in the eutrophication processes is turned to account through the biomasses of secondary producers (only 10% of the large-size mussels on the tronson of AR can supply 3 tons).
- Biofilter power increases 30 times, thus leading to a better water purification.

Actually, the main fishing efforts in the Romanian Black Sea Waters are represented by 41 giant pound nets (net traps installed in near shore waters), 16 beach nets (catching by surrounding the fish shoals), 3143 long lines (hooks endowed), 230 gill nets and 9 vessels – operational coastal fishing trawls. The analysis of the fish catches indicate a 16 times decrease of the fish production during the decade 1989 – 1999. The total fish catches volume in 2004 was 1,831 tons, out of which 481 (~ 25%) tons resulted from the fishing with stationary tools and 1,350 tons from the active fishing; this volume is with 19.9% higher than those realized in 2003, but is with 13.4% smaller than in 2002 and with 26% smaller than in 2001 and 2000.

Despite the great number of historical monuments, the inventory of the Historical and Cultural Heritage did not identify any such objectives in the specific areas where the works will be executed. There are some suspicions concerning the Mangalia area, but nothing really documented.

The next section contains an overview of the project and the Initial Environmental Examination (IEE) for thirty impact items. The overview of the project includes the identification of the areas for coastal protection works, the presentation of the proposed works, an estimation of the necessary construction materials and the expected changes of the coast resulting from the implementation of the plan. Two main sources were identified for the beach fill sand: the riverbed of the Danube and the seabed offshore of Midia Port.

The Initial Environmental Examination was done based on both a scientific analysis of the potential impacts of the works on thirty items and on the results of surveys done at the stakeholders meetings.

The surveys unveiled a wide variety of opinions, the answers of the participants from Bucharest and Constanta being generally inconsistent. Either the participants from Bucharest have a better environmental training allowing a more realistic point of view or/and the participants from Constanta, more concerned about the local environmental issues of the project, worry excessively. Heterogeneous answers could be also a result of misunderstanding the questionnaires offered to the participants.

Despite the differences in answers, the general assessment is that the engineering works to prevent erosions and to expand the beaches will have certainly some impacts, not severe, temporary and limited to the period of works, which should be October – May, outside the touristic season.

As the result of scoping at the coastal protection planning stage 12 items were evaluated with a “B” indicating “some impact is expected”. A 13-th item, item No. 16 - Hydrological situation, was added later, considering the potential impact of the sand mining. The remaining 17 items were considered as having no impact. The thirteen items evaluated with a "B"(some impact is expected) are listed below.

- No. 7 – Misdistribution of benefit and damage;
- No. 8 – Cultural heritage;
- No. 9 – Local conflict of interests
- No. 10 – Water usage or water rights and rights of common;
- No. 16 – Hydrological situation (sand mining effect);
- No. 17 – Coastal zone (mangroves, Coral reefs, tidal flats etc.);
- No. 18 – Flora, fauna and biodiversity;

- No. 20 – Landscape;
- No. 22 – Air pollution;
- No. 23 – Water pollution;
- No. 25 – Waste;
- No. 26 – Noise and vibration;
- No. 29 – Bottom sediments.

A further, detailed analysis of the impact on each of these items, including the realization of a graded impact matrix led to the conclusion that, excepting the cultural heritage, the impact on all the other items will be minimal. In most cases the impact will be temporary; limited to the period of construction. For the cultural heritage, in the absence of any relevant data on the existence of monuments in the interest areas, it was estimated that there would be no impact. The main reasons for this evaluation were the following:

- Item No. 7– Misdistribution of benefit and damage: Obviously, the main direct beneficiaries of the works will be the hotel owners, whose profits will most probably increase. However, increased profits mean increased taxes and, indirectly the entire community in the area will benefit from the works. Thus the impact of the works on Misdistribution of benefit and damage will be limited, being moderate at most.
- Item No. 8– Cultural heritage: At the moment there are no known sites related to cultural properties submerged below water. There are some suspicions concerning the Mangalia area, but nothing really documented. As such the impact degree in unit 7 was set -1 and to 0 for all the other units.
- Item No. 9– Local conflict of interests: The local conflict of interest is mainly determined by the misdistribution of benefits. As such the expected impact will be moderate at most.
- Item No. 10 – Water Usage or Water Rights and Rights of Common: The impact will be low. The littoral fishing with stationary tools represents only 25% of the total capture and most of the tools are located north of the study area while most fishing grounds for recreational boat fishing are situated outside the workplace. Use of part of fishing harbors situated in Units 4, 5, and 6 for the construction site may cause some inconvenience to fishermen temporarily and cause a minor negative impact on fishing activities.
- Item No. 17 – Coastal Zone (Mangroves, Coral reefs, Tidal flats, etc.): In general a project may cause coastal erosion onto neighboring beaches and/or changes in marine conditions owing to construction of structures. However, the projects envisaged in the present coastal protection plan are all contained in the coastal sediment sells of their own as described in 7.3.1 (1), and there will be no impact onto the neighboring beaches.
- Item No. 18 – Flora, Fauna and Biodiversity: The project will generally exercise a low impact on benthos and benthic plants and marine biodiversity around the area concerned. However, the impact degree in the coastal unit 8 was specially assessed as -4 due to presence in the area of the marine reserve of 2 Mai and Vama Veche where no project shall be implemented. There is expected a positive effect of hard structure construction in the sea on biodiversity of benthos, as described in 7.2.2 (2).
- Item No. 20 – Landscape: In general, a project of coastal protection and rehabilitation may deteriorate aesthetic harmony in beaches by installation of hard

structures. However, in the case of the present coastal protection plan, jetties of 200 to 400 m are located with a mutual spacing of 700 to 1,200 m and offshore structures of artificial reefs are submerged below the water. Thus the impact on aesthetic harmony is considered as minimal without mitigation.

- Item No. 22 – Air Pollution: The air pollution will be limited to the exhaust fumes of the equipment used for the execution of works and transport of materials.
- Item No. 23 – Water Pollution: The main sources of water and sediment pollution may be the sand used for beach refill and minor accidental spills of fuel and other oil products from the equipment. However, the sand mined from the riverbed of the Danube is saturated with water and do not contain silty components, and will produce little water pollution in beach fill operations. The sand mined from the seabed off Midia Port will contain a certain percentage of silty components and some silt protection measures needs be employed to mitigate the water pollution.
- Item No. 25 – Waste: The project may not yield construction waste and debris, because the materials used in the project are sand, stones, concrete blocks etc., which are all duly placed in the water as designed. Deteriorated existing structures such as groins are demolished and removed, but the demolished parts are recycled as the core materials of new jetties and artificial reefs.
- Item No. 26 – Noise and Vibration: The project may yield noise and vibration that may disturb residents, mainly owing to the traffics of dump trucks carrying beach fill sand, stones, and concrete blocks on roads. Working of backhoes, bulldozers, and other construction equipment on beaches and in the sea will not disturb residents, because the construction sites are away from residential areas.
- Item No. 29 – Bottom sediment: The project is not expected to cause contamination of bottom sediment (sand) apart from water pollution by turbidity during beach fill operations, because the construction materials are sand, stones, and concrete that do not contain any harmful materials to contaminate the bottom sediment.

A separate analysis of the impacts of the beach fill sand mining and transport was done, leading to the addition of Item 16 - Hydrological situation to the list of the items with certain impact. For each of the both potential sources, that is the Danube riverbed and the seabed east of the Midia harbor, two alternatives have been examined: "mining" and "no action". In the Danube case, the degree of impact on the hydrological situation for the last alternative was evaluated by considering the negative impact of sand accumulation on smooth navigation of ships on the Danube.

Mitigation measures are finally proposed for each of the impacted items, both in the construction and operation phases (Table 7.3.10).

The section on the Environmental Management Plan outlines a preliminary EMP and makes provisions for the environmental monitoring plan during the construction and operation phases of the project. The monitoring plan will include all the environmental compartments likely to be affected by the works.

Several stakeholders meetings were organized, both in Constanța and in Bucharest. The participants are classified as coming from the following groups:

- A. Governmental – central and local structures
- B. Water National Agency, Transports, Civil engineering, Tourism
- C. Scientific Research: marine geology and geo-ecology, environment protection and engineering
- D. Design Institutes
- E. NGOs: professional and civil society
- F. International aid agencies

Despite the invitation to the second meeting held in Constanța, addressed by Apele Române to twenty selected residents, whose participation was considered by the study team as most important, none cared to attend. The situation was rather similar for the third meeting.

The results of the surveys done on these occasions were already presented. Among the other expressed opinions, relevant for the project were the following:

1. The effects of the project could be negative for some local people or companies, but they are certainly positive for the entire community.
2. This project will consider also to the assurance strategy of the coastal zone, because of its contribution to the protection and rehabilitation of the coastal zone, beaches infrastructure and also the hotel zone.
3. Regarding the sand nourishment around the Romanian littoral, we should be very careful about the sand grain size because we may destroy the habitats if silt and mud cover them.
4. Mamaia beach should have short submersed groins, even their construction is not easy and looks very expensive – JICA team will study the proposals.
5. The Danube sand has a good grading and can be a good source for Eforie Nord nourishment. Concerning Mamaia South beach, Midia can be a good source of sand but the water circulation in this area looks very complicated and should be taken into consideration the sediment and shells accumulations.

The 5th stakeholder meeting in Constanta was concluded with the participants' agreement for the selections of two priority sites, Mamaia Sud and Eforie Nord.

A draft Terms of Reference (TOR) for the Environmental Impact Assessment ends the chapter. TOR establishes the main tasks for the natural or legal persons, independent of the developer of project and certified in the conditions of the law, hired to realize the Environmental Impact Assessment Study and to draw the report presenting the results of the study.

The final conclusions of the studies and analyses performed within this chapter are as follows:

- the project will exert a certain impact on a limited number of the analyzed items (13);
- in all cases the impact will be minimal and temporary in most of them;
- mitigation measures for the impact on all affected items and a monitoring program for the most important potentially affected environmental compartments were foreseen.
- the SEA procedure for obtaining the environmental approval was initiated. SEA does not exclude EIA, the decision on the necessity for EIA belonging to the Regional Environmental Agency Galati (GD 1076/2004, Art. 39(1)).

CHAPTER 8:

ADMINISTRATION AND FINANCING OF COASTAL PROTECTION PLAN

Chapter 8 Administration and Financing of Coastal Protection Plan

8.1 Administration of Coastal Protection Plan

The proposed plan of coastal protection and rehabilitation of the southern Romanian Black Sea shore covers a long time span; the first stage from 2007 to 2020 and the second stage after 2021. Because of the wide coastal area to be protected and the limitation in the financial resources, the plan must be executed consecutively year after year. To ensure the realization of the coastal protection plan, there should be established a special coastal administrative unit within the Ministry of Environment and Water Management (MoEWM) in charge of coastal protection and rehabilitation. In tandem, corresponding sections should be established in the Water Directorate Dobrogea Litoral (DADL) and possibly in the National Administration Romanian Waters Headquarters (ANAR HQ) as well as Regional/Local Environment Protection Agencies.

The roles and responsibilities assigned to the special coastal administrative unit and sections are *inter alia* as follows:

- 1) Prepare the execution plan of coastal protection and rehabilitation works for the Romanian Black Sea shore, take appropriate measures for its timely execution, and revise it as necessary,
- 2) Secure the fund for implementation of the sequential projects in respective phases,
- 3) Invite consulting firms for feasibility studies and engineering services in respective projects,
- 4) Administer individual projects for coastal protection and rehabilitation,
- 5) Collect the relevant information and data, construct the database, and maintain it in good order,
- 6) Secure the fund for coastal monitoring in **8.2** and execute the monitoring continuously without intermission,
- 7) Execute maintenance works as the needs arises, and
- 8) Review and revise the overall coastal protection plan as necessary.

The special coastal administrative unit should be composed of the permanent staff with the minimum number of four as in the following:

- | | |
|----------------------|--|
| a) Leader: | Overall management of coastal protection plan and project implementation |
| b) Deputy Leader: | Coordination of coastal protection plan and project implementation |
| c) Civil engineer: | Planning and supervision of engineering matters |
| d) Environmentalist: | Planning and supervision of monitoring program |

The special coastal administrative unit as well as the corresponding sections in ANAR and DADL should be provided with written documents for the authority and competence of each officer in the unit, which shall be made public. With this measure, the unit and sections will be able to make speedy decisions by themselves.

It should be kept in mind that the priority projects selected at Mamaia South and Eforie Nord are just the beginning of the overall and long-term coastal protection/rehabilitation plan. They should be succeeded by the projects at other sub-sectors. Alteration of the timing of project implementation proposed in the coastal protection plan is the competence of the special unit to be

relevance. PIU also functions as a secretariat of Steering Committee that is called for at least once a month in Constanta.

Unlike other project implementation scheme under the finance of the World Bank, the Japan Bank for International Cooperation (JBIC) and/or other bi-lateral aid agencies/international financing institutions (IFIs), PIU substantially has little authority and power delegated for fund management. Accounts for replenishment of loan proceeds and grants are opened and managed by CPCU, and disbursements are eventually made by CFCU upon the receipt of a Request for Interim Payment from Contractor, certified by the consultants, and endorsed by PIU. As for the EBRD loan funds, payment requests are forwarded through the endorsement of PIU to EBRD, and payments take place directly from EBRD to suppliers (Direct Payment Method). As seen in the above, the mechanism of fund management now in place constitutes part of governance and fiduciary accountability in project management.

In line with the framework as reflected in the foregoing, CFCU holds the overall authority in project management inclusive of procurement of consultants and contractors, fund flow, financial recording, accounting and auditing, evaluation, and others of relevance. In the case of ISPA sewerage and wastewater treatment plants rehabilitation project in Constanta, Mr. Razvam Liutiev at CFCU (0727-895048), Bucharest, is in this charge. In the wake of the commencement of the project, the Danish Government financially supported MoPF in procurement of consultant (CFCU under the assistance from the Danish government procured the consultant (CES Consulting Engineer, Germany) and contractors for each of the four engineering components included in the project³. The consultant is to report progress made and issues addressed to CFCU and EC in Bucharest, with CCs to the institutions of relevance inclusive of MoEWM, National Administration of Romanian Water (ANAR), and others.

(3) WB-supported project – hazard risk mitigation and emergency preparedness project (HRMEP) project in Romania (Project ID: P0751)

In support of the government's firm commitment to reduce the environmental, social, and economic vulnerability to natural disasters⁴ and catastrophic mining spills of pollutants, the World Bank (WB), in compliance with the Bank's assistance policy for the sector as reflected in the Country Assistance Strategy (CAS), financed the Hazard Risk Mitigation and Emergency Preparedness Project (HRMEP Project) in 2004. The specific objectives of the project include the following:

- (i) strengthening the institutional and technical capacity for disaster management and emergency response through upgrading communication and information system,
- (ii) implementing specific risk reduction investments for floods, landslides and earthquake,
- (iii) improving the safety of selected water-retention dams, and
- (iv) improving on a pilot basis the management and safety of tailing dams and waste dump facilities.

The project cost in aggregate stood at US\$203.6 million of which WB-the International Bank for Reconstruction and Development (IBRD), WB-the International Development Association

³ Contracts took place in compliance with the so-called FIDIC Yellow-Book that brought about lump-sum contracts with the contractors.

⁴ The country has suffered from natural disasters in the past, with the recent incidences including, among others, the 1977 earthquake with 7.2 on the Richter scale, the 1991 flood inundating about 1,400km², and the 1997 and the 1998 floods. The economic burden accruable to these disaster are estimated at US\$2 billion, US\$0.5 billion, US\$0.3 billion, and US\$0.2 billion equivalents, in that order. (source: WB, *Ibid.*, 2004, (p.5)

established. For example, the water pollution problem enhanced by insufficient water circulation between closely-spaced groins at a certain sub-sectors can be mitigated by early implementation of widely-spaced long jetties with beach fill projects stipulated in the proposed coastal protection plan. The special coastal administrative unit may accelerate implementation of the project at a sub-sector with acute water pollution problem in coordination with the authorities responsible for waste water treatment.

The special unit within MoEWM dedicated for coastal protection and rehabilitation should administratively be differentiated from Project Implementation Unit (PIU) to be set up for the execution of the priority projects at Mamaia South and Eforie Nord. The special unit has the responsibility of administering the long-term plan, while PIU functions for individual projects that last for several years only. Nevertheless PIU may function as the special sections to be established within DADL, and possibly ANAR HQ, during the period of the initial coastal protection project implementation. For reference, the indicative TOR for PIU is given as Appendix K in Volume 2.

8.2 Coastal Monitoring and Maintenance Plan

Successful administration of the southern Romanian Black Sea shore is totally dependent on diligent execution of geophysical, environmental, and structural monitoring. Geophysical monitoring include inter alia:

- 1) Continuation of the annual and seasonal beach profile survey having been conducted by the National Institute for Marine Research and Development “Grigore Antipa” (NIMRD),
- 2) Continuation of the hourly measurement of the water level at Constanța and Mangalia having been conducted by NIMRD,
- 3) Continuous wave and current measurements with the JICA equipment, which have been initiated in December 2005, and
- 4) Bathymetric and topographic survey of the whole coastal area on a regular basis at least in the five year period.

Execution of the Study as summarized in the present report was impossible without the information on beach profiles and water level provided by NIMRD. The topographic survey maps compiled in the report by PROIECT S.A. described in **4.1.1** were the sole data source of the calibration of the numerical model for shoreline changes. Without these map data, the reliability of the numerical model could not be maintained. The wave climate analysis in the Study has mainly depended on the wave hindcast data by the European Center for Medium-Range Weather Forecast, supplemented by a long record of visual observations provided by NIMRD. Continuation of wave and current measurements with the JICA equipment is indispensable for reliable planning and designing the forthcoming projects of coastal protection and rehabilitation in the second phase and later ones.

The items and the methods of geophysical monitoring are elaborated in Appendix H of Volume 2.

Environmental managing plan (EMP) during and after the priority projects has been described in **7.4**. The principles of EMP should be adopted in execution of the overall coastal protection plan. From this viewpoint, regular surveys of marine fauna and flora along the southern Romanian Black Sea shore should be commissioned to competent institutions by the special coastal administrative unit of MoEWM or the special sections of ANAR and DADL.

New beaches to be created by the coastal protection and rehabilitation projects will naturally change their shapes depending on seasons and years. Monitoring of the topography of new beaches and adjacent coastal areas should be carried out frequently as described in Appendix H of Volume 2.

The special coastal administrative unit of MoEWM and the corresponding sections of ANAR and DADL should make regular inspection of the existing and new shore protection facilities for their structural integrity at least once in five years. Based on the result of the inspection, the administrative unit and sections should prepare the plan of structural rehabilitation as such necessity arises. If excessive erosion of beaches, especially around the newly filled areas, are found, the coastal administrative unit and sections should prepare an emergency plan for beach rehabilitation. Even though the proposed coastal protection plan has been designed to minimize the maintenance beach fill, expectation of no necessity of maintenance work is unrealistic. The required amount of the maintenance supply is clarified only through regular measurements of beach topography, and it is the responsibility of the special coastal administrative unit of MoEWM and the corresponding sections of ANAR and DADL.

It should be stressed that the monitoring program and its trustworthy execution are the obligation of MoEWM as the owner of the coastal protection and rehabilitation plan. The Article 26 of the Government Decision no.1076/2004 (regarding SEA) stipulates that the owner of the plan must submit the monitoring program on environment effects as a part of the documents to obtain the environmental approval from the competent authority for environment protection. The Article further states that the accomplishment of the monitoring program is the responsibility of the plan owner, who must submit annually the results of the monitoring program to the competent authority for environmental protection. The monitoring program should include the geophysical monitoring described above as well as the monitoring of water quality, fauna and flora, and other environmental elements.

8.3 Management Assessment and Institutional Aspects

8.3.1 Project Implementation Framework

(1) Organization framework for project implementation

A managerial and operational framework for the envisaged coastal protection and rehabilitation project on the Black Sea shore should be considered on a possible and sustainable basis, while taking a close look at the diagrams associated with the ongoing projects in Romania under the auspices of EU (ISPA fund) and the World Bank. As such, this section provides the current practice of project management, with an emphasis on the share of responsibility among the game players (administrative stakeholders).

With the above in view, the legal framework for coastal protection is given in **8.1.2** of Volume 2, whereas the schematic cum operational framework specifically devised for the proposed projects with a bearing on managerial modality as discussed and agreed with the officials at MoEWM and DADL being provided in **8.2.2** of Volume 2. While it would still be early to specify the mechanism of fund management and procurement, the prospective implementation procedures covering procurement, fund management, and monitoring and evaluation (M/E) are also provided in the subsequent section of the same report in **8.3.2**.

(2) EU-funded project – ISPA sewerage system and wastewater treatment plants rehabilitation project in Constanța (2000/RO/16/P/PE/003)

Faced with a serious degradation of water and ambiance quality attributable to the Black Sea shore region in Constanta accruable to untreated effluents and industrial wastewater discharged, the Government of Romania together with the European Union (EU) and the European Bank for Reconstruction and Development (EBRD) embarked on the improvement of environment infrastructure in the city while commencing the Sewerage System and Wastewater Treatment Plants Rehabilitation Project (2000/RO/16/P/PE/003) in 2002. The project, with the overall objective of improving water quality of the Black Sea coast area in a way to have the city's environment quality comply with the requirements of Accession Partnership, is to (i) rehabilitate and newly establish the wastewater treatment plants (WWTPs) in Constanta North (Contract A), (ii) rehabilitate sea outfalls for Constanta North and Eforie South WWTPs (Contract B), (iii) rehabilitate Constanta pumping stations, sewerage network, and Constanta South overflows (Contract C), and (iv) extend Eforie South WWTP (Contract D).

The aggregate project cost amounts EUR 96.6 million, of which EU, EBRD, and the County Council of Constanta account for 75 percent (EUR 72.4 million grant), 21 percent (EUR 20 million loan), and the balance of 4 percent (EUR 4.1 million own-fund), in that order.¹ The Project components under the auspices of EU financing scheme of the Instrument for Structural Policies for Pre-Accession (ISPA) include Contract A, B, and D, whereas EBRD loan covering Contract C. Local cost portion of the project is covered by the County Council own fund.

¹ Reference: European Union, *ISPA in Constanta* (leaflet), 2002

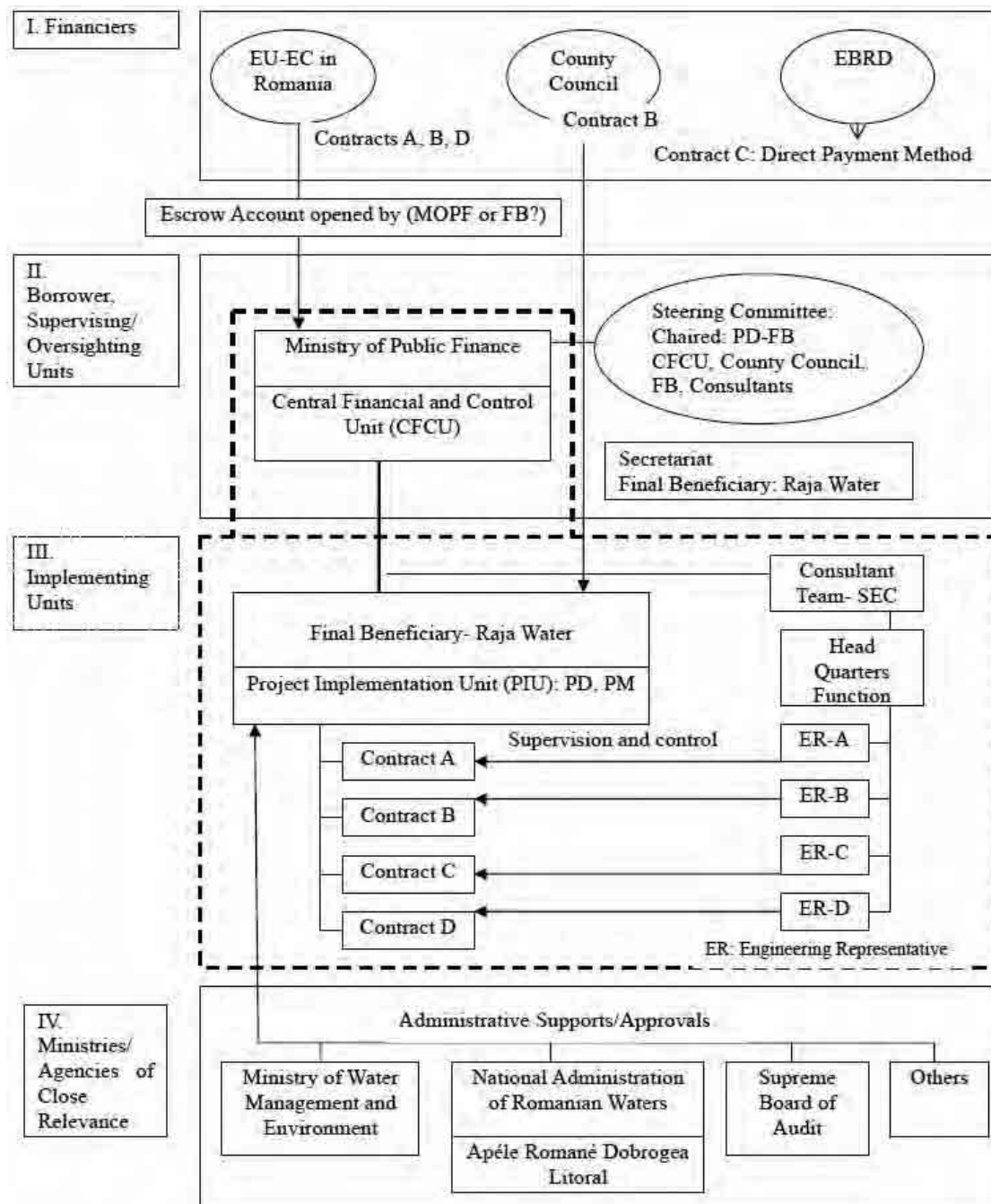


Fig. 8.3.1: Institutional framework for project implementation and fund management

A project financed by external sources involves a number of governmental ministries, agencies and other institution, which may be called “game players.” In case of an EU-financed project to be described in the next item (2), the game players in the arena of implementation and management of projects include:

- i) The Ministry of Public Finance;
- ii) Steering Committee;
- iii) Final Beneficiary;
- iv) Project Implementation Unit;
- v) Consultant team for project management; and
- vi) Other ministries/agencies in close relevance.

The institutional framework for project implementation and fund management is shown in Fig. 8.3.1. The Ministry of Public Finance (MoPF)² is a receiver/borrower of external loan funds, as a signer of Financial Memorandum/Loan Agreement on the Romanian side, and holds legal authority to manage funds in all aspects. Of the divisions in MoPF, Central Financial and Control Unit (CFCU) is the central figure in project management, while procuring consultants/contractors, providing administrative guidance and all of the financial and contractual concurrence/approvals to project implementing body in consultation with Steering Committee (SC). Requests for approval of procurement documents and for payment are checked based on the consultant's certification, and sequentially disbursed from the MoPF accounts. SC is an advisory body chaired by Project Director at Final Beneficiary, namely, Raja Constanta (Constanța Water Company), with regular members of CFCU, County Council (project financier), and the consultant team. Concerned ministry/agency, such as the Ministry of Environment and Water Management (MoEWM) is called for attendance and provide views and opinions, as necessary. Final Beneficiary (FB, Raja Constanta) is a kind of project executing agency as power and authority in association with technical issues has been devolved from CFCU, while Project Management (or Implementing) Unit (PMU/PIU) being set up as a specialized unit within Final Beneficiary (FB). FB with PIU as a front-line operator of the project plays a role of, among others, project coordinator for the project contractors and the consultants. Tasks as borne out by FB and PIU includes, for instance, administrative support and endorsement for contractors to acquire lands, obtaining approvals of land use and others as necessary from national and local-level agencies of

² In the following, many abbreviated words are used. For reference, they are listed below.

ANAR:	National Administration Apelo Romane (Romanian Waters)
CFCU:	Central Financial and Control Unit
CIGCCE:	Inter-Ministerial Committee for Guarantees and Credits for External Trade
DADL:	Directorate Apelor Dobrogea – Litoral (Department of Waters Dobrogea – Litoral)
EBRD:	European Bank for Reconstruction and Development
EU:	Europe Union
FB:	Final Beneficiary
GEF:	Global Environment Facility
GOR:	Government of Romania
HRMEP	Hazard Risk Mitigation and Emergency Preparedness Project
IFI:	International Financing Institution
IMF:	International Monetary Fund
JBIC:	Japan Band of International Cooperation
LCS:	Lease Cost Selection
IDA:	International Development Association (WB group)
M/E	Project monitoring and evaluation
MoAI:	Ministry of Administration and Interior
MoEWM:	Ministry of Environment and Water Management
MoPA	Ministry of Public Administration
MoPF:	Ministry of Public Finance
MoTCT:	Ministry of Transport, Construction and Tourism
MTEF:	Medium-Term Expenditure Framework
NAMR:	National Administration of Mining Resources
PCO:	Primary Credit Order
PMU (PIU):	Project Management (Implementation) Unit
QC:	Consultant Qualification
QCBS:	Quality and Cost Based Selection
SC:	Steering Committee
VAT:	Value Added Tax
WB:	World Bank (International Bank of Reconstruction and Development, IBRD)

relevance. PIU also functions as a secretariat of Steering Committee that is called for at least once a month in Constanta.

Unlike other project implementation scheme under the finance of the World Bank, the Japan Bank for International Cooperation (JBIC) and/or other bi-lateral aid agencies/international financing institutions (IFIs), PIU substantially has little authority and power delegated for fund management. Accounts for replenishment of loan proceeds and grants are opened and managed by CPCU, and disbursements are eventually made by CFCU upon the receipt of a Request for Interim Payment from Contractor, certified by the consultants, and endorsed by PIU. As for the EBRD loan funds, payment requests are forwarded through the endorsement of PIU to EBRD, and payments take place directly from EBRD to suppliers (Direct Payment Method). As seen in the above, the mechanism of fund management now in place constitutes part of governance and fiduciary accountability in project management.

In line with the framework as reflected in the foregoing, CFCU holds the overall authority in project management inclusive of procurement of consultants and contractors, fund flow, financial recording, accounting and auditing, evaluation, and others of relevance. In the case of ISPA sewerage and wastewater treatment plants rehabilitation project in Constanta, Mr. Razvam Liutiev at CFCU (0727-895048), Bucharest, is in this charge. In the wake of the commencement of the project, the Danish Government financially supported MoPF in procurement of consultant (CFCU under the assistance from the Danish government procured the consultant (CES Consulting Engineer, Germany) and contractors for each of the four engineering components included in the project³. The consultant is to report progress made and issues addressed to CFCU and EC in Bucharest, with CCs to the institutions of relevance inclusive of MoEWM, National Administration of Romanian Water (ANAR), and others.

(3) WB-supported project – hazard risk mitigation and emergency preparedness project (HRMEP) project in Romania (Project ID: P0751)

In support of the government's firm commitment to reduce the environmental, social, and economic vulnerability to natural disasters⁴ and catastrophic mining spills of pollutants, the World Bank (WB), in compliance with the Bank's assistance policy for the sector as reflected in the Country Assistance Strategy (CAS), financed the Hazard Risk Mitigation and Emergency Preparedness Project (HRMEP Project) in 2004. The specific objectives of the project include the following:

- (i) strengthening the institutional and technical capacity for disaster management and emergency response through upgrading communication and information system,
- (ii) implementing specific risk reduction investments for floods, landslides and earthquake,
- (iii) improving the safety of selected water-retention dams, and
- (iv) improving on a pilot basis the management and safety of tailing dams and waste dump facilities.

The project cost in aggregate stood at US\$203.6 million of which WB-the International Bank for Reconstruction and Development (IBRD), WB-the International Development Association

³ Contracts took place in compliance with the so-called FIDIC Yellow-Book that brought about lump-sum contracts with the contractors.

⁴ The country has suffered from natural disasters in the past, with the recent incidences including, among others, the 1977 earthquake with 7.2 on the Richter scale, the 1991 flood inundating about 1,400km², and the 1997 and the 1998 floods. The economic burden accruable to these disaster are estimated at US\$2 billion, US\$0.5 billion, US\$0.3 billion, and US\$0.2 billion equivalents, in that order. (source: WB, *Ibid.*, 2004, (p.5)

(IDA), and the Government of Romania (GOR) financed respective of US\$150.0 million loan (73.7%), US\$7.0 mil GEF grant (3.4%), and US\$ 46.6 million equivalent (22.9%). The project comprises the following four components, *id. est.*,

- A. Strengthening of Emergency Management and Risk Financing Capacity (MoAI: US\$10.91 million),
- B. Earthquake Risk Reduction (MoTCT: US\$71.2 million),
- C. Flood and Landslide Risk Reduction (MoEWM and ANAR: US\$101.09 million), and
- D. Risk Reduction and Mining Accidents on Tisza Basin (NAMR: US\$15.25 million).

Specifically, PMU is responsible for (i) implementation of the project component, (ii) monitoring and evaluation (M/E), (iii) financial management, (iv) procurement: preparation of TOR and bidding documents for goods and services, evaluation of bids, signing the contracts, monitoring and management of contracts, and certification and/or commissioning of delivered products and services. PMU will proceed with procurement processing under the assistance of consultants in the preparation of designs, bidding documents and supervision/verification. In the meantime, PMU in MTCT will be in a position to coordinate overall aspects of project implementation while directly being involved in financial management in each of the project components as somewhat detailed in the following, as well as procurement and operations providing *ad hoc* advises and guidance as requested.

A brief look at the scheme of project management inclusive of the operational schemes of fund flow and procurement is depicted and given in Fig. 8.3.2.

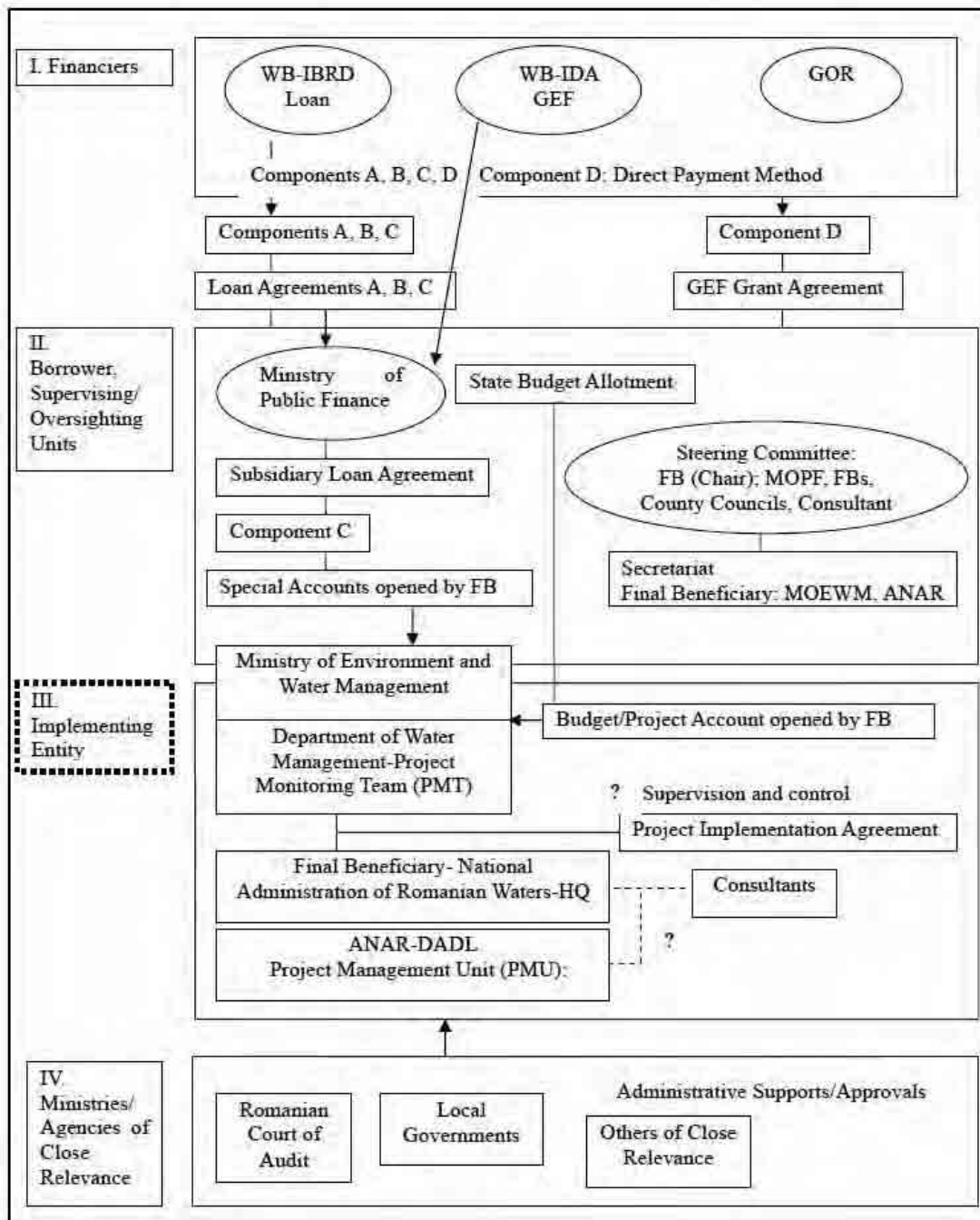


Fig. 8.3.2: Implementing framework for RHEP project

8.3.2 Fund Management

(1) Fund management of EU-financed ISPA project

Regardless of financing sources, the schematic framework for and operational modality are seemingly almost the same. With this, the descriptive analysis of fund-flow in the following will also be applicable to the World Bank-financed projects⁵.

⁵ Reference: WB, Project Appraisal Documents, The Hazard Risk Mitigation and Emergency Awareness Project, 2004, The Agricultural Pollution Control Project, 2001, The Health Sector Reform Project, 2004

(a) In-flow of funds

In the wake of signing and approval of Financial Memorandum between the Government of Romania and EU, an escrow account that is a trust account held in the borrower's name to hold money pledged and to be used solely for a designated obligation is opened by MoPF to receive replenishment of EU grant fund. With regard to the EBRD loan fund, direct payment method is taken up by the Bank, thereby incurring no transactions in the country. County Council local fund is disbursed to the local currency account opened at the Romanian commercial bank and managed by Final Beneficiary (Raja Waters).

(b) Out-flow of funds: procurement

As previously noted, the Project comprises four contracts (components), *namely*,

- (i) wastewater treatment plants (WWTPs) in Constanța North (Contract A),
- (ii) Constanta North and Eforie South WWTPs (Contract B),
- (iii) Constanta pumping stations, sewerage network, and Constanta South overflows (Contract C), and
- (iv) Eforie South WWTP (Contract D). These contracts are being implemented by Co-signers of checks/documents of relevance for procurement are Project Directors of PIU and the consultant team.

Value Added Tax (VAT) is not included in tender prices as submitted by prospective suppliers to contracting authority, while the amount of duties and taxes inclusive of VAT incurred to procured goods and services for project is to be included in the estimation of a *Total Project Cost*. This is of importance for financiers, with international/bilateral financing institutions such as the World Bank, The European Bank for Reconstruction and Development, the Japan Bank for International Cooperation, and others alike in particular. While the cost component of “taxes and duties” is not eligible for loan assistance, Romanian Government or contracting authority is in a position to pay for. In general, VAT paid by project implementation authority and remitted to the Revenue Commissioners of Romania is not to be recovered.

(2) Procurement Guidelines under EU-Financed Project Scheme

As noted by the European Union⁶, procurement of goods and services involved in the public sector development projects should be carried out in the framework of *Public Financial Management (PFM)*, while securing accountability, transparency, predictability, and participation in practices. In so doing, honesty and fairness in carrying out procurement is an underlying principle and a *Must*. Likewise, contracting authorities need to be cost-effective and efficient in the use of public resources in pursuance of *Value for Money* in project management, while upholding morality, integrity, and the highest standard of output quality. In this light, public sector procurement in Romania is subject to audit and scrutiny under the Controller and Auditor General (Amendment) Act 1993, and auditors are accountable to the public for expenditures incurred⁷.

Indicatively the Guidelines under EU-financed projects provide the schematic framework for procurement of goods and services with the following threshold values⁸:

⁶ The European Union, *Public Procurement Guidelines-Competitive Process*, 1994, p.6, www.etenders.gov.ie

⁷ As part of implementation framework for Public Financial Management, the country's supreme institution of public auditing is requested to duly undertake not only compliance accounting, but also Value for Money performance auditing for government ministries and or public entities.

⁸ Reference: EU, *Ibid.*, 1994, www.etenders.gov.ie

- i) Goods and services under EUR 5,000 in value might be procured by verbal quotes from one or more competitive suppliers; and
- ii) Supplies or services contracts between EUR 5,000 and EUR 50,000 in value might be awarded by responses to specification sent by fax or e-mail to at least three suppliers or service providers.

To note that land acquisition for the Constanta North WWTP component of the ISPA project (Contract A) took one year⁹ that inevitably pushed back the construction schedule to the consecutive years.

(3) Fund flow of WB-financed project (HRMEP)

Under the conditions satisfactory to the Bank, PMU is to open the Special Account (Special Account Method) in a commercial bank to cover finance needs arising in each of the project components in concern. Foreign currency deposit released from the Bank is to be transferred to a local currency transfer account while being converted to the Romanian currency as needed to finance eligible expenditure payments in local currency to domestic suppliers. In order for the Bank as well as GOR to allow for consistent supervision, monitoring and reporting on the project as a whole, PMU at MTCT will be responsible for the consolidation of project management reports inclusive of the Project Financial Statements. Likewise, PMU in MTCT will be responsible for devising the project's financial procedures manual and preparing financial monitoring reports.

With regard to the Component C, the responsibility for fund management including of the opening and operating of a Special Account is carried out by the Water Management Department of MoEWM. Loan proceeds in local currency from the Special Account of MoEWM will be advanced to the ANAR's transfer account on a monthly basis, sufficient to cover project expenditures in the following month. Likewise, local funds from the State will also be transferred to the dedicated local currency account of ANAR.

8.3.3 Auditing System

(1) Auditing¹⁰

The conceptual as well as operational frameworks of Public Financial Management for sound management of public funds inclusive of those from external sources duly call for the function of public auditing as one of the key institutions in monitoring, guidance, and evaluation of performances by public service providers, *vis-à-vis*, project implementing agency and project management unit in concern. Within this framework in general, policies, rules, and procedure guidelines of public auditing cover the following:

(a) *Financial audit (compliance auditing)*

The audit approach is to be on the risk based concepts and covers such matters as general auditing concepts, planning, conduct of the audit, documentation, quality control, audit approach for similar situations, audit of operating statements and balance sheet. It also deals with works of internal auditing and analytical procedures in place in public entities.

⁹ Interview at the ISPA Project Engineering Office for the Contracts A and D on 26 October 2005

¹⁰ WB, *Ibid.*, 2004, pp.99-100

(b) Financial reporting

Information on the general reporting standards as well as guidance and document samples in relation to independent audit reports, management letter, engagement letter, solicitor's representation letter, client representation letter etc are to be delineated, legalized, and duly complied with.

(2) Multiple layer of auditing system on HRMEP project

With regard to the Romanian public auditing, some shortfalls in procedures and controls had been pointed out including, among others, inadequate documentation procedures and control, contract monitoring and invoice payment procedures, and financial management and disbursement procedures. In the light of the above, a project accounting procedure manual has been developed in due course of the project implementation for the uniform use by all of the entities directly involved (MoAI, MoTCT, MoEWM, ANAR, NAMR). The project accounting books and records at the agencies involved are to be maintained on a cash basis (cash-accounting) and denominated in Romanian currency, whereas those for the Special Accounts on accruable basis (accruable accounting) to maintain the currencies from WB-IBRD loan and WB-IDA GEF grant. An auditing arrangement for the project has been set out as outlined in the following.

(a) Internal auditing

While all of the involved entities have an internal audit department, auditing of the concerned Project is to be incorporated in their annual work program as part of their overall activities.

(b) External auditing

The project is to be audited annually by an audit firm in compliance with the Bank's Terms of Reference for auditing. The scope of audit includes all of the project's books and records as maintained by the project implementing entities, all withdrawal application, and the Special Accounts, with audit project financial statements together with the auditor's opinion thereon to be submitted to the Bank within six months of the end of reporting period, being the fiscal year. The project management unit (PMU) in the Ministry of Telecommunication, Construction, and Tourism (Component B, MoTCT) is to be responsible for contracting an external audit firm for all of the project entities, and subsequently to coordinate auditing for the entire project components. In addition, the Romanian Court of Accounts (COA), the country's supreme audit institution, is to undertake ad hoc external audits of the public entities, inclusive of those directly involved in the Project.

It would be noteworthy that the external audit contracts for the Ministry of Administration and Interior (MAI), MoTCT, MoEWM and NAMR are to be financed by the Loan, whereas that for ANAR financed by its own source.

8.4 Project Financing to the Coastal Protection Plan**8.4.1 Possible Funds for the Coastal Protection Projects****(1) Environmental fund¹¹**

In 2001, the Ministry of Public Administration (MoPA) of the Government of Romania undertook the study on the need for the enhancement of environment management in the country and the

¹¹ Reference: The Danish Environmental Protection Agency, *Romania's Road to Accession-The Need for an Environmental Focus, Chapter 6. Financing Compliance with the EU Requirements, including Management of EU Funds*, 2002 (www.mst.dk/homepage)

associated cost incurred to its implementation over the period up to 2030¹². In aggregate EUR17.7 billion was estimated for the long-term period during 2002-2030, while allocating the funds to rehabilitate and develop (i) wastewater and sewerage network in rural areas (EUR5.4 billion, 30.6 percent), (ii) wastewater and sewerage network in urban areas (EUR4.1 billion, 23.7 percent), (iii) centralized heating system (EUR6.8 billion, 38.5 percent), and (iv) sanitation-municipal solid waste management (EUR1.3 billion, 7.2 percent). As depicted in Fig. 8.4.1, little attention was then paid for environment protection and coastal protection.

To meet investment requirement as given in the foregoing, the Government of Romania established the Environment Fund in 2001 with 31 administrative positions¹³, and EUR1.2 million had been collected by October 2002. Subsequently in 2002, Bill 293/2002 was enacted to provide the legal framework for environment management in the country, while stipulating financial sources for the Fund. While standing on the basis of “Polluters-Pay” principle, financial sources include the following:

- (i) 3 percent quota on earnings of enterprises on ferrous and non-ferrous wastes;
- (ii) fee or charges collected for pollutant emissions,
- (iii) fee or charges collected from lands developed for solid waste landfills;
- (iv) 3 percent quota on the value of packaging industry exempting those used for medicines;
- (v) 2 percent quota on the value of hazardous chemicals trade/manufacturing/ import industries, exempting medicine;
- (vi) 0.5 percent quota on the value of hazardous chemicals for the agriculture sector,
- (vii) 3 percent quota on prices of woods from the National Wood’s Regia and other private owners,
- (viii) 1.5 percent quota on the value for cigarette trading,
- (ix) State budget, donations, grants, financial assistance both from domestic and international individuals/institutions,
- (x) surplus fund accrued to restitution of credits, interests, other financial transactions of the Fund; and
- (xi) taxes collected from issuing environment protection-related authorization and approvals.

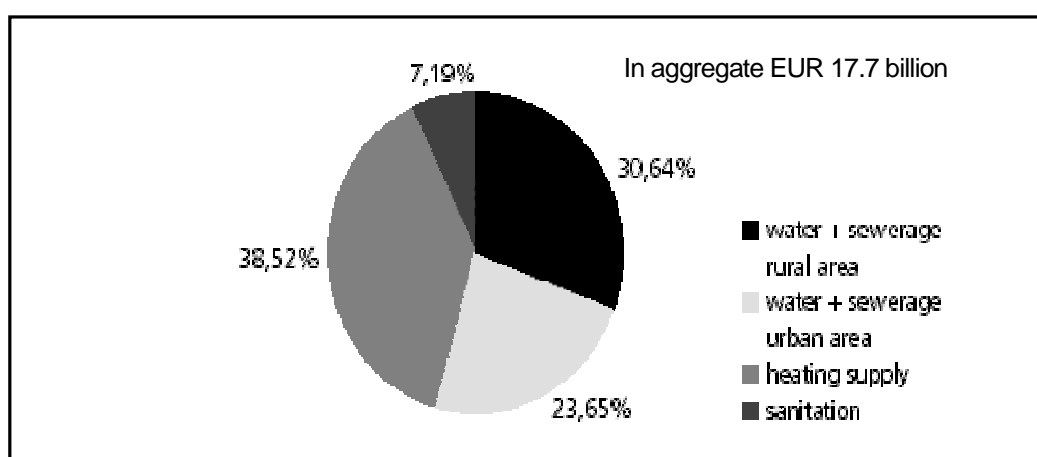


Fig. 8.4.1: Allocation of the Environmental Fund by Component (2002-2030)

(Source: The Danish Environmental Protection Agency)

¹² The year 2030 was presumably set as the due for Romania to likely achieve the EU objectives for drinking water and urban wastewater treatment.

¹³ As of October 2002, three (3) staff persons came in place.

The aggregate amount supposedly obtained by the Fund is estimated by MoPA at EUR 1,143.5 million over the short-term period of 2002-2004. Of this, EU finance predominantly through ISPA (Instruments for Structural Policies for Pre-Accession) and other bilateral contribution inclusive of the USA and Japan constitute a large part accounting for 48.2 percent, followed by international financing institutions (26.3 percent), state budget (8.8 percent), the private sector (8.8 percent), and local budget (7.9 percent).

(2) Financial involvement of EU in socioeconomic and environment upgrading

(a) Overview

The overall objective of the European Union (EU), with the European Commission (EC) as a key institution for EU policy planning and implementation for Southeastern European countries including Romania, is to support nurture the ownership of the countries in thriving on its peace, stability, and prosperity. With this, the primary EU policy is anchored in two strategies, notably, (i) accession to EU involving Romania and Bulgaria, and (ii) the Stabilization and Association Process for other former socialist economies¹⁴ to prepare for eventual membership in EU¹⁵. Following the accession negotiation in 2004 and the signing of the Treaty of Accession with EU member countries on April 2005, Romania together with Bulgaria is now set to join EU on 1st January 2007.

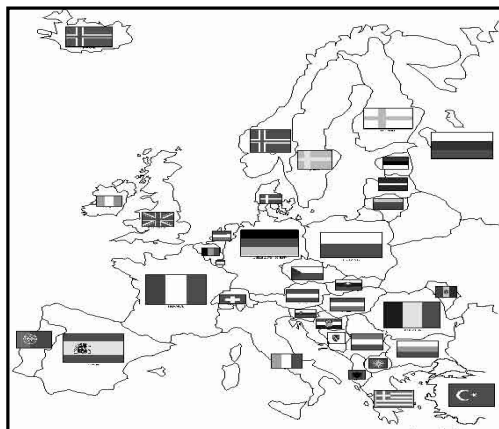


Fig. 8.4.2: Map of EU Countries
(Source: Ms. A. Raducu, EC Bucharestntries)

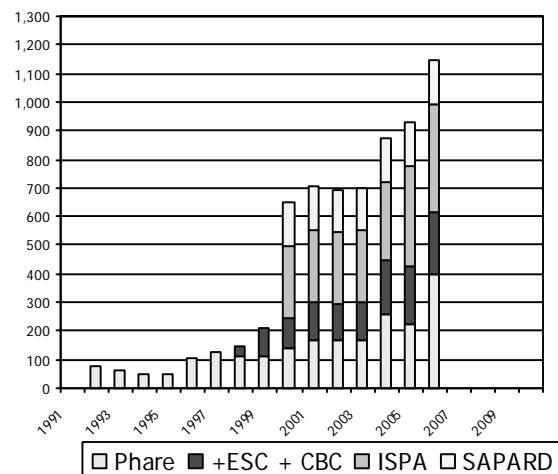


Fig. 8.4.3: EU Pre-accession support to Romania

EU partnership with Romania and Bulgaria in the light of Accession, as reflected in the EC's second *Regular Report on Romania's Progress towards Accession* (1999), has laid the way for both of the countries' EU accession through the channels of financial support and technical assistance, namely, (i) PHARE, (ii) ISPA, and (iii) SAPARD, with EUR 685 million in aggregate in 2003. While since 1990¹⁶ EU had granted financial assistance to Romania that accumulated to EUR 2.2 billion (1990-2003)¹⁷, the amount drastically increased in 2000 reflecting the

¹⁴ This includes Albania, Bosnia and Herzegovina, Croatia, FRY-Sebiria and Montenegro, FRY-Kosovo, FYR-Macedonia, and Regional Western Balkans.

¹⁵ Reference: The European Commission and EU Policy towards South east Europe, <http://www.seerecon.org/gen/ecrole.htm>

¹⁶ Romania's diplomatic relations with EU dates back to 1990 in the wake of the 1889 people's revolution and commencement of transition, with the signing of the Trade and Cooperation Agreement in the following year. Subsequently in 1995, the Europe Agreement entered into force to substantiate political and economic ties between EU and the country.

¹⁷ Reference: The European Development Bank, *Strategy for Romania*, November 2004, p.27

commencement of Accession negotiations. In 2005, EU allocated EUR 952 million for PHARE, ISPA and SAPARD¹⁸, accounting for around 1.4 percent of GDP on the same year. This is envisaged to be increased to EUR 1,155 million in the ensuing year. The absorption rate of funds was close to 90 percent in 2004, downsizing from the stable 97 percent in average through 2000-2003. A map to EU member countries and EU Pre-Accession support to Romania are depicted in Figs. 8.4.2 and 8.4.3.

(b) *EU assistance to romanian environment sector*

With the country's participation to its membership in a close view, EU has granted a multilateral pre-accession financial assistance to Romanian since November 2002¹⁹ in line with the country's *Accession Roadmap* to EU. The aggregate amount of grant fund to Romania in 2003 was ER685 million, equivalent to US\$799 million as par 2003 foreign exchange quotation²⁰. Further in support of the country's policy commitment to policy and sectoral restructuring, EU fund since then increased by 20 percent (2004) and 30 percent (2005) to reach EUR 1,155 million to Romania (to Bulgaria EUR 545 million) being envisaged in 2006 conditional upon the country's progress in the compliance with the *Accession Roadmap* and institutional enhancement of EU fund manageability. In the recent three years of 2004-2006, the total amount of EU fund inflow reached EUR 2.8 billion²¹.

A. PHARE program

PHARE program started originally in 1992 reflecting the Romania's new diplomatic relations with the western allies. Highlighting the preparation endeavored by candidate countries to accessing EU membership, the PHARE program in this light has since 2000 commenced its provision of funds, with the overall policy objectives of (i) institution building and effective implementation of the "*acquis communautaire*" and economic and social cohesion, while accounting respective of around two-thirds ($\frac{2}{3}$) and one-third ($\frac{1}{3}$)²². Specific fields of assistance under PHARE include the following:

- (i) minorities,
- (ii) public administration reform,
- (iii) justice,
- (iv) agriculture and rural development,
- (v) environment,
- (vi) border management,
- (vii) economic and social cohesion, and
- (viii) cross border cooperation (CBC) and Neighborhood Programs.

To Romania, PHARE fund was allocated EUR 279 million for the consecutive years of 2002-2003, such that the aggregate commitments of PHARE fund over the period of 2000-2003 (as of the end of September 2003) amounted to EUR 2.2 billion (US\$2.6 billion). In the meantime,

¹⁸ Source: *EUROPA-Enlargement Candidate Country-Romania*, [file:///H:/EUROPA-Enlargement Candidate Country-Romania](file:///H:/EUROPA-Enlargement%20Candidate%20Country-Romania)

¹⁹ At the same time in November 2002, Romania's pro-EU/pro-US policy was profoundly revealed by the NATO's invitation for Romania to join this political and military ally.

²⁰ Equivalent to 1.7 percent of the country's GDP in 2002, this grant is the second front-runner in size amongst the candidate countries to receive EU funds while following Poland.

²¹ Reference: EC Delegation to Romania, *State of Play in Romania's Presentation to Access Structural and Cohesion Funds*, 2005 (through the courtesy of the Team Europe Seminar leader, Ms. Aura Raducu)

²² Reference: The European Bank for Reconstruction and Development (EBRD), *Strategy for Romania*, Nov 2003, pp.27-29

Cohesion Fund commenced servicing in 1998.

A multi-annual programming approach (a medium-term expenditure framework) started in 2004, with the 2005 and envisaged 2006 PHARE allocations at EUR 431 million and EUR 438 million, respectively.

B. ISPA (instrument for structural policies for pre-accession)

Since 2000 the ISPA program has supported large-scale investment projects and programs in the environmental and transport infrastructure sectors, with the ISPA project portfolio accounting for 75.0 percent (EUR 1.2 billion) of the aggregate EUR 1.6 billion support as of the end of September 2003. Of the 31 projects under the ISPA finance, the transport sector (modernization of major roads and railroad networks in place) and the environment sector (drinking water distribution, wastewater treatment and sewerage networks) account for 53 percent and 47 percent, respectively. Likewise, a bunch of 10 additional projects for ISPA funds in the sectors of railways, solid waste and wastewater management with the estimated cost of EUR 427 million in aggregate was proposed, one of which is the Sewerage System and Wastewater Treatment Plants Rehabilitation Project (SSWTPR) currently ongoing in Constanta.

Total commitment of ISPA in 2005 was EUR 342 million, dividing almost half and half to transport and environment sectors.

C. SAPARD (special action program for agricultural and rural development)

The SAPARD program has since 2000 supported large-scale investment projects and programs in the agricultural and rural development sector, with the respective of annual and aggregate funds standing at EUR 150 million and EUR 448 million (US\$522 million) as of the end of September 2003. Of this, development of physical infrastructure in the rural area, improvement of processing and marketing of agricultural/fishery products, and technical assistance account respective of 77.9 percent, 21.9 percent, and 0.2 percent. By numbers, processing and marketing-related projects were 349, followed by infrastructure projects in the rural areas and technical assistance (TA) projects of 90 and 5, in that order.

EU Financial allocation to SAPARD Program in 2005 was EUR 175.2 million, followed by the 2006 commitment at the same amount in real terms.

(3) EU-post accession financial assistance 2007-2013²³

Romania, in the light of the country's geopolitical situation in Eastern Europe and diplomatic ties adopted with the Western European countries in the wake of the collapse of the Berlin walls, has been viewed as an interface between EU and the Balkans as well as the Black Sea regions²⁴. With this, EU has continued discussions with the Government of Romania to devise the *National Strategic Reference Framework 2007-2013 (The Sectoral Operation Program, SOP 2007-2013)* for the sectors including environment protection²⁵. In the Operational Programs under the

²³ JICA study team gratefully acknowledges the support from and information provided by Ms. Aura Raducu, EC Bucharest. Those including, among others, *State of Play in Romania's Preparation to Access Structural and Cohesion Funds, 2005*, as offered by Ms. Raducu and other colleagues of relevance in the office, have been used in this report, as appropriate.

²⁴ Reference: EU, Romania, *2005 Comprehensive Monitoring Report, Executive Summary, 2005*

²⁵ Other priority areas included in the National Development Plan 2007-2013 are: (i) increasing economic competitiveness and development of the economy based on Know-how, (ii) development and modernization of transport infrastructure, (iii) development of human resources, increasing the employment measures and

coverage of *SOP 2007-2013*, Priority areas in the environment infrastructure sector include

- (i) sustainable management of water sources,
- (ii) waste management modernization, increasing the standards for environment and life quality, and
- (iii) associated technical assistance for human capacity enhancement.

Other four pillars of operational priority in the Post-Accession period include

- (i) economic competitiveness,
- (ii) transport infrastructure,
- (iii) human resource development, and
- (iv) regional development.

In the light of administrative framework for fund operation, preparation of the European Council Regulations on the use of EU fund in Romania is now in progress, while laying down the general provisions for financial management. On the government side, a National Committee is set up by DG #1200/2004 in the Ministry of Public Finance for the coordination and preparation of Structural Fund that come. Further, a Single Action Plan for the improvement of EU fund management was approved by the government in July 2005.

Table 8.4.1 EU Pre-and Post-Accession Financial Instruments

Pre-accession Instruments	Post - accession Funds
PHARE – Economic and Social Cohesion	European Regional Development Fund (ERDF) European Social Fund (ESF)
PHARE – Cross Border Cooperation – Neighborhood Programs	Objective European Territorial Cooperation European Regional Development Fund
ISPA	Cohesion Fund (CF)
SAPARD	Fund for Agriculture and Rural Development

Table 8.4.2: EU commitment to Post-Accession Romania by Category

(€ millions, 2004 prices)	2007	2008	2009	Total
Commitment appropriations				
Agriculture – market measures	249	244	239	732
Agriculture – direct payments	0	405	476	881
Agriculture – rural development	577	770	961	2,308
Sub-total agriculture	826	1,419	1,676	3,921
Structural operations	1,399	1,972	2,603	5,973
Existing internal policies *	244	248	252	744
Institution building *	26	17	8	52
Sub-total Internal Policies	270	265	260	796
TOTAL COMMITMENTS	2,495	3,655	4,539	10,690
Payment appropriations	1,109	2,195	2,823	6,128

combating the social exclusion, (iv) development of rural economy and increasing productivity in the agricultural sector, and (v) supporting equal participation for Romania's regions to the socio-economic development process.

In line with the above, and while the conventional financial package of a package of PHARE, ISPA, and SAPAD is to be provided for project finance till 2010, EU's post-accession instruments newly come in place of EU pre-accession funds is summarized and given as listed in Table 8.4.1, each of which being converted from the conventional instruments. To note that the coastal protection project currently under the study by JICA finance is advised by MoEWM of its being incorporated as a pipeline project in *SOP*. Further, the EU door is widely open on the JICA study in concern, due largely to a series of discussions with EU officials with a bearing on the project outline and contents, as well as collaborative actions that would come between EU and Japan in due course of the study.

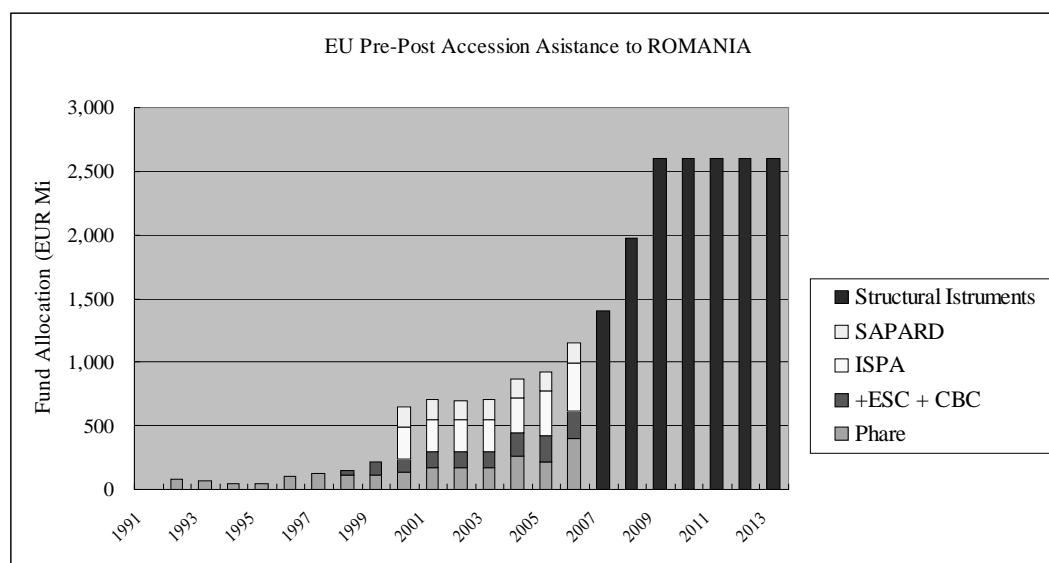


Fig. 8.4.4: EU fund assistance to Romania, 1992-2013

The environment sector finance will be under the scheme of Cohesion Fund (CF) and European Regional Development Fund (ERDF). While Pre-Accession financial package over the three years of 2004-2006 was EUR 2.8 billion, that for the first three years immediately after the accession (2007-2009) is being envisaged at EUR 10.6 billion, with 278.5 percent increase from the last three-year-medium-term financial package. Overall, EUR16.4 billion is envisaged to inflow to the country as the pecuniary expression of EU assistance over the period of 2007-2013. Disaggregating the Structural Operations in concern, EUR 1.4 billion, EUR 1.9 billion, and EUR2.6 billion in the years of 2007, 2008, and 2009 and on, respectively. Chronological evolution of EU fund assistance and structural operation as well as agricultural assistance are depicted in the Table 8.4.2 and Fig. 8.4.4.

Besides, Romania as well as other 10 new member states will benefit, by the Article 31 of the Accession Treaty, from the Transition Facility of EUR 82 million in the first year of accession. The fund is allocated in support of the government to develop and strengthen its administrative and judicial capacity to implement and enforce community legislations. Likewise, the country will also benefit from another temporary instrument, *namely*, the Schengen Facility, for the country to implement the *Shengen Acquis* and external border control over the period of EU accession January 2007 to the end of 2009. According to the Article 32 of the said Treaty, EU fund allocation to Romania in the light of the above is in aggregate EUR 559.8 million, with EUR 297.2 million, EUR 131.8 million, and EUR 130.8 million in the years of 2007, 2008, and 2009, in that order²⁶.

²⁶ Source: *file://H:/EUROPA-Enlargement Candidate Country-Romania*, p.3

(4) World Bank Group

(a) Overview

The World Bank group is the largest creditor to Romania, with a total commitment of US\$3.8 billion over the period of 1991 through 2003. Of this, active portfolio amounted to US\$1.34 billion inclusive of 22 lending operations by the International Bank for Reconstruction and Development (IBRD), three Global Environment facility grants, and seven smaller grants that are under US\$1.0 million worth of projects. The overall objective of the Bank group is to support the government's policy commitment in poverty reduction, sound management of macroeconomics with a focus on the private sector development, and governance and institutional reforms. AS of the end of 2003, the International Financing Corporation (IFC, the second World Bank) approved and disbursed over US\$245 million for industries that include building materials, paper, mobile telephone, brewery, leasing and financial sector. Good relations with the European Bank for Reconstruction and Development (EBRD) is reflected in a number of co-financing projects including pre-privatization of BancPost, Sical paper company, the Danube Fund, and the BCR transaction²⁷. In the year 2005, The Bank commitments to the country amounted to US\$709 million. The Bank's commitments by year and sector are depicted and given in Figs. 8.4.5 and 8.4.6.

In pursuance of the government's commitment to poverty reduction and EU accession, Romania faces a number of policy issues to immediately be addressed and take actions. This includes, among others,

- (i) accelerating structural reforms,
- (ii) reforming public institutions and improving governance,
- (iii) reforming the legislative process and the judiciary,
- (iv) reforming the pension system,
- (v) developing rural areas and reducing poverty, and
- (vi) reforming the energy sector²⁸.

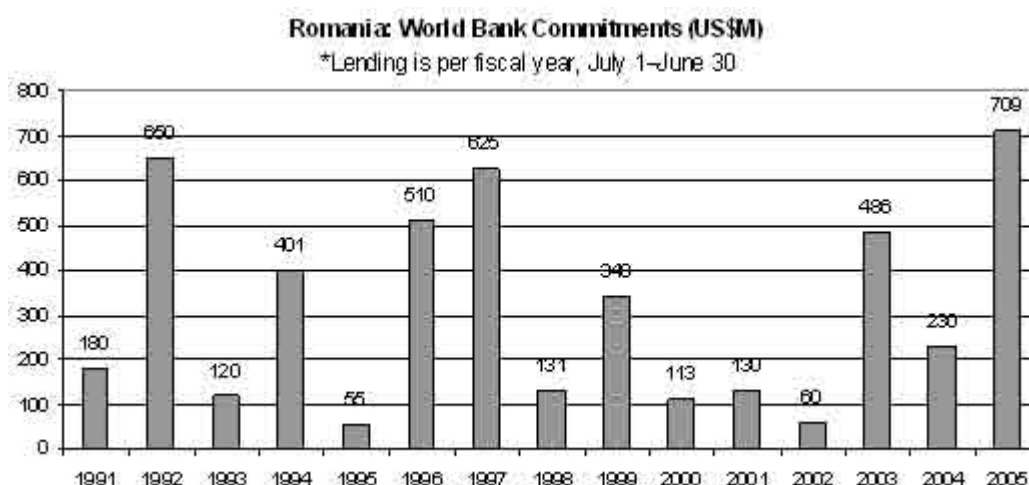


Fig. 8.4.5: Commitments by year as of June 2005

(Source: The World Bank)

²⁷ EBRD, *op.cit.*, 2003, pp27-28

²⁸ Reference: The World Bank, Romania-Country Outlook 2006, <http://www.worldbank.org.ro/website/external/countries/ecaext/romaniaextn/>



Fig. 8.4.6: Commitments by sector as of June 2005

In the light of the proposed coastal protection projects on the southern Romanian Black Sea shore, structural reform that aims, among others, at implementing a transparent, predictable and efficient tax system is of close relevance, with enhancing tax-base of revenue collection in view such that the government readily be able to finance the balance of the EU structural and Cohesion Funds Romania is to receive after accession. Other policy targets in the category of structural reform include completing the privatization agenda, and improving the business climate by eliminating administrative barriers.

With the foregoing in view, the Bank's investment and programmatic adjustment operations will focus on the following three broad areas for the year 2006: (i) promoting the private sector and growth of efficient markets, (ii) building public sector institutions and improving governance, and (iii) building human capital and improving social protection. The environment sector accounted for 13.6 percent (US\$193.2 million) out of the Bank's active portfolio of US\$1,423 million as of June 2005 Bank commitment. The Bank's commitments by year and sector are depicted and given in Figs. 8.4.5 and 8.4.6.

(b) Country partnership strategy 2007-2009

Under the *Country Partnership Strategy 2007-2009* (CPS) newly introduced in lieu of the former Country Assistance Strategy (CAS), the World Bank envisages a budget-support type of loan, namely, the Environment Management Project for the forthcoming three-year period within the Bank support category, namely, *Pillar 1: accelerating Structural and Institutional Reforms for Sustained Growth*²⁹. Prospective loan amount will be somewhere around US\$150 million equivalent, with the project scope including (i) promotion of nitrate reduction in line with the EU Nitrates and Water framework Directives, (ii) development of institutional capacity and a project pipeline for EU Structural funds targeting contaminated soil, and (iii) institutional support a new National Agency for Protected Areas and Biodiversity Conservation. Besides, grant-based Global Environment Facility (GEF) will be provided to complement the lending activities as reflected immediately above, while focusing on (i) international waters, (ii) biodiversity, and (iii) persistent

²⁹ Source: The World Bank, Country Partnership Strategy for Romania for the Period FY06-FY09, May 2006, p. 27. Other two pillars include *Addressing Fiscal Vulnerabilities and Modernizing the Public Sector* (Pillar 2) and *Targeting Poverty Reduction and Promoting Social Inclusion* (Pillar 3), while totaling the number of the pipeline projects to 19.

organic pollutants³⁰.

Meanwhile, the World Bank and the JICA study team has accumulated a series of discussions and associated exchange of views on the policy and strategic frameworks for coastal protection in the country, as well as on the possible financing to the current study under the auspices of JICA. With this, the Bank door is open wide on the study in concern, and the Bank is to be kept abreast of the development of JICA Study.

(5) United Kingdom (UK)³¹

In line with the commencement of diplomatic ties with Romania, the Government of the United Kingdom (UK) has extended various supports, with technical assistance (TA) projects as the major part through the Department for International Development (DFID). The overall policy objective (goal) of UK assistance to Romania is to support the country's successful transition to a pluralistic democracy and well-regulated market economy in such a way that benefits are sustainable and be enjoyable by all of the level of the society. With this, DFID highlights human and institutional enhancement of the public sector (central bank, governments at the central, regional, and local levels, special legal entities, and supreme audit institution) in the framework for public financial management (PFM). Specifically, DFID focuses its support in the following areas:

- (i) accountable and responsive public administration with well-institutionalized capacity of micro-management of the economy and EU fund management for accession,
- (ii) restructuring publicly owned enterprises,
- (iii) strengthening human capacity to promote regional development,
- (iv) poverty reduction and social cohesion among different ethnic/religious/cultural groups, and
- (v) enhancing human capacity at the regional and local levels in planning and implementation of sustainable environment policies.

To this end, DFID provided in aggregate £30 million of TA assistance over the period of 1991 through 2000 that turned out to be "somewhat disappointing results"³². With this in view, DFID's bi-lateral assistance strategy is facing toward more selective on areas where the UK has a clear comparative advantage, while keeping well-harmonized and complementary assistance with other multi- and bi-donor institutions. Of the £9.2 million TA funds during 1999-2001 (commitment and planning), around £2.1 million was allocated for the environment sector while accounting for 22.8 percent.

(6) European Bank for Reconstruction and Development (EBRD)³³

In line with the acceptance of the National Plan for the Adoption of the *Acquis Communautaire* (the EU legal order), the Romanian National Environment Action Plan (NEAP) was revised in 1999 to provide a key instruments for public interventions within the EU integration process. With this, and faced with serious concern over the environment issues including waste management, improved access to sewerage treatment, drinking water quality, underground water contamination, integrated pollution control and enforce measures, the Bank mandate is to actively support

³⁰ Under the finance of GEF, the Agricultural Pollution Control Project in Călărăsi County is ongoing with the overall objective of increasing use of environment-friendly agricultural practices in a bid to reduce nutrient discharge from agricultural sources to the Danube River and the Black Sea.

³¹ Reference: DFID, *Romania Country Strategy Paper*, 2000

³² DFID, *op. cit.*, 2000, p2

³³ Reference: The European Bank for Reconstruction and Development, *Strategy for Romania*, November 2003

environmentally sound and sustainable development through its investment projects. Specifically, the Bank loan portfolio for the environment sector includes the Municipal Utilities Development Programs I and II, the Regional Water and Environment Program, the District Heating for Municipalities in 16 cities, with associated training programs³⁴. Bank lending program (pipeline projects) as of October 2003 amounted EUR 844 million of which EUR 198 million had been brought about for lending.

(7) European Investment Bank (EIB)³⁵

With the outstanding portfolio of EUR 3.0 billion as of 2003 in Romania, the European Investment Bank supports Romanian Government in the transition period to EU accession, while financing 41 investment projects in the sectors of environment, transportation, energy, telecommunication, and industry and small-and-medium-scale enterprises (SMEs). In the wake of financing in 2003 to seven projects with the total commitment of EUR 651 million, EIB is to keep on the track to support the country by financing to the priority projects for EU accession with an emphasis on environment, energy, and transportation, SMEs promotion, and the private sector enhancement.

(8) Council of Europe Development Bank (CEB)

Established in 1956 under the supreme authority of the Council of Europe, the Bank (Council of Europe Development Bank, CEB) has played a key role as a multi-national financial instrument exclusively for political and social solidarity in the European Union (EU) member countries, with less advantaged regions in particular. With the overall objective of to (i) improve living condition, (ii) respond to emergency situations, and (iii) strengthen social cohesion by extending loans to pre-and post-accession countries to EU, the eligibility criteria as stipulated in the Bank *Resolution*³⁶ include the loans listed in Table 8.4.3.

In 2004, the Bank approved in aggregate EUR 1,750 million worth of loan projects³⁷, of which the Bank committed EUR 23.3 million to the Romanian projects (1.3 percent). Of the 17 countries as borrowers, Hungary was placed first on the credit-line with EUR 369.7 million (21.1 percent), followed by Italy, Spain, Portugal, Norway, and others while accounting for 18.9 percent, 14.3 percent, 11.3 percent, 6.8 percent, in that order. With regard to the sectors received funds from the Bank, the largest chunks emanated from job creation and preservation of small and medium scale industries (SMEs) and vocational training, and natural and ecological disasters and prevention, each of which accounting for 23.8 percent (EUR 416.0 million) and 22.8 percent (399.4 million), respectively. Environment protection was placed third with EUR 282.1 million while accounting for 16.1 percent of the aggregate. Against the commitment as agreed upon by the Bank and eligible borrower countries, loan disbursement in the same year was EUR 88.6 million (5.8 percent).

³⁴ Overall objective of EBRD lending programs is to support the Government to implement the country's reform agenda and to improve investment climate to attract more direct foreign investments (DFIs) and accelerate the development of local enterprises. In this context, the Bank strategy for financing focus, to a larger extent, infrastructure development in the energy and transport sectors, private sector development, and financial sector reform.

³⁵ EBRD, *Ibid.*, p.28

³⁶ EC, *Reference: Article of Agreement and Resolution 1480 (2004)*

³⁷ CEB loans do not exceed 50 percent of the total investment costs as a general rule with in average covering 40 percent, thereby having borrower countries finance the balance of 60 percent.

Table 8.4.3: CEB Portfolio in Romania

Project	Category	Amount (EUR mil)	Approval
Loans			
Two-step loan for Job creation and SME Enhancement	Job Creation/SMEs	20.0	2004
Integration of Street children in the Society	Health	3.3	2004
Rehabilitation of rural hospitals in Gura Ocuntei and Balfesti	Health	1.7	1999
Community-based medical services for children	Health	10.0	1997
Construction of 400 school sports halls in rural and urban areas	Education	54.5	2003
Rehabilitation of 1,400 pre-university schools in rural and urban areas	Education	43.5	2003
Rehabilitation of Education infrastructure	Education	12.0	1997
Construction and rehabilitation of 9,500 dwellings for young couples and low-income families	Social Housing	140.0	2005
Construction of social housing for young couples and low-income families	Social Housing	111.8	2002
Rehabilitation of Romanian Athenaeum Palace Concert Hall	Social Development	2.5	2003
Poverty alleviation and strengthening social cohesion in poor rural areas	Social Development	10.0	2000
Road and Railways Rehabilitation after 2005 Flood (2005, EUR51.2 million, ongoing), and (v) Restoration of Hydropower Works after 2005 Flood	Natural Disaster/Environment Protection	51.2	2005
Restoration of Hydropower Works after 2005 Flood	Natural Disaster/Environment Protection	8.8	2005
Flood Prevention Infrastructures Project (I)	Natural Disaster/Environment Protection	40.0	2003
Flood Prevention Infrastructures Project (II)	Natural Disaster/Environment Protection	20.0	1998
Rehabilitation of Heating Networks in Bucharest	Natural Disaster/Environment Protection	10.0	1997
Grant			
Emergency Assistance for Romanian Institutionalized Children	Children in precarious situation	1.0	1999

Romania has received loan and grant funds from CEB with the loan portfolio of 16 projects (EUR 559.4 million in aggregate) as of June 2005. Of this, the Bank financed five projects with EUR 130.0 million (23.2 percent) to MoEWM as of December 2005, including the following five projects:

- (i) Flood Prevention Infrastructures Project (I) (1998, EUR20.0 million, closed),
- (ii) Flood Prevention Infrastructures Project (II) (2003, EUR40.0 million, ongoing),
- (iii) Rehabilitation of Heating Networks in Bucharest (1997, EUR 10 million, closed),
- (iv) Road and Railways Rehabilitation after 2005 Flood (2005, EUR51.2 million, ongoing),
- (v) Restoration of Hydropower Works after 2005 Flood (2005, EUR 8.8 million, ongoing).

While discussion between MOEWM and CEB on possible financing to the prospective coastal protection project on the southern Black Seashore region, if the occasion arises, is not in sight thus far, the Bank's current portfolio associated with Romania by category is summarized in Table 8.4.2.

(9) US Agency for International Development (USAID)

The United States Agency for International Development (USAID) has since 1991 commenced financial and technical assistance to the country, with the aggregate amount of US\$400 million as of the end of 2003. Most of the Agency's support aims at the private sector enhancement to improve policies, laws and regulations for market expansion, as well as privatization of state enterprises. The enhancement of SMEs is another policy target for the Agency, with supporting business associations, NGOs, and government institutions to make SMEs more competitive in the international market. Of the 2003 aggregate budget of US\$26.2 million, the Local Democratic Governance Program and Child Welfare and Health Program accounted for 29 percent and 27 percent, respectively.

8.4.2 Budgetary Process and Procedure of External Borrowing

In preparation for the implementation of the coastal protection and rehabilitation project in the southern Romanian Black Sea shore from 2007, this section describes an overall view of the budgetary process as stipulated in the Public Finance Law as a basis on which state budget for coastal protection is constituted. A set of financing sources possibly of avail is provided subsequently both for the international and local costs accruable.

(1) Budget process in Romanian Government

The Public Finance Law³⁸ stipulates that state budget is elaborated by the executive power for the Ministry of Public Finance (MoPF) to draft budget bill. In the framework of budget calendar and the primer on budgeting prepared by MoOPF, budgeting process begins in the month of March of the precedent year, with the approval from the cabinet (government) of expenditure ceilings and macro-trend of the economic and public finance policies are to be advised to the Finance and Banking Commission of the Parliament. Budget proposal for the next and consecutive three years (a medium-term expenditure framework, MoTEF) is to be submitted to the MoPF by each of the line ministries (Primary Credit Orderers, PCOs) with detailed documents. In the wake of the parliamentary advice through MOPF regarding the macroeconomic forecast and guiding principles for budget draft amendments by the middle of June, PCOs will submit the revised draft budget, while reflecting the level of macro forecast of the economy as well as budget execution in the previous year. Draft budget as prepared by MoPF by the beginning of August will be discussed by the Parliament specialized committees which have the legal right to make proposals of modifications and to draw up a report on the draft budget. In the wake of debates in the Parliament committees, the assemblies of both Parliamentary Chambers votes budget bill to enact before the end of fiscal year (31 December). With this, budget bill becomes a Budget Appropriation Acts project, with the Government lawfully allowed to commence annual budget execution. Sequence of budgeting processing is summarized in a Budget Calendar³⁹ as listed in Table 8.4.4.

According to the law 500/2002 Article 16, recurrent, development, and special accounts of the

³⁸ Law No. 500 published in the Official Gazette No. 597/08.13.2002, Law No. 500 on Public Finance dated July 11, 2002

³⁹ Source: Parliament of Romania, *Law on Public Finance*, No.500, Section 2, Articles 31-37

government, *vis-à-vis*, state budget, the state social security budget, special fund budgets, autonomous public institution budgets, state or state-guaranteed foreign loan budgets, foreign grant budgets, the State Treasury budget and public institution budgets are approved as follows:

- a. State budget, the state social security budget, special fund budgets, state or state-guaranteed foreign loan budgets and foreign grant budgets: by law;
- b. Budgets of autonomous public institutions: by bodies purposefully empowered by special laws;
- c. Budgets of public institutions partly financed from the budgets specified at a. :by law, as annexes to the budgets of primary spending authorities
- d. Budgets of public institutions fully financed from the budgets specified at a. above: by their next higher-ranked spending authority
- e. Budgets of public institutions fully financed from their own revenues: by the management of the public institution, subject to advice from their next higher-ranked spending authority
- f. State Treasury Budget: by Government decision

Table 8.4.4: Budget calendar adopted within the Government of Romania

1 January	New fiscal year starts
By 31 st March	Macroeconomic and social indicators for the subsequent budgetary year as well as the consecutive three years are to be drawn up by the bodies lawfully enabled for the preparation of the draft budget next year.
By 1 st of May	Tax and budget policies, together with expenditure ceilings for Primary Credit Orderers (PCO)s, for the next and consecutive three years are to be submitted to the cabinet by the Ministry of Public Finance.
By 15 th of May	Approval from the cabinet (government) of expenditure ceilings is conferred, and macro-trend of the economic and public finance policies are to be advised to the Finance and Banking Commission of the Parliament.
By 15 th of May	Budget proposal for the next and consecutive three years is to be submitted to the MOPF by the PCOs with detailed documents.
By 15 th of May	Budget proposal for the next and consecutive three years is to be submitted to the MOPF by the local public administration with detailed documents.
By 1 st of June	A framework letter of macroeconomic context for budget draft, methodology of the elaboration of budget draft, and expenditure ceilings as approved by the cabinet are sent to PCOs by the Minister of Public Finance.
By 15 th of June	Should the change in the macroeconomic framework take place to inevitably have the expenditure ceilings modified, proposal for the new ceilings is to be submitted to the Cabinet, and subsequently upon the approval from the Cabinet, the primary credit orders of the modified ceilings are notified to PCOs by the Minister for Public Finance.
By 1 st of August	Draft budget with annexes is to be submitted by PCOs to MOPF
By 30 th of September	Draft budget law and draft budget, together with macroeconomic report, are to be submitted to the Cabinet by MOPF
By 15 th of October	Upon the approval from the Cabinet, draft budget law (Budget Bill) and draft budget are submitted to the Parliament for approval.
3 days before 31 December	Provided that Budget Bill is not enacted by this date, the government prepare provisional budget for the following year, while permitting unless otherwise approved one twelfth of the current year allotment for monthly expenditure.

(2) Procedure of external borrowings

In Romania there are mainly three possible situations to finance a certain development project:

- (1) Central Government will borrow and allocate funds at the central level;
- (2) Central Government will borrow and will on-lend funds to local authorities or to final beneficiary which is to repay loans; and
- (3) Local Authorities will borrow external by themselves, and amortize loans.

With regard to the case (3) immediately above, local governments are empowered to borrow external funds through the Ministry of Public Finance, as stipulated in Article 3 of the Public Finance Law no. 313/2004. Public administration authorities at the local level are also allowed to contract or guarantee internal and/or external loans on short-, medium-, and/or long-term debts in order to finance investment needs for public interest, only subject to the approval of the Local Loans Authorization Commission. At the time of discussions at local or County councils for external borrowing, at least two-thirds of votes in favor of borrowing is a must to pass as a legislature. Debt amortization is made from the local budget resources.

The necessary steps in order to have credits disbursed from international financing institutions (IFIs), inclusive of the World Bank, the Europe Council of Development Bank and-or others of relevance, to the central administrative bodies is defined and governed by the international public law, as follows.

- (1) The Ministry of Public Finance together with beneficiary ministry will jointly submit *a Memorandum on the Agreement* to the cabinet for approval advising of the details of the loan from IFI and on the negotiation mandate. In this connection, the law no. 590/ 2003 regarding external treaties should be referred to and respected. This *Memorandum* should include the following documents:
 - (i) Notification of the main loan managers regarding the rationale and objectives of the proposed investment program with external borrowing as part of financing source. Feasibility study report is also attached.
 - (ii) Letter of support for the proposed lending from the coordinating Ministry, while indicating the project in compliance with the sectoral strategy and necessity and opportunity of external loans. Commitment by beneficiary ministry is to be confined to the borrowing ceilings as set out by MOPF.
 - (iii) IFI's Appraisal and Recommendation to President;
 - (iv) Mandate which will contain the main technical and financial elements proposed by the IFI as well as the negotiation conditions. and
 - (v) Letter from IFI regarding loan processing schedule, or another document of Expression of Interest in lending.
- (2) The negotiation of the external loan will be held in accordance with the approved mandate.
- (3) After the negotiation is complete, the Ministry of Public Finance initiates a Memorandum for the approval of a report on negotiation and the acceptance of giving the full power to sign the credit agreement.
- (4) After the acceptance of the Memorandum (from point c), IFI will be informed by MOPF of the approval of the negotiation results.

- (5) Based on the full powers and authorities delegated by the Ministry of Public Finance to a representative on behalf of the Government of Romania, the treaty will be signed between the Beneficiary ministry and IFI in concern.
- (6) The agreement signed will be:
 - (i) Ratified or approved through a legislative act with law power, if the commitments undertaken by Romania have IFI's policy conditionalities which surpasses the current legal provisions;
 - (ii) Approved through Government Decision, if the commitments undertaken by Romania have IFI's policy conditionalities which do not surpass the current legal provisions. This action will be undertaken by MoPF and the beneficiary ministry. The objective is to create legal framework in need for the fulfillment of the agreement.
- (7) In conformity with the provisions of the law/Government Decision as provided above, and after its ratification and publication on the Official Journal (Gazette), MoPF and final beneficiary will conclude an Agreement of Subsidiary Loan (AIS) through which the MOFP transfers totally or partially the obligation borne out by the state towards IFI. AIS will need to be approved by MoFP before the signing between the both parties at the minister or state secretary level.
- (8) In order for financing agreement to enter into force, the Judicial Notification along with the documents requested by the IFIs has to be issued by MoPF on behalf of the GOR.

The procedure elements from (1) to (8) will be applied also in the case of other financing institutions if the legislation is compatible.

Likewise, the necessary steps in order for public administrative bodies at the local level to commit to IFI borrowings, as governed by the international public law or the home country law, is exhibited in Fig. 8.4.7.

- (1) Local public administration authority, as a final beneficiary or guarantor of external loan, has to approve the government decision regarding the necessity and opportunity of the investment project (financed entirely or partially from external funds) and to secure the technical and economic feasibility as well as financial resources in need for project implementation.
- (2) Local public administration authority, as the final beneficial or guarantor of external loans, should adopt the government decision regarding the approval of contracting loan that inclusive of: the name of IFI and loan amount, terms and conditions of loan, amortization schedule from local budget or own resources of the economic agent of local subordination, and payment clause of duties and taxes accrued to procurement of goods and services for the project. In case where the concerned loan is contracted by the economic agent of local subordination, local council or other managerial body with authority adopts the decision regarding the investment realization, contracting the loan mentioning the amount borrowed and the name of the external lender, the payment of the debt from own resources of the economic agent of local subordination, and payment clause of duties and taxes accrued to procurement of goods and services for the project.
- (3) Final beneficiary of external borrowing has to obtain approval (favorable notification) from the Authorization Commission for borrowing at the local level, or from the Inter-ministerial

Committee for Guarantees and Credits for External Trade (CIGCCE) for the disbursement or the guarantee of loans.

- (4) Final beneficiary of external borrowing will obtain approval from the Competition Council regarding the financing of the investment objective from external loan as contracted directly by the state.
- (5) Based on the documents mentioned for at the points 1-4, the Ministry of Public Finance together with the Ministry responsible with the local authorities and with the main loan manager for the local budget initiate a Memorandum towards the Government for awarding an agreement in principle for contracting the external loan.
- (6) Local administrative body and the Ministry responsible for this entity/administrative unit have to put forward a proposal for a Government Decision regarding the approval of the technical and economic feasibility of the proposed investment program;
- (7) MOPF initiates memorandum towards the Government regarding the approval of the negotiation mandate with IFI. Documents in need for elaboration and approval for this memorandum include:
 - (i) Government decision regarding the approval of technical and economic indicators of the investment;
 - (ii) Loan amount to be rendered should be under the annual limit for external public debt (debt ceiling);
 - (iii) Favorable Notice from the Authorization Commission of Local Loans or CIGCCE;
 - (iv) The decision of the Competition Council;
 - (v) Mandate, which will contain the main technical and financial elements proposed by the financing institution along with the negotiation proposals.
- (8) After the negotiation conducted by MOPF on the proposed external loan accordingly to the approved mandate, MOPF initiates the memorandum for the approval of the negotiation results and of the awarding the full power for signing loan agreement (L/A) to the ministry in concern.
- (9) MoPF advises to IFI of the results of the negotiations approved by the Government.
- (10) The authorized representative of Ministry in concern will sign the agreement after obtaining the necessary approvals from the Ministry of Public Finance.
- (11) Signed agreement will be:
 - (i) Ratified or approved through a legislative act with law power, if the commitments undertaken by Romania have conditionalities which surpasses the current legal provisions;
 - (ii) Approved through Government Decision, if the commitments undertaken by Romania have conditionalities, which do not surpass the current legal provisions. MoPF and beneficiary ministry will undertake this action in a bid to create necessary legal framework for the fulfillment of the agreement.

- (12) In conformity with the provisions of the law/Government Decision as mentioned above, and after its ratification and publication on the Official Journal (Gazette), the ministry in concern and beneficiary public body will conclude an Agreement of Subsidiary loan (AIS) through which the Ministry transfers totally or partially the obligation undertaken by the state towards MoPF and IFI. AIS will need to be approved by MoFP before the signing between the both parties at the minister or state secretary level.
- (13) In order for the financing agreement to enter into force the Judicial Notification along with the documents requested by the IFIs have to be issued. Schematic diagrams of loan processing within the Government and with IFIs are illustrated in Fig.8.4.8.

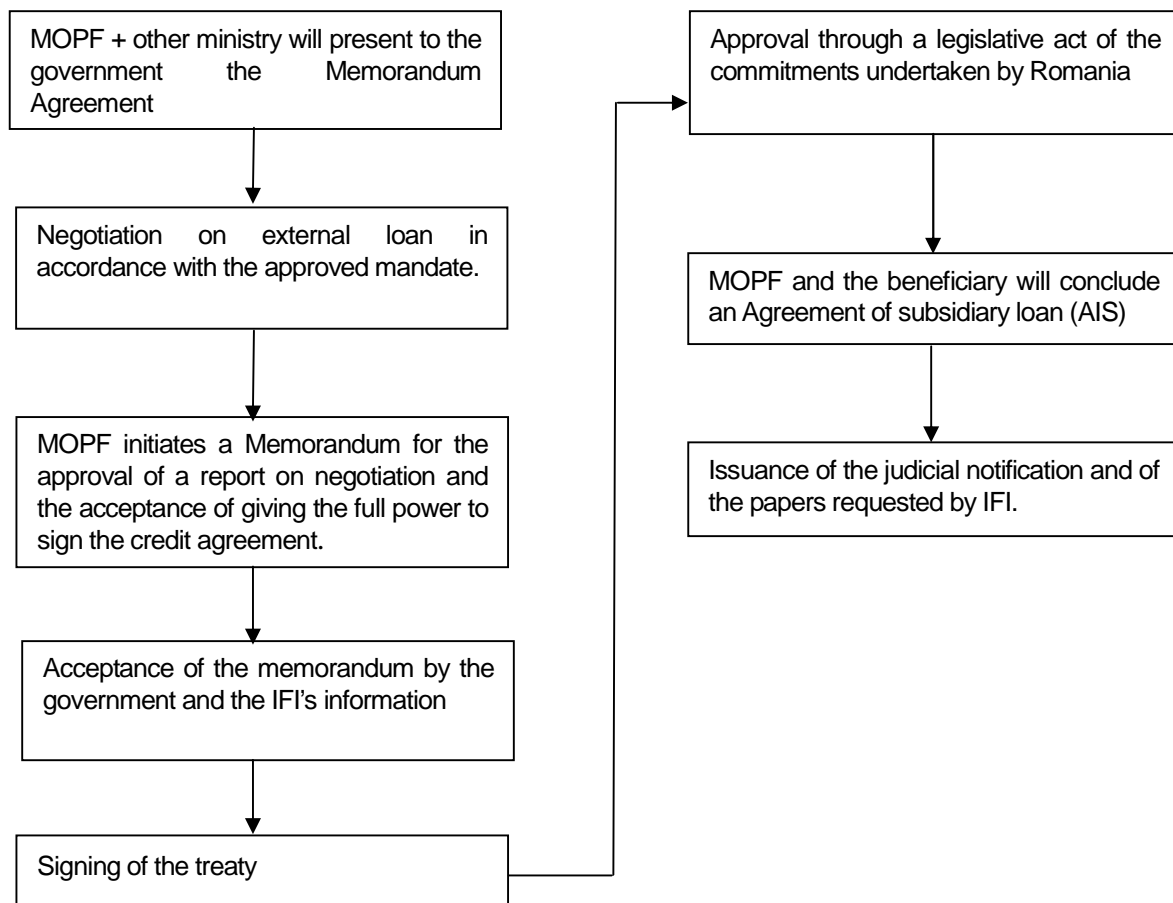


Fig. 8.4.7: Flow diagram of credit from IFI

Schematic diagrams of loan processing within the Government and with IFIs are given hereunder.

- 1) The necessary steps in order to obtain a credit from IFIs, funds reimbursed from the central government budget, governed by the international public law (Fig. 8.4.7).
- 2) The necessary steps in order to obtain a credit from international organization, governed by the international public law or the home country law, having as final beneficiaries local public authorities, public services or economic agents of local subordination (Fig. 8.4.8).

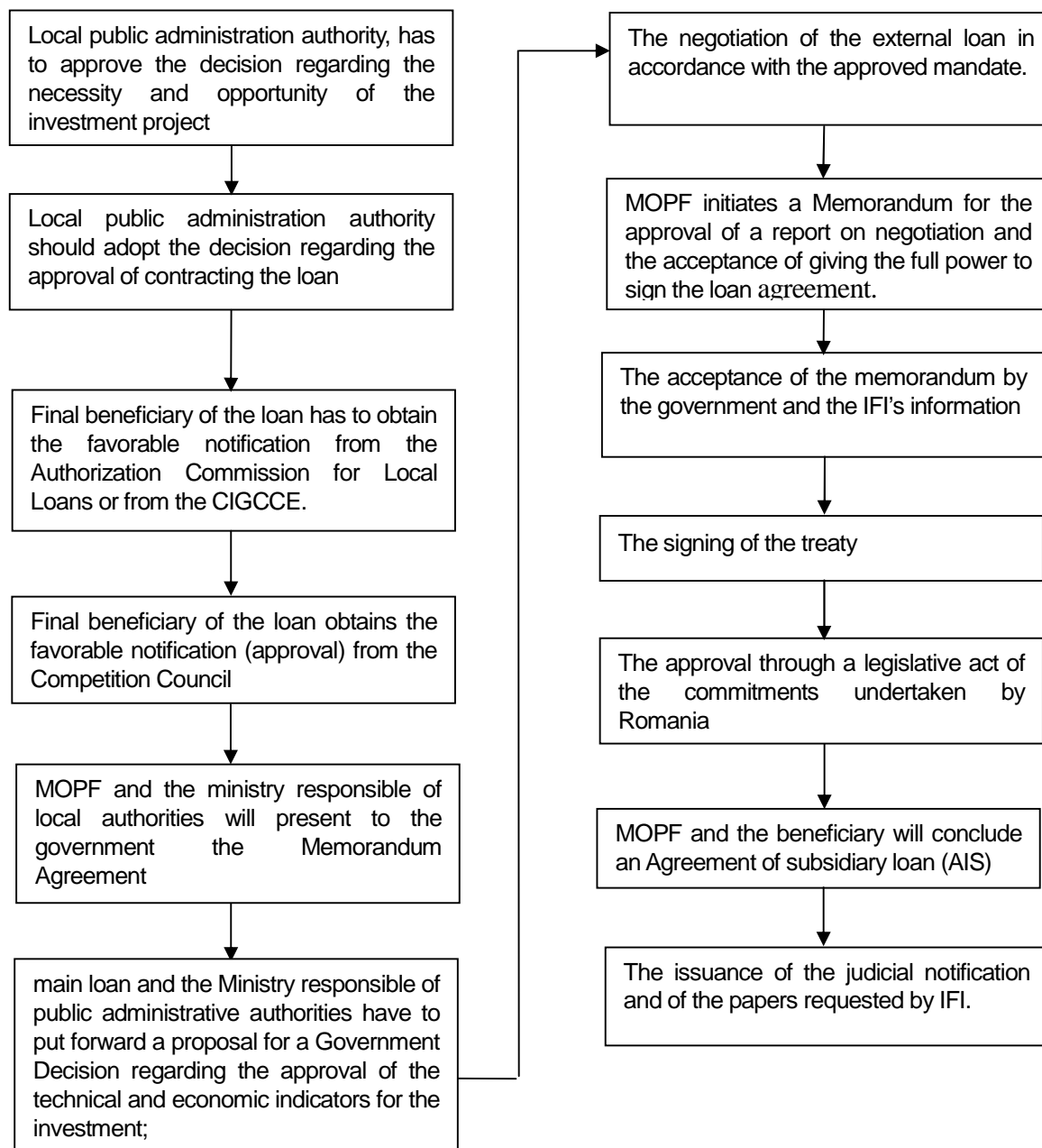


Fig. 8.4.8: Flow diagram for credit from IFI to local public authority

Table 8.4.5: Loan portfolio of MoEWM as of the end of 2005

	Project	Financier	Loan Amount
1	Flood Prevention Infrastructures Project (2003)	CEDB	EUR 40.4 million
2	Restoration of Hydropower Works after 2005 Flood	CEDB	EUR 8.8 million
3	Hazard Risk Mitigation and Emergency Preparedness Project	WB	US\$101.09 million
4	DESWAT Project	US EX-IM Bank	US\$4.6 million

Table 8.4.6: MoEWM-ANAR budget proposal on coastal protection 2006-2008

No.	Project	Cost (Est. US\$ mil)
1	Reinforcement and protection works of the Black Sea Coast, sector Sacalin Island and Portita, Constanta County	60
2	Consolidation and protection works of the Black Sea Coast, sector between Portia-Edighiol-Vadu, Constanta County	40
3	Consolidation and protection works of the Black Sea Coast, Midia Navodari-Constanta Casino, Constanta County	50
4	Consolidation and protection works of the Black Sea Coast, between Agigea Sud Dike- Tuzla Cape, Constanta County	25
5	Consolidation and protection works of the Black Sea Coast, between Tuzla Cape-Tatlageac Lake, Constanta County	30
6	Consolidation and protection works of the Black Sea Coast, between Tatlageac Lake-Mangalia Lake, Constanta County	30
7	Consolidation and protection works of the Black Sea Coast, between -Mangalia Lake-Vama Veche, Constanta County	15
8	Increasing the Siutghiol lake water quality, Constanta County	28

CHAPTER 9:

CONCLUSIONS, RECOMMENDATIONS AND FURTHER ISSUES

Chapter 9 Conclusions, Recommendations and Further Issues

9.1 Conclusions

(1) Basic study

The basic study has been made first by over-viewing the social and economic background of Romania on the basis of various statistics available. The state of utilization and administration of the coastal area under the Study is then described.

The geophysical conditions of geological and geomorphological features, meteorological conditions, water level and astronomical tide, wave climate and extreme waves, and others have been examined and analyzed on the basis of the data and report submitted from Romanian institutions under the subcontract with the Study team. The spring tidal range at Constanța is 4.0 cm only, but there are irregular fluctuations of water level up to a few decimeters over several weeks. The analysis of wave climate off Constanța has provided with the input data for numerical simulation of the future shoreline changes with and without project implementation. The Study team has also carried out coastal reconnaissance of the whole shore sectors, and their geomorphological features are examined.

The state of beach erosion in the Study area has been analyzed by means of available charts, maps, and satellite images. The rate of shoreline position change at individual shore sectors has been evaluated by analyzing the data collected by the National Institute for Marine Research and Development (NIMRD). The severest erosion appears at the Mamaia South sub-sector with the rate of -2.0 m per year. The past records of shoreline position changes have been well reproduced by the numerical simulation that becomes the reliable means for assessing the effectiveness of shore protection measures to be proposed. If no shore protection measures are taken, Mamaia South will experience a beach erosion of 40 m in the coming twenty years, while some places in Eforie Nord, Eforie Middle and Eforie Sud t will have a shoreline retreat of more than 20 m.

Mineral content analysis of the sediment along the shoreline of the Study area revealed that the terrigenous sand from the Danube reaches down to Cape Constanța but not southward beyond it. The beach sand from Agigea (south of Constanța Port) to Vama Veche is made of shell fragment without any trace of terrigenous sand.

(2) Coastal protection plan

First, the fundamental features of a regional coastal protection plan against erosion are compared with other infrastructure development projects. It is discussed that a coastal protection plan needs to be prepared for independent coastal littoral cells individually and there can be no overall alternatives except for “zero-option.” The Study area has been divided into seven sectors and twenty sub-sectors as shown in Fig. 5.2.1 for convenience of executing the Study, and there exist nine independent coastal littoral cells.

Strategy of formulating coastal protection and rehabilitation plans has been set, and nine sub-sectors are judged to require implementation of coastal protection and rehabilitation projects. The rest of sub-sectors do not need to implement projects for time being. For the nine sub-sectors, plans of beach fill, jetty extension, breakwater construction and other means have been proposed as the measures to be executed in a medium- to long-term basis. The total volume of beach fill

sand for the period of 20 years or longer is about 3.2 million m³. The total cost of coastal protection plan is estimated as about 3.2 million Euro based on the price in 2005 without price contingency. Availability and quality of beach fill sand have been investigated during the Study. It is clarified that the river sand at the location between km 300 and 340 can be utilized for beach fill purpose without endangering the sand resources nor with significant environmental impact on the flow regime of the Danube.

An implementation schedule of the coastal protection plan is proposed to be divided into the first stage from 2007 to 2020 and the second stage after 2021. The first stage is further divided into three phases to which projects in individual sub-sectors are assigned.

(3) Priority project sites

The nine sub-sectors that require shore protection measures have been examined and compared for the urgency of shore protection, the state of beach utilization, and other factors. Based on such comparison, the areas of Mamaia South and Eforie Nord have been selected as the sites of priority projects.

(4) Environmental and economical considerations

First, a survey is made on the policy, legal aspects and administrative framework of environmental protection in Romania. Tables of the elements and quality standards have been prepared for various environmental factors. Then, the environmental conditions in the coastal sectors are described with some details on the ecosystem.

The initial environmental examination of the coastal protection plan for the Southern Romanian Black Sea shore begins with an overview of the shore protection projects considered in the Coastal Protection Plan for the Southern Romanian Black Sea shore. Thirty items stipulated in the JICA guidelines have been examined by the Study team as well as the stakeholders in Romania.

Nine stakeholder meetings were held in the period from June 2005 to March 2007, six in Constanța and three in Bucharest. Scoping of the environmental items was made in the stakeholder meetings and further examination has yielded assessment of impact degree. Four factors are assessed to have moderate impact, two with low impact, and the rest twenty six as no impact. Agenda, presentations and discussions at seven stakeholder meetings are summarized in **7.5**.

A preliminary environmental management plan is proposed with cost estimates for monitoring of various environmental parameters.

The public debate regarding the SEA on the Coastal Protection Plan was held at Constanța on March 29, 2007 for discussion on the Master Plan. Meantime, the number of participants was 49 including 19 members related to the Study. In response to the result of public debate, environmental approval on Coastal Protection Plan as the Master Plan was issued by The Ministry of Environment and Water Management with the final decision numbered 13/05 07 09 and the SEA procedure was completed in July of 2007.

(5) Administration and monitoring of coastal protection plan

A recommendation is given for the establishment of a special coastal administrative unit in the Ministry of Environment and Water Management and the corresponding sections in ANAR and

DADL. The minimum number of the permanent staff of the special coastal administrative unit is four: Leader, Deputy Leader, Civil Engineer, and Environmentalist. The special coastal administrative unit as well as the corresponding sections should be provided with written documents for the authority and competence of each officer in the unit and the sections, which will be made public. With this measure, the unit and the sections shall be able to make speedy decisions by themselves.

The coastal administrative unit together with the corresponding sections will be charged with the responsibility of effective and efficient execution of the coastal protection plan consecutively year after year. They will also be responsible for preparing and executing the plans for monitoring geophysical, environmental, and structuring aspects of the coastal areas. Undertaking of timely operations for maintenance beach fill is also necessary, because mitigation against beach erosion always requires maintenance works.

(6) Management Assessment and Institutional Aspects

An overview of project implementation framework is provided with two projects financed by EU and World Bank for reference. Then the fund management and auditing systems are discussed with examples of several international financing institutions. Availability of project financing to the coastal protection plan is explained by listing possible international funds. Budgetary process in Romania is described together with the procedure of external borrowing. Affordability analysis will be provided in Volume 2 in relation with the feasibility study for the projects at Mamaia South and Eforie Nord.

9.2 Recommendations

(1) Establishment of special coastal administrative unit

This recommendation is elaborated in **8.1** and summarized in 9.1 (5). No further explanation is given here.

(2) Collaboration with LEPA and authorities in charge of sewerage system

Inshore water areas of several sub-sectors are having troubles of water pollution, which is mainly caused by direct discharge of waste water from hotels and households. New tertiary waste water treatment plants being built at Mamaia South and Eforie Sud will certainly decrease the pollution load to the Black Sea. However, laying of sewer pipes to the treatment plants from all the sewage outlets would require special regulations and efforts of the authorities concerned. MoEWM and DADL should make good collaboration with LEPA and authorities in charge of sewage system for improvement of water quality in the coastal area.

(3) Formulation of coastal protection plan for the northern unit of the Romanian Black Sea shore

The present JICA Study was given the assignment of formulating a coastal protection plan for the southern unit of the Romanian Black Sea shore, which aims at the year 2020, according to the Scope of Works signed between the Governments of Japan and Romania on the 30th of July 2004. As widely known, the beach erosion in the northern unit is much severer than in the southern unit. The section **4.2.2** gives a brief account of the state of beach erosion there. The rate of beach erosion reaches 19 m per year at maximum.

The cause of beach erosion in the northern unit is two-fold. One is the general decrease of sediment supply from the Danube, mostly owing to construction of many dams in the mainstream and tributaries of the Danube in recent several decades. The other is the extension of the two jetties at the entrance of the Sulina Channel. The jetties are indispensable to protect the channel from siltation and to maintain the water depth necessary for international navigation. However, the jetties also stop the southward transport of sediment that comes from the Chilia Branch; the sediment forms sand bars outside the Sulina Channel. The River Administration of the Lower Danube, Galati (AFDJG) is continuing maintenance dredging both inside and outside the Channel. The dredged spoil which is a mixture of sand and mud is dumped at the offshore side of the Channel from where no natural sediment transport toward the shore is expected.

There is a possibility of reducing the beach erosion rate of the northern unit by shifting the dredged spoil dumping site to a shallow water area located in the southwest of the Sulina Channel. If the water depth is small enough, the dumped sediment will be transported southwestward by waves and currents and eventually contribute to natural nourishment of eroding beaches. A shift of the dumping site may increase the cycle time of the dredge Dunărea of AFDJG and the operational cost, because of a longer distance to the new dumping site. A study is needed to investigate both the technical effectiveness of such operation and the institutional coordination among MoEWF, MoTCT, AFDJG, and other related authorities.

With or without the above proposed study, MoEWM should initiate an overall study to cope with the acute beach erosion problem of the northern unit of the Black Sea shore. Coordination with the Danube Delta Biosphere Reserve Authority is necessary, because the coastline is included in the protected reserve area and no construction of permanent structures there is allowed in principle. It is hoped that the data and information collected in the Study will be of assistance to the study for formulation of coastal protection plan for the northern unit of the Black Sea shore.

(4) Development of expertise in coastal engineering in Romania

The Study team had opportunities to meet with Romanian academicians and engineers at the technical workshop held by the team in Bucharest on November 15, 2005 and the International Symposium on Coastal Erosion organized by NPO in Mangalia on June 22 to 24, 2006. The Study team learned that Romania brought up many specialists in marine construction during the 1950s to the 1990s when the Ports of Constanța, Midia, and Mangalia were developed and expanded. Many jetties, groins, revetments and promenades were built along the coast in this period. Hydraulic laboratories were busy in carrying out many model tests on wave transformations, structural stability, and beach protection.

To the regret of many people concerned, marine construction works in Romania have been stagnant in recent days and little stimulus has been given to researchers and practitioners in this field. This has resulted in the scarcity of middle to young experts in the field of coastal engineering. Senior people who developed their expertise have not caught up the world-wide development of technology and there remains a wide gap between Romania and technically developed countries. In the field of coastal protection technology, for example, biennial conferences called the International Conference on Coastal Engineering (ICCE) are most respected with more than 800 attendees, and the proceedings of ICCEs are a kind of technical manuals among coastal engineers. Few Romanians must have ever participated in these conferences.

Deficiency in coastal engineering expertise in Romania may cause some difficulty in implementing the series of projects formulated in the Coastal Protection Plan for the Southern Romanian Black Sea

shore in the sense that the Romanian counterparts to the overseas consultants and contractors (if any) cannot take the leadership in technical discussions and various negotiations.

A remedy to this problem is to commission various field studies, analyses, and computations related to the priority projects to the universities and consultants in Romania by disbursing only a small portion of the project fund. Through such means, capable young experts will gain valuable experiences and develop themselves. Research can only grow in the field where the field works demand the new solution.

(5) Investigation of the mechanism of long-period oscillations of water level and their effect on water circulation along the Black Sea shore

As described in 3.3 (5), the water levels at the Ports of Constanța and Mangalia exhibit long-period oscillations with the amplitude of a few decimeters and the period of a few weeks. The mechanism of its generation has not clarified yet. However, the water level fluctuations affect the design water level for shore protection facilities and they may induce some coastal currents. The latter may be important to water circulation between narrow zones enclosed by the existing short groins, where water pollution appears from time to time.

Although the phenomenon of long-period water level fluctuations belong to the research field of physical oceanography, its investigation is recommended because of its importance for the coastal zone management.

9.3 Further Issues

(1) Project performance and the need for ministry's policy commitment

The Plan for Coastal Protection and Rehabilitation of the Southern Black Sea Shore (hereinafter referred to “the Plan”) presented in the present Final Report is going to be promoted by firm policy commitment for successful administration of the integrated coastal zone management in Romania.

As indicated by the international financing institutions, the dominating factors affecting the extent to which project performance is evaluated include, among others, macroeconomic environment and the competency and performance of the Ministry of Public Finance (MoPF) which virtually controls the project through its delegated power and authority on fund management and procurement (certifying authority) as well as allocating domestic budget as appropriate in amount and timing. With DADL's technical as well as administrative capability as a Project Beneficiary being well competent and adept in expeditiously proceeding with the project as given, project success may depend, to a large extent, on policy environment for coastal protection and rehabilitation favorable to the project operation and DADL.

In view of the above, it will be a “must” for the Ministry of Environment and Water Management (MoEWM), as a managing authority, to firmly keep its policy commitment to the projects under the Plan that follows up for other beaches along the coastline. Consulting services in the advent of, as well as during, the project implementation also yield significant rewards to project success in terms of smoother and expeditious processing of technical and administrative matters for the project. With this, MoEWM should readily be in a position to administratively as well as financially support DADL to expedite project processing by providing professional consultancy supports, as necessary.

As specified in **8.1**, the special coastal administrative unit should be established in MoEWM with the competence for efficient execution of the Plan. Similarly, the coastal administrative sections should be designated in ANAR and DADL for smooth coordination with MoEWM.

(2) Need for counterpart fund to the short- and medium-term Black Sea shore protection plan

More than often, difficulties are encountered by project administration and management on the both sides of “recipient” and “development partner” to ensure domestic “counterpart fund” adequately in amount and timing to match the financing need arising from external grant and/or borrowings. In view of the accession to EU in January 2007 and associated flow of funds thereof as well as continued economic environment in favor of the country¹, the external financing need for Romania is projected to be US\$ 9.0 billion in 2007 to US\$ 12.5 billion in 2009². The government should increase the revenue by enhancing tax collection capacity and other means. With this, the proposed projects of and the ensuing medium-term plan for the Black Sea Shore protection and rehabilitation could be brought into implementation on time.

(3) SEA and EIA

Romania has introduced the Strategic Environment Assessment (SEA) procedure in 2004 and began its execution 2006. The Coastal Protection Plan has been selected as the first case of the SEA procedure. The Ministry of Environment and Water Management made a contract with an authorized environmental consultant firm for assisting SEA in October 2006. The consultant firm utilized the initial environmental examination report and the Interim Report of the Study for preparation of the SEA report, which was submitted to the Ministry in February 2007. The SEA report pointed out that a part of coastal protection facilities planned at the Eforie Sector may have significant environmental impacts. To avoid the environmental impacts, the original coastal protection plan at the Eforie Sector has been partially modified. The facilities proposed in Fig. 1.9 are those after modification.

The public debate regarding the SEA on the Coastal Protection Plan was held at Constanța on March 29, 2007 for discussion on the Master Plan. Meantime, the number of participants was 49 including 19 numbers related to the Study). In response to the result of public debate, environmental approval on Coastal Protection Plan as the Master Plan was issued by The Ministry of Environment and Water Management with the final decision numbered 13/05 07 09 and the SEA procedure was completed in July of 2007.

The remaining issues are the possible environmental effects by the implementation of the priority project at Mamaia and Eforie, which are raised during the SEA public debate. The issues are discussed in Executive Summary and Chapter 9 of Volume 2 of the Final Report.

¹ The European Commission reportedly issued the decision in the light of the accession of Romania ns Bulgaria to the Union on 26 September 2006.

² Source: The World Bank, *Country Partnership Strategy FY06-FY009*, 2006, p.5