

**GUIDELINES  
FOR INTEGRATED  
COASTAL ZONE MANAGEMENT  
OF THE SZCZECINSKI LAGOON**  
(the Polish side)

The study is a summary of thorough studies concerning physiography, environmental resources, areas located in the Polish part of the Szczecinski Lagoon and Integrated Management Plan of the Coastal Area of the Szczecinski Lagoon (1996, 1999) and Verification of the Integrated Management Plan of the Coastal Area in the area of Implementation Preparation (1999). Experts and members of the Area Task Team took part in the works on the study.

**Szczecin 2000**



## Contents

1. Introduction .....	3
1.1. The sustainable development principle, its importance and place in politics and legislation ....	3
1.1.1. The sustainable development principle in Baltic Agenda 21 .....	5
1.2. Borders of the coastal zone of the Szczecinski Lagoon included in the Management Plan .....	5
1.3. History of the project .....	5
2. Integrated Coastal Zone Management of the Szczecinski Lagoon. The tasks and key elements of the strategy .....	7
2.1. General characteristics of the Szczecinski Lagoon and of the coastal areas .....	7
2.2. Vision of the future – the directions of development of the Szczecinski Lagoon area .....	9
2.3. Tasks of the strategy .....	10
3. Assumptions of ICZM of the Szczecinski Lagoon .....	11
3.1. Guidelines for ICZM of the Szczecinski Lagoon .....	11
3.2. Institutions responsible for management in the ICZM zone of the Szczecinski Lagoon .....	11
3.3. Planning .....	12
3.4. Regulations for coastal zone management .....	12
3.5. Problems influencing the state of environment .....	16
4. Priority goals of ICZM of the Szczecinski Lagoon and the methods of their realisation .....	17
5. Guidelines for the management plan of the communes .....	21
6. Financing of realisation of the ICZM tasks .....	41
7. Aspects of institutional implementation of the assumptions of Integrated Management .....	45
8. Social conditions .....	47
9. Sustainable development indicators for ICZM of the Szczecinski Lagoon .....	49
10. Recapitulation.....	53

## Annexes

Annex 1. Characteristics of the area of ICZM of the Szczecinski Lagoon	
Annex 2. Protected areas and areas worth protection on the area of ICZM of the Szczecinski Lagoon	
Annex 3. State of the environment on the area of ICZM of the Szczecinski Lagoon	
Annex 4. Water management of ICZM of the Szczecinski Lagoon	
Annex 5. Conflicts between the environment and the economy	
Annex 6. Needs of the communes in the field of environmental protection and improvement of the state of the environment	
Annex 7. Setting up of priority tasks for water management, nature protection, monitoring and in the light of activities of the Maritime Office	
Annex 8. Sustainable development indicators for ICZM of the Szczecinski Lagoon	

## **Experts and members of the Area Task Team (ATT):**

Leader of the Area Task Team:                   Maciej Cehak  
The Marshalship of the West-Pomeranian Voivodeship,  
Department of Strategy and Spatial Planning

Secretary of the Area Task Team:               Małgorzata Landsberg-Ucziwek  
The Voivodeship Inspectorate of Environmental Protection  
in Szczecin

Władysław Buhholtz – the Maritime Institute in Szczecin

Ryszard Dobracki – State Geologic Institute in Szczecin

Kazimierz Furmańczyk – the Szczecin University, the European Union for Coastal Conservation

Hanna Garbacik – Wesołowska – Sea Fishery Institute in Swinoujście

Bogdan Jakuczun – Wolinski National Park

Urszula Jakuczun – the Union of Communes of the Wolin Island

Andrzej Kreft – Regional Water Management Board

Andrzej Kwapiszewski – Regional Water Management Board

Ireneusz Lewicki – Wolinski National Park

Zygmunt Mostowski – Voivodeship Meliorations and Greenlands Management Board

Stanisław Musielak – the Szczecin University, the European Union for Coastal Conservation

Franciszek Nowacki – Proxima, Wrocław

Witold Nowak – the Maritime Office in Szczecin

Janusz Połonka – the Stepnica Commune, the European Union for Coastal Conservation

Jerzy Tokarski – Regional Spatial Management Office

Jerzy Urban – Regional Spatial Management Office

Piotr Zaremba – the City Hall, the Municipal Town-Planning Office in Szczecin

Przemysław Zyska – Polish Academy of Sciences, the “Swidwie” Ornithological Station

Wojciech Zyska – the Voivodeship Nature Conservator

Representatives of self-governmental administration of the communes: Dobra Szczecińska, Dziwnów,  
Goleniów, Kamień Pomorski, Kolbaskowo, Międzyzdroje, Nowe Warpno, Police, Szczecin, Wolin

# 1. Introduction

Globally it is believed that coastal areas are habitats of unique characteristics, extremely important from the ecological and economic point of view, under pressure of several factors. For the last few years environmental protection and economic growth have been widely recognised as complementary goals in the field of coastal area development. Integrated management of the coastal area is a relatively new idea and only a few programmes have been successfully implemented so far.

**Integrated management of the coastal area is perceived as a constant process with numerous participating sectors, created for improving, development, planning and protecting of the area through integration and inter-sectorial co-operation. It should be assumed that the process compiles and does not substitute plans in particular sectors. Integration concerns undertaken management goals as well as the tools needed for their realisation.**

**The essence of integrated management is the idea of sustainable development of coastal areas. Integrated management concerns both land coastal area and sea coastal area.**

## 1.1. The sustainable development principle, its importance and place in politics and legislation.

There are many definitions of sustainable development. One of them, defining the idea in a clear and simple way, is shown below.

**Sustainable development is such development which satisfies contemporary needs and does not deprive future generations of the ability to satisfy their own needs.\***

The sustainable development principle became widely accepted by the communities of the world as a result of the United Nations conference, Rio de Janeiro 1992 (Agenda 21).

**Sustainable development should be considered in three dimensions: economic, social and environmental, taking into account their interdependence and mutual logical relations. The point of departure is the exploitation of non-renewable resources and these resources which are difficult to renew, aiming to satisfy the needs (living standard, living quality) in a long term, and the transitional element is public selection and market regulation, defining development goals (and consequently exploitation of non-renewable resources) in a different way in time and space.**

**The essence of sustainable development (also called eco-development) is the awareness of the existence of mechanisms setting bounds to economic growth and causing recession which are stimulated by the process of growth. The realisation of eco-development requires a compromise which resolves itself to searching for the best way of satisfying many important current and future needs when the resources used to satisfied these needs are limited.**

The idea of sustainable development has been registered in the Constitution of the Republic of Poland in all basic legal acts regulating environmental protection or strongly related to environmental protection (including the spatial planning act), in the state environmental policy, in the Polish state programme for the accession to the European Union, in the legislation of the European Union and in many international conventions and agreements.

The basic assumption of sustainable development in the field of environmental protection is conducting the policy and activities in particular sectors of the economy and social life in such a way that would preserve environmental resources and qualities in a state securing permanent possibility of utilising them by contemporary and future generations, at the same time maintaining the constancy of natural processes and natural biodiversity at landscape, ecosystem, species and genic level.\*\* In the state environmental policy this basic principle is transformed into several concretising principles, such as:

---

\* *The United Nations World Committee for Environment and Development report*

\*\* *State Environmental Policy at the Beginning of the 21<sup>st</sup> Century, Project, Ministry of Environment, Warsaw, November 1999.*

- the principle of equal access to natural environment,
- the principle of state environmental policy regionalisation,
- the state environmental policy collectivising principle,
- the “polluter pays” principle,
- the principle of suppression of pollution, arduousness and threats at source,
- the principle of integrated attitude to environmental protection,
- the principle of securing environmental protection at the highest technical and economic level.

An individual and its actions are strongly attached to the natural system (air, water, soil, ecosystems, biological resources, biodiversity). Maintaining this system balanced requires a coherent and joint management of the access to environmental resources, preventing from negative results of economic activity and suppression of these results (environmental protection) as well as rational exploitation of nature resources (water management, forestry, protection and exploitation of soil and raw materials, spatial planning). It should be reflected in adequate **management structures** at state, voivodeship and self-governmental level and such division of competences, tasks and available procedures which will cause the environmental protection policy goals to be set basing on recognised needs – local, regional and state and the means for achieving this goals to be chosen basing primarily on ecological and economic effectiveness. Only in this case environmental safety will be secured.

The new State Environmental Policy sets three goal attainment stages: *short-term* goal realisation stage while aspiring to EU membership (2000-2002/2003), *medium-term* goal realisation stage in the first period of EU membership, involving transitional periods and realisation of adaptation programmes (2003/2004-2010-2012) and realisation of *long-term* goals set in “*Strategy of sustainable development of Poland by 2025*”, prepared by the government.

**Long-term priorities of the state environmental policy (New State Environmental Policy project, accepted by the Cabinet):**

- **Thorough reconstruction of the production and consumption model, aiming to improve the efficiency of raw materials and energy utilisation and to minimise the impact of any form of economic activity and development of civilisation on health and environment**
- **Full integration of environmental policy with the policies in particular sectors of the economy, spatial policy, regional policy and consumer policy through adequate modification of sectorial programmes or working out of new programmes, fully adjusted to the strategy of sustainable development.**

**The spatial planning system (local spatial management plans of communes, spatial management plans of voivodeships and ideas of the state spatial management policy) is one of the basic tools of realisation of the regionalisation principle in the state policy (i.e. adaptation of directions and methods of acting in the field of particular areas’ development to their differentiated predispositions) and one of the basic tools of the policies integration principle in different sectors of the economy (and of balancing their not uncommonly divergent interests).**

Basic tasks of the spatial planning system from the point of view of the environmental policy include:

- stimulating of changes in the spatial structure of economic activity, directed to limit excessive concentration of this activity, its better adjustment to local and regional conditions (above all nature and environment bound) and minimising transport needs and the scale of transport requirements of the economy in different spatial configurations,
- harmonisation of opposing tendencies in the field of development directions’ selection of a particular region, resulting from existing investments, available human resources and the level of environmental degradation and transformation.

The environmental policy **collectivising principle** will be carried out through creation of new institutional, legal and material conditions for the citizens, social groups and non-governmental organisations for their participation in the process of formation of the sustainable development model, with simultaneous development of environmental education, arousing of environmental awareness and sensitivity and formation of new ethical standards for acting in relation to the environment. The process will proceed using mechanisms and recommendations resulting from “*Convention on access to information,*

*participation of the public in decision-making and access to judicial proceedings in environment bound cases”.*

### **1.1.1. The sustainable development principle in Baltic Agenda 21**

Agenda 21 is a tool for overcoming existing developmental disharmony, for raising efforts in the field of permanent and sustainable spatial and economic development which “*satisfies the needs of the public and ensures the conditions for satisfying the needs of the future generations*”.

Preliminary assumptions of Agenda 21 for the Baltic Sea region were drawn up at the Conference of Environmental Protection Ministers in October 1996, in Sweden. According to these assumptions the sustainable development principles should be taken into account above all in seven sectors of the economy: agriculture, power industry, fishery, forestry, industry, tourism and transport.\*

### **1.2. Borders of the coastal zone of the Szczecinski Lagoon included in the Management Plan**

According to the Guidelines for Integrated Coastal Zone Management (HELCOM 1995), the area included in planning activities should be large enough to enclose all the factors and activities which influence the sustainable and ecological utilisation and development of the area.

**The terrains which will be taken into consideration within the coastal zone of the Szczecinski Lagoon are the Polish part of the Szczecinski Lagoon and the whole Kamienski Lagoon (called further on to make the text clear the Szczecinski Lagoon), the coastal fragment of the Pomeranian Bay and the land areas surrounding these reservoirs. Accepting of these borders, delimited mainly basing on the borders of administrative units, results from the necessity of adjustment of the conclusions of the Management Plan to the local spatial management plans. The border of the Management Plan which has been agreed upon is shown on Map 1.**

The habitats included in this area are characterised by varied grades of transformation and anthropogenic development, such as:

- areas of a natural character, i.e. part of the Szczecinski Lagoon within the borders of the West-Pomeranian Voivodeship, the waters of the Kamienski Lagoon and the Pomeranian Bay,
- areas which are nearly natural, i.e. water ecosystems (rivers, lakes, field ponds, etc.), water and mud ecosystems (marshlands, swamps, peatbogs, wetlands, areas periodically flooded by fresh water and salt water),
- areas anthropogenically transformed in a relatively small degree, i.e. forests, meadows, fields,
- areas transformed to varied extents, i.e. areas where villages and towns and any other human settlements exist, industrial and municipal plants, industrial parks, storehouses, warehouses, harbours, mines, farms, land transportation routes, airports, powerlines and pipelines, solid waste storage sites, military areas, etc.

### **1.3. History of the project**

The Szczecinski Lagoon has been considered one of the highest priority regions in the field of the Baltic Sea environmental protection (HELCOM). High biodiversity of the wetlands and adjacent areas (ecotones) in the Szczecinski Lagoon area, and on the other hand economic pressure and its environmental consequences oblige to introduce interdisciplinary projects on coastal area protection.

In 1995 a pilot Integrated Management Plan of the Coastal Areas was drawn up with the participation of the German side\*\*

In 1996 the plan was accepted by HELCOM PITF 9 (Baltic Programme Implementation Task Force) together with the plans for other areas.

The evaluation of all plans carried out by world experts indicated a necessity of making them more

---

\* *Baltic Agenda 21, Introduction to spatial planning in the Baltic Area, Governmental Strategic Planning Centre, Gdansk 1998*

\*\* *The Integrated Coastal Zone Management of the Szczecinski Lagoon, by J.Urban and team.*

detailed and therefore in mid 1999 an initiative was undertaken to improve and update contemporary plans<sup>\*</sup>. The plan is co-ordinated by WWF-Denmark. Part of the work for the Szczecinski Lagoon has been financed by the means of the Helsinki Committee Secretariat in Gdansk. The plan for the Szczecinski Lagoon has been worked out and verified by the regional Spatial Management Office of the West Pomeranian Voivodeship from the financial means of Helsinki Committee Secretariat in Gdansk.

However, in the opinion of ATT (Area Task Team in the Szczecinski Lagoon area) the verified plan did not include all necessary aspects which should have been taken into account as the financial means were limited and the period of realisation was short. The introduced Integrated Management Plan of the Coastal Zone (further on called **Management Plan**) has been created basing on previous studies, financed by the means of the National Fund for Environmental Protection and Water Management, on the initiative of the Ministry of Environmental Protection.<sup>\*\*</sup>

A fact which needs particular emphasis is the differentiation of the Integrated Management Plans of the Coastal Areas in particular regions. Within HELCOM six areas were selected (1999): the Matsalu Bay, The Gulf of Riga (Estonia/Lithuania), the Kuronian Lagoon (Lithuania/Russian Federation), the Szczecinski Lagoon (Poland/Germany), the Vistula Lagoon (Poland/Russian Federation), the Kain Bay (Estonia).

Each of the regions plays a different role in the economy of the particular countries. The regions are strongly or less industrialised, have suffered from environmental degradation on a large or smaller scale and the threats and their consequences have been identified to different degrees. The Szczecinski Lagoon area and the Vistula Bay area are the typical examples.

Comparative studies of tens of exemplifying applications of the Integrated Coastal Zone Management are carried out at present within the European Union. The conclusions drawn from these studies will be used in the recommendations of the European Union<sup>\*\*\*</sup>

Enclosed maps worked out in GIS system and the inventory of the tasks that are planned and performed in the Integrated Coastal Zone Management region – the Szczecinski Lagoon – are an integral part of the studies. Time assignments for the priorities are different for particular aspects taken up in the studies. This differentiation of time assignment has got its own purposes, e.g. performing of nature protection tasks requires a different period of time than water protection tasks.

The plan for the Szczecinski Lagoon should be taken into account in the Strategy of Voivodeship Development worked out by the Marshalship.

Development of the plan should not be performed without the participation of our neighbours from Mecklenburg. Therefore the plan has been officially recognised as a subject of co-operation of the Joint Environmental Protection Committee of the Western-Pomeranian Voivodeship and Mecklenburg. The German side notifies the Polish side about the progress in the development of the plan; the estimated time of bringing the plan to an end for the German side – September 2000.

---

<sup>\*</sup> Verification of the Integrated Management Plan of the Coastal Area of the Szczecinski Lagoon, by J.Urban and a team.

<sup>\*\*</sup> The suggestion of activities to be performed in support of the implementation of the Integrated Management Plans of the Coastal Areas in the Vistula Bay and the Szczecinski Lagoon in Poland.

<sup>\*\*\*</sup> Lessons from the European Commission's Demonstration Programme on Integrated Coastal Zone Management (ICZM), EC, Luxembourg, 1999 (<http://europa.eu.int/comm/dg11/iczm/discdoc.htm>)

## 2. Integrated Coastal Zone Management of the Szczecinski Lagoon. The tasks and key elements of the strategy.

In the strategy of the Integrated Management Plan the following key stages can be distinguished:

<b>Vision</b>	– a clear outline of the vision of the future of the Szczecinski Lagoon,
<b>Assumptions</b>	– working out of general, acceptable guidelines for Integrated Management and for the Integrated Coastal Zone Management of the Szczecinski Lagoon,
<b>Priorities</b>	– defining strategic goals for the Szczecinski Lagoon,
<b>Realisation</b>	– identifying the methods for realisation of strategic goals.

### 2.1. General characteristics of the Szczecinski Lagoon and of the coastal areas

*A more detailed description of the area can be found in the enclosed annex. The description below is its synthesis.*

The Szczecinski Lagoon, being part of the estuary of the Oder River, is a wide littoral reservoir. Its area is 687 km<sup>2</sup> and its average depth is 3.8 m. The reservoir is characterised by specific hydrochemical properties of waters which are formed under the influence of inland water inflow and water exchange with the sea. The inflow of brackish waters from the Baltic Sea and the Pomeranian Bay depends on: set and speed of the wind, state of the sea, atmospheric pressure and water level in the Lagoon. Damming up of the waters which occurs in this area causes flooding of the coastal areas which are valuable habitats of flora and fauna and at the same time natural treatment systems for the pollution carried in by river tributaries and area run-off. The volume of the waters of the Szczecinski Lagoon is 2.58 km<sup>3</sup> and they are exchanged 6-7 times a year on average.

The Pomeranian Bay is an important reservoir for Polish maritime economy. Navigational access routes leading to the big harbour complex Szczecin-Swinoujscie and to smaller harbours of the Pobrzeze Szczecinskie and Pobrzeze Slowinskie run across the Bay. Many attractive health-care resorts and holiday resorts for which development of tourism is dependent on the cleanliness of the reservoir are located on the coast of the Bay.

The main tributary of the Szczecinski Lagoon is the Oder River. The basin of this river covers about one third of the area of Poland (about 119 000 km<sup>2</sup>). Other significant tributaries are the rivers: Gowienica, Gunica, Dziwna, Swina, Piana, Swiniec, Wkra, Wolczenica and Zarow. The water from irrigation polders is discharged from the direct basin to the Lagoon. The largest irrigated areas are located in the region of Czarnocin (the eastern coast) and Warnoleka (the southern coast). The largest wetlands exist in the area of the Reverse Delta of the Swina River, the Kodrabskie Depression, the Valley of the Swiniec River, lower Grzybnica and Wolczenica, the lakes Ostrowo and Piaski, the eastern coast of the Lagoon – the area of Stepnica, Skoszewo, the Valley of the Oder River, Szczecin, the basin of the Gunica River (**Map 1**).

The water outflows through three straits: through Swina and Dziwna into the Pomeranian Bay and through Piana into the Greifswald Lagoon. The biggest lake in the mouth of the Oder River is Lake Dabie with the area of 5 570 ha. As this lake is directly connected with the Szczecinski Lagoon, the water level in the Lake is dependent on the water level in the Lagoon. The pollution and biogenic compounds discharged into Lake Dabie and coming mainly from the Szczecin agglomeration are a serious burden to the whole estuary of the Oder River.

The state border between Germany and Poland runs north to south and divides the reservoir into two parts: the western part, called further on the Small Lagoon and the eastern part, characterised by higher water exchange dynamics, called the Great Lagoon.

The Great Lagoon (the Polish part of the reservoir) covers the area of 410 km<sup>2</sup>. The waterway from Swinoujscie to Szczecin runs through it. The average depth of the constantly dredged waterway is

about 10-11 m and its length within the Lagoon - 20 km (it is assumed that the depth of the waterway should reach 14 m). The waterway has a very significant influence on the water exchange between the Great Lagoon and the Pomeranian Bay.

The sore points of the reservoir from the navigational point of view are low average depth (3.8 m) and numerous shoals (25% of the area of the Lagoon).

The specific role of the Lagoon is:

- slowing down the velocity of the waters of the Oder River and other tributaries and consequently sedimentation,
- creating periodically flooded and wet coastal zones, including the Reverse Delta of the Swina River,
- creating and maintaining habitats for salt-water, fresh-water and transitional organisms, for whose existence sea water inflow is essential.

**The area of the coastal zone of the Szczecinski Lagoon is a habitat for plant communities as well as animal and plant species being the object of concern of a number of conventions and directives of the European Union and the Polish environmental protection act. According to the experience of many countries, such areas are a Mecca for millions of nature observers and for ordinary people for their weekend rest. Therefore the coastal zone of the Lagoon due to the specificity of its location and the wealth of natural systems can become a place of rest and one of the main tourist attractions of the West Pomerania and of the whole country.**

In the area of the Wolin Island the Wolinski National Park exists, which represents an area of unique Pomeranian nature and in particular it protects the phenomenally diversified landscape of the Wolin Island and a major part of the Delta of the Swina River together with the adjacent waters of the Pomeranian Bay and the Szczecinski Lagoon. It was established in 1960 on the area of 4 800 ha and in 1996 extended to 10 937 ha. Through including the adjacent waters of the Baltic sea one-mile wide and the internal sea waters of the Szczecinski Lagoon the park became the first sea park in Poland. It was an element of realisation of the settlements of the Helsinki Convention (ratified in 1999) about taking selected areas of the Baltic Sea under legal protection. The park also obtained the BSPA status (*Baltic Special Protected Area*). One of the leading functions of the park is making the nature values accessible for tourism and carrying out ecological education. In the area of the park there is a bison reserve. More than 120 000 people visit the reserve every year. The role of this object is to acquaint tourists with the species that can be hardly found in the wild. The network of trails, cycling paths and points of observation is an offer for everybody who wants to learn about the nature of the park. The park is visited by 300 - 500 thousand people a year, mainly in the summer.

Acknowledging the unique nature values of the area the Nature Friends International recognised it together with the islands Uznam and Wolin the landscape of the year 1993/94. The Delta of the Swina River, the Szczecinski Lagoon, the Pomeranian Bay, the Kamienski Lagoon and the Rozwarowskie Marshlands are bird refuges of European importance. The Wolinski National Park due to its biodiversity is a priority area for maintaining the natural heritage.

The Szczecinski Lagoon is of a great importance to the region. It is a reservoir of high effectiveness of fishery. Annual catch of 3000 tons (mostly roach, bream, perch and pike-perch) gives it a significant position. The Lagoon is at present the only Polish water reservoir close to the sea where spawning of lavaret takes place in late autumn.

In the coastal areas of the Lagoon many valuable mineral resources can be found (aggregates, saline waters, natural gas, small amounts of crude oil and peats) and curative raw materials (therapeutic peats, mineral and thermal waters).

The area of the Lagoon and the terrains included in the Management Plan of the Coastal Area are divided into the following administrative units: Dobra, Dziwnow, Goleniow, Kamien Pomorski, Kolbaskowo, Miedzyzdroje, Nowe Warpno, Police, Stepnica, Szczecin, Swinoujscie, Wolin (**Map 1**).

In Kamien Pomorski and Swinoujscie due to great climate conditions and saline water sources health care in sanatoria has been developed. The favourable microclimate of Dziwnow, Miedzyzdroje and other resorts as well as the beautiful beaches are attractive for Polish and foreign tourists.

The tourists are also attracted by the terrains and facilities of the Wolinski National Park, picturesque lakes and many monuments, especially in Kamien Pomorski and Wolin. An additional attraction of these towns are annual organ festivals (Kamien Pomorski) and the Viking festival (Wolin).

Swinoujscie is one of the most popular holiday resorts and health-care resorts of the southern coast of the Baltic Sea and at the same time it is a sea harbour of international importance.

In Police one of the biggest chemical plants producing phosphatic fertilisers is located. Therefore the town and the district are of an industrial character. The location close to the state border and to the Szczecin agglomeration influence the economic growth. At the same time it is a valuable area for tourism because of its large forest complexes (the Wkrzanska Forest) and many water reservoirs (the lake and ornithological reserve Swidwie). Trzebiez and Nowe Warpno are water-tourism centres.

In the Stepnica commune there are picturesque nature reserves: "Czarnocin" and "Bialodrzew Kopicki". The tourists are attracted by beautiful forests and the possibility of fishing.

Szczecin is the historical capital of West Pomerania. The connections with the sea and the basin of the Oder River have had the biggest influence on its over thousand-years development. It is the biggest city of the voivodeship and at the same time its administrative, commercial, educational and cultural centre. The biggest industry of the voivodeship is concentrated here (including harbour and shipyard industry). It is also an important traffic junction of land and water transport. Due to its location (the mouth of the Oder River), its monuments, forests and lakes it attracts many tourists.

The coastal areas of the Szczecinski Lagoon have already been developing dynamically, among other things due to the location close to the European Union border, the attractiveness of this part of the Baltic coast for tourists and the developing co-operation with western and northern neighbours.

The pollution accumulated in the bottom sediments of the Lagoon and the continuous inflow of pollution discharged from the tributaries influence the present state of the waters of the Lagoon. In the mouth of the Oder River sewage from Szczecin, Police and the "Police" Chemical Plant is discharged. The estimation of the grade of pollution reduction that takes place in the Lagoon is a very difficult task due to complicated conditions of water exchange and mixing which exist here.

In spite of the situation the natural and economic values of the area of the Lagoon and its surroundings fulfil the requirements of UNESCO to recognise it as a biosphere reserve.

The conception of establishing a biosphere reserve in the area of the Szczecinski Lagoon is an outcome of the celebration of "the Landscape of the Year 1993/94 - the mouth of the Oder River".

## **2.2. Vision of the future – the directions of development of the Szczecinski Lagoon area**

The specific configuration of the area of the Szczecinski Lagoon included in the Integrated Management plan, unique and varied conditions, e.g. hydrological and climatic, cause that specific and even unique flora and fauna can be found here. The same elements that centuries ago became a stimulus for the development of transport, agriculture, fishery, trade and colonisation nowadays are the grounds for localisation of the most significant industrial plants on the scale of the voivodeship. These areas, due to their unique climatic values and the presence of one of the most beautiful Polish sea beaches, are also a place that has been used for recreation for years - mainly for holiday rest and health-care.

Taking into account the identified functions and utilisation methods of nature resources the following directions of development are advisable:

**1. Preservation and development of the key branches of industry resulting in increasing of the income of the inhabitants in the areas included in the Integrated Management of the Coastal Zone, in accordance with the eco-development principle. The conditions of economic growth stimulation are: investments for the benefit of modern, environmental friendly technologies, modernisation of infrastructure for industrial production and reorganisation of the industrial processes management systems:**

- maintaining and development of harbour and shipyard industry,
- development of land and sea transport,
- maintaining the existing key industrial plants (including the "Police" Chemical Plant) together with minimisation of their harmfulness to the environment and health of the inhabitants,
- development of fishery respecting the principle of securing fish resources renewal,
- development of farming respecting the principle of applying best farming practices and the possibilities of restoring the ecological functions of the areas that not a long time ago played an exceptional role as habitat areas for unique species of flora and fauna,
- development of forest management in accordance with the sustainable development principle,
- development of varied forms of tourism and recreation, with the use of unique nature, landscape, cultural and historical values, taking into account the minimisation of harmfulness of its influence on the environment and popularisation of the conception of preservation and protection of biodiversity,
- water tourism, together with development of a network of small ports and havens, cycling tourism, ecotourism, agrotourism,
- development of health-care functions, including utilisation of natural curative resources and climatic values,
- promotion of the area due to its exceptional nature, economic, tourist and other values.

**2. Protection of unique nature and landscape values through maintaining the previous forms of protection in the Integrated Management of the Coastal Zone of the Szczecinski Lagoon area and creation of new ones, including:**

- protection of valuable species of flora and fauna,
- restoration of selected wetlands,
- implementation of the biosphere reserve conception,
- protection of the functions of this area in the European ECONET system.

**3. Integrated protection of water resources, being a particular value for the area of the Szczecinski Lagoon, conditioning preservation of the exceptional economic and nature values of the area.**

**2.3. Tasks of the strategy**

1. Assignment of the assumptions of integrated policy in the area of ICZM of the Szczecinski Lagoon.
2. Assignment of the methods for elaboration of the detailed Integrated Coastal Zone Management of the Szczecinski Lagoon.
3. Definition of strategic tools for development of the Coastal Areas of the Szczecinski Lagoon.
4. Involving and development of participation of numerous institutions and local communities in the realisation of ICZM.
5. Working out of a co-ordinated system of strategic goals for implementation of ICZM in the Szczecinski Lagoon.
6. Definition of methods of carrying out the activities within ICZM of the Szczecinski Lagoon aiming to achieve sustainable development.
7. Monitoring and assessment of the achievements and their popularisation.

### 3.0. Assumptions of ICZM of the Szczecinski Lagoon

#### 3.1. Guidelines for ICZM of the Szczecinski Lagoon

1. The need of a long-term process of protection and improvement of the state of the environment in the Szczecinski Lagoon.
2. Minimisation of negative consequences of the urbanisation process in the region in relation to the unurbanised terrains concentrating nature values.
3. Equal treatment of the land and water part of ICZM of the Szczecinski Lagoon.
4. Balanced utilisation of the nature resources of the Szczecinski Lagoon and the adjacent land areas.
5. Directing the spatial development in accordance with natural predispositions.
6. Increasing of the wealth of people and improving of their life standard.
7. Particular promotion of environmental friendly management methods.
8. Effective involvement of local communities in any decisions in the field of economy.
9. Integrated approach to the transportation issues. Securing the access to the shore both from the water and from the land (roads, small ports and havens).
10. Standardisation of law connected with management in the areas of ICZM of the Szczecinski Lagoon.
11. Securing the constancy of the process of ICZM of the Lagoon, among other things through the activities of the task force ICZM - ATT (Area Task Team) with the participation of the German side.

#### 3.2. Institutions responsible for management in the ICZM zone of the Szczecinski Lagoon

The institutions responsible for the management of the ICZM zone of the Szczecinski Lagoon are:

**Self-governmental administration:** The Marshalship of the West-Pomeranian Voivodeship together with the dependent departments and self-governmental administration at the district and commune level – responsible for management on the areas of the dependent administrative units.

**Governmental administration:** The West-Pomeranian Voivode together with dependent departments and institutions – carry out the state policy in the voivodeship.

**Other government offices of administration,** including:

**Maritime Office** (*Urząd Morski*) in Szczecin – responsible for sea waters management (including inland waters – Lake Nowowarpieńskie, part of the Szczecinski Lagoon with the Swina River and the Dziwna River, the Kamiński Lagoon, the Oder River between the Szczecinski Lagoon and the southern border of the waters of the Szczecin harbour) and the zone of mutual influence of sea waters and land. In consequence, all plans and projects of investments connected with management of the technical zone, inland sea waters and territorial sea are approved or accepted by this organ of sea administration.

**Regional Water Management Board** (*Rejonowy Zarząd Gospodarki Wodnej*) in Szczecin – responsible for the definition of the strategy of utilisation and protection of water resources in the area of its activities (there are seven Regional Water Management Boards in Poland). It administers selected main rivers of the basin of the Oder River, waterways and channels, some damming reservoirs with their infrastructure: flood-gates, dams, pumping stations and the grounds over the administered waters being the property of the Treasury.

**Inspection of Environmental Protection, the Voivodeship Inspectorate of Environmental Protection** (*Inspekcja Ochrony Środowiska, Wojewódzki Inspektorat Ochrony Środowiska*) in Szczecin – carries out its activities in the area of the voivodeship, its main tasks are: inspection in the field of respecting the environmental protection regulations, carrying out and co-ordination of environmental monitoring.

**Voivodeship Sanitary Inspectorate** (*Wojewódzka Stacja Sanitarno-Epidemiologiczna*) in Szczecin - responsible for supervision of the conditions of environmental hygiene, hygiene in working places, schools and other educational institutions, of health conditions of food and nourishment, aiming to protect people's health from the influence of harmful and arduous factors.

**Voivodeship Board of Land Improvement** (*Wojewodzki Zarzad Melioracji i Uzytkow Zielonych*) in Szczecin – carries out its activities in the area of the voivodeship and is dependent to the Marshalship. It administers the rivers and watercourses which are important for agriculture, the buildings over these waters and utilised irrigation systems.

**Voivodeship Fund of Environmental Protection and Water Management, district and commune funds** (*Wojewodzki Fundusz Ochrony Srodowiska i Gospodarki Wodnej*) – they have the main sources of financing of ecological undertakings in the area of the voivodeship at their disposal. The means coming from fees and fines for water intake and sewage discharge administered basing on the Environmental protection, environment formation and Water Law act are distributed through these funds.

**Regional Directorate of State Forest** (*Okregowa Dyrekcja Lasow Panstwowych*) in Szczecin – realisation of forest management in the area of its activities (the borders of this area do not cover the borders of the voivodeship).

**Wolinski National Park** (*Dyrekcja Wolinskiego Parku Narodowego*) – responsible for protection of nature values of the area of the park.

**Szczecinski Landscape Park** (*Dyrekcja Szczecinskiego Parku Krajobrazowego*) – responsible for protection of nature, historical and landscape values of the area of the park.

**Agricultural Property Agency of Treasury** (*Agencja Wlasnosci Rolnej Skarbu Panstwa*) – an institution established for management of the property of the Treasury in relation with landed properties located in the areas designated in the spatial management plans for agriculture, the property left over after closing down the state farms.

**Land users:** owners and tenants of the terrains located in the ICZM area (industry, trade, services, farming, fishery, recreation, forestry), local communities, clubs and associations of various kinds carrying out their activities in this area.

**Consulting and advisory institutions:** Technical University of Szczecin (*Politechnika Szczecinska*), University of Szczecin (*Uniwersytet Szczecinski*), Maritime Institute (*Instytut Morski*) in Szczecin, Fishery Institute (*Instytut Rybactwa*) in Swinoujście, State Geologic Institute (*Panstwowy Instytut Geologiczny*), Institute of Meteorology and Water Management (*Instytut Meteorologii i Gospodarki Wodnej*), Institute of Environmental Protection (*Instytut Ochrony Srodowiska*), Agricultural University (*Akademia Rolnicza*), Union of Communes of the Wolin Island (*Zwiazek Gmin Wyspy Wolin*), non-governmental institutions.

### 3.3. Planning

Planning of development and activities in the ICZM area of the Szczecinski Lagoon is carried out mainly basing on:

- regional/voivodeship spatial management plan,
- commune, local plans and studies of directions and conditions of spatial management, nature assessment of the communes (the communes are obliged to prepare new plans by the end of 2002),
- strategic plans of particular institutions responsible for management,
- the strategy of development of districts, communes, the voivodeship and the state – taking into account the tasks resulting from European integration (under construction at present),
- the Wolin Island Communes Development Plan,
- the protection plans of the national park, landscape park and nature reserves.

### 3.4. Regulations for coastal zone management

#### *State regulations:*

Joining the European Union is one of the most important goals of the Polish government. Association of Poland with the European Union took place on the grounds of the European Treaty signed on December 16, 1991 which was implemented on February 1, 1994. The government obliged itself to carry out systematic activities for the benefit of changes in the Polish law and adjustment of the Polish law to the law of the European Union. Legal acts of the European Union are recommendations, resolutions, decrees, decisions and directives.

**The directives of the European Union regarding water protection (including the Framework Water Directive), waste, emission of pollution into the environment, protection of nature resources etc. will be introduced into the Polish legal system in the process of integration with the European Union. The preparatory stage is to be finished by the end of 2002. Therefore the law which is in force at the moment is undergoing intensive adjustments.**

The state legislation in the field of environmental protection is based on the following more important legal acts:

- The environmental protection and environment formation act, 1980, with further changes.
- The nature protection act, 1991, with further changes.
- The Water Law act, 1974, with further changes.
- The act on forests, 1991, with further changes.
- The spatial management act, 1994, with further changes.
- The act on wastes, 1997, with further changes.
- The Geologic Law act, 1994.
- The act on changing of some acts defining the competences of public administration organs due to the reform of the state political system, 1998.
- State border protection act, 1990, with further changes.
- Arable lands and forests protection act, 1995, with further changes.
- Building law, 1994, with further changes.
- On the sea areas of the Republic of Poland and maritime administration, 1991, with further changes.
- The act on prevention from polluting the sea by ships, 1995.
- The act on harbours and sea havens, 1996, with further changes.

***International conventions and agreements important for ICZM:***

- The agreement between Poland and Federal Republic of Germany on co-operation in the field of water management on transboundary waters, May 19, 1992.
- The agreement on the International Committee for Protection of the Oder River against Pollution (Poland, Germany, Czech Republic, European Union) - ratified in 1999.
- Intergovernmental agreement on co-operation in the field of environmental protection between Polish People's Republic and Federal Republic of Germany, 1989.
- International Convention: Regulations for the Prevention of Pollution by Sewage from Ships, London, November 2, 1973 and the Protocol from 1978 regarding this Convention, London, called the MARPOL Convention 1973/78.
- Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, December 29, 1972, drawn up in Moscow, Washington, London and Mexico City.
- Convention on Wetlands of International Importance Especially as Waterfowl Habitat – the Ramsar Convention, February 2, 1971, Poland has been a party of the convention since March 22, 1978.
- Convention on International Trade in Endangered Species of Wild Fauna and Flora – the Washington Convention, March 3, 1973 (CITES), ratified December 12, 1989.
- Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention), September 19, 1979. The Convention was signed on March 3, 1995 and it came into force for Poland on January 1, 1996.
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, March 22, 1989. Ratified on March 20, 1992.
- Convention on Long-Range Transboundary Air Pollution, the Geneva Convention, 13 November 1979. Signed on November 13, 1979, ratified on July 19, 1985, came into force for Poland on June 17, 1986.
- The United Nations Framework Convention on Climate Change signed in Rio de Janeiro on June 5, 1992, came into force for Poland on October 26, 1994.
- The Convention on Biological Diversity, Nairobi, 22 May 1992, signed in Rio de Janeiro on June 5, 1992, ratified in 1996.
- Convention on the Conservation of Migratory Species of Wild Animals (the Bonn Convention), June 23, 1979, came into force for Poland on May 1, 1996.

- Convention on Environmental Impact Assessment in a Transboundary Context (the Espoo Convention), February 25, 1991, signed on February 26, 1991, came into force for Poland on September 10, 1997.
- Convention on the Protection and Use of Transboundary Watercourses and International Lakes – signed in Helsinki on March 18, 1992. The Convention came into force in October 1996 and it was ratified in 2000.
- The Convention on the Protection of the Marine Environment of the Baltic Sea area (the Helsinki Convention), 1974.
- The Convention on the Protection of the Marine Environment of the Baltic Sea area (the Helsinki Convention), signed on April 9, 1992, ratified in 1999.
- Convention for the Protection of the World Cultural and Natural Heritage (the Paris Convention), signed in 1972 in Paris.

***Legislation work connected with the transposition of the commonwealth law on environmental protection***

The Ministry of Environmental Protection is responsible for the transposition of the law on environmental protection. Some projects of legal acts from this area is prepared by other departments and central offices (State Atomistics Agency, Ministry of Economy, Ministry of Health and Social Care, Ministry of the Interior and Administration, Ministry of Agriculture and Food Management. In the environment sector the following projects of acts transferring the commonwealth law are being prepared\*:

- The act on fertilisers and fertilising (the end of the legislation process planned by June 30, 2000) and the Good Farming Practice Code (accepted June 30, 1999),
- Amendments of the Atomic law act (the end of the legislation process planned by 31 December, 1999),
- Amendments of the Nature Protection act (the end of the legislation process planned by 31 December 2000),
- The Water Law act (the end of the legislation process planned by December 31, 2000),
- The act on wastes (the end of the legislation process planned by December 31, 2000),
- The act on packages and packaging waste (the end of the legislation process planned by December 31, 2000),
- The act on acting in the field of assessment of influence on the environment and access to the information about the environment and environmental protection (the end of the legislation process planned by December 31, 2000),
- The Environmental protection act, (the end of the legislation process planned by 31 December 2000),
- The act on genetically modified organisms and genetically modified micro-organisms (the end of the legislation process planned by December 31, 2001),
- The act on the state system of assessment of accordance transferring the legal rules concerning technical standards (the end of the legislation process planned by December 31, 2002),
- The act on chemical substances and preparations together with executory rules (the end of the legislation process planned by December 31, 2002),
- The act on control of dealing with the substances reducing the ozone layer (the end of the legislation process planned by December 31, 2002),
- The act on permitting public trading of biotoxic substances (the end of the legislation process planned by December 31, 2002).

Introducing the acts mentioned above to the Polish legal system will cause full compliance of the Polish environmental protection law with the commonwealth law (according to the state of the commonwealth law on January 1, 1999).

\*According to the state on January 1, 1999.

### ***Polish and German co-operation:***

The possibility of integration of activities in the field of ICZM of the Szczecinski Lagoon depends strongly on the real co-operation with neighbouring Mecklenburg – West Pomerania. It is carried out at many organisational levels and it results from agreements at a state, voivodeship and commune level. Many institutions are responsible for its realisation depending on the issues being the subject of co-operation.

The co-operation of the Voivode with the Lands Mecklenburg – West Pomerania and Brandenburg became stronger after the year 1990, in virtue of adequate agreements about mutual co-operation in the field of environmental protection, with particular regards to nature protection. The basis for the co-operation of the West-Pomeranian Voivode and Mecklenburg – West Pomerania is an agreement signed on October 10, 1995 and establishment of the Joint Environmental Protection Committee (October 10, 1995) whose main spheres of activity are: environmental protection, water management, solid waste management, protection against emission and spatial planning. On the other hand, the co-operation with Brandenburg is carried out in virtue of the joint declaration on co-operation in the field of environmental protection and nature protection between the Ministry of Environment, Nature Protection and Spatial Management of Brandenburg and the West-Pomeranian Voivode which was signed in 1997. In August 1999 a new agreement was signed by the Minister of Environment, Nature Protection and Water Management of Brandenburg and from the side of the West-Pomeranian Voivodeship - by the Marshal and the Voivode.

The Task Force established within the framework of the agreement aims to: develop co-operation in the field of environmental protection, initiate and support joint projects, support co-operation of the professionals both in the field of administration and in particular in the field of environmental protection, co-operate within the framework of Agenda 21, secure constant and regular information exchange, carry out experience exchange to prepare Poland for EU integration.

Joint nature protection in the valley of the Oder River and the basin of the “Swidwie” nature reserve has been assumed one of the significant elements of transboundary co-operation. As a result, the International Park of the Valley of the Lower Oder River and a joint nature reserve “Swidwie-Goettesheide” have been established, an initiative has been undertaken to elaborate a joint “Red book of plants and animals of the Szczecin Pomerania, Mecklenburg – West Pomerania and Brandenburg” and to work out a strategy of nature resources protection on the coast of the Baltic Sea, the islands Uznam and Wolin, the Szczecinski Lagoon and to establish joint education centres in Criven and Gryfino.

Joint works are carried out in the field of protection of groundwater resources of the islands Uznam and Wolin and the sustainable development programme of the islands. Building of a joint sewage treatment facility for Swinoujscie and neighbouring German villages is without doubt an example of co-operation worth copying.

The representatives of our voivodeship participate in the works of Polish and German Environmental Protection Board (the Board was established in 1991). The effect of this co-operation is among other things elaboration of a Polish and German handbook of joint environmental protection notions.

Within the framework of co-operation the Voivodeship Inspectorate of Environmental Protection in Szczecin carries out joint monitoring of boundary waters. Actually, the co-operation has been carried out since 1970. The Szczecinski Lagoon, the Pomeranian Bay and so-called small boundary waters are included in the joint studies. The boundary stretch of the Oder River is included in the monitoring studies as a result of the agreement on co-operation on boundary waters between Republic of Poland and Federal Republic of Germany signed on May 19, 1992. Within the framework of co-operation Polish-German Committee on Transboundary Waters has been established and within the framework of the Committee – five task forces. The participation of the Voivodeship inspectorate in the activities of the Committee consists mainly in co-operation with the W-2 water protection Task Force and W-3 accidental pollution Task Force.

### **3.5. Problems influencing the state of environment**

Already in the initial stage of the project in the area of ICZM of the Szczecinski Lagoon the following problems have been catalogued, whose influence on the natural environment cannot be left out of account:

#### **1. Threats to biodiversity posed mainly by:**

- lowering level of surface waters and groundwater,
- environmental pollution,
- methods of land use and management,
- high eutrophisation level of the waters of the Szczecinski Lagoon and the Oder River,
- lack of a joint environmental protection programme with Mecklenburg – West Pomerania.

#### **2. Landscape deformation:**

- lack of a landscape architecture programme,
- unrestricted, often shocking spatial management.

#### **3. Threats to water resources in quality and quantity aspects**

- lack of water economy balances for the basin,
- excessive exploitation of water resources,
- discharging of excessive loads of pollutants both from point and area sources.

#### **4. Floods and droughts**

- lack of a prevention system,
- wasteful use of water resources.

#### **5. Air pollution**

- emission of pollution from industry, houses and road transport,
- too slow progress in applying "clean" technologies.

#### **6. Threats to earth surface:**

- wrong solid waste management,
- wrong technology of solid waste storage,
- lack of industrial waste storage sites,
- lack of the habit and obligation of waste sorting.

#### **7. Economic condition of the region:**

- changes in the economic and political system of the country causing deep economic changes including the wealth of the inhabitants,
- the approach of the users of the environment - to obtain maximum profit,
- lack of legal instruments implementing environmental management,
- uncontrollable development of fishery management.

#### **8. Defects of the legal system and weak institutional co-operation.**

#### **9. Lack of integrated management in the area.**

Undoubtedly many of these problems are being solved at the moment, which can be proved by the results of the survey of the institutions responsible for management (including self-governmental institutions).

#### 4. Priority goals of ICZM of the Szczecinski Lagoon and the methods of their realisation

The priority goals of ICZM of the Szczecinski Lagoon	Methods of their realisation
<b>1. Introducing sustainable coastal management</b>	1. Working out of a strategy of sea shores protection against floods and erosion. <ul style="list-style-type: none"> <li>•discussions in ATT on strategy and guidelines in accordance with the principles of ICZM,</li> <li>•integration of protection of the shores with the planning system (guidelines),</li> <li>•delimitation of areas threatened by floods and erosion - at present and as a result of the greenhouse effect,</li> <li>•conveying the information on erosion and floods to the public.</li> </ul> 2. Implementation of the shore protection plan.
<b>2. Protection and improvement of the environment of the Szczecinski Lagoon and the coastal areas.</b>	<i>A detailed description of the state of the environment and the tasks within monitoring can be found in Annexes 3 and 7.</i>
<b>2.1 Protection of animated nature</b> threats to biodiversity posed by: <ul style="list-style-type: none"> <li>• impoverishment of the system of species of flora and fauna,</li> <li>• weakening of standing timber,</li> <li>• vanishing of protected species,</li> <li>• appearing of new species, bearing down the native species.</li> </ul>	1. Implementation of legal regulations aiming to protect the wetlands. 2. Reduction of pollution discharged into the environment. 3. Promoting of positive trends of land utilisation, reclamation and restoration of degraded areas. 4. Protection of the ecological functions of the water environment. 5. Implementation of the sustainable principles of fishery management together with an effective system of monitoring and education, by: <ul style="list-style-type: none"> <li>•protection of spawning-grounds, fry and young.</li> <li>•partial protection of spawners (pike-perch).</li> <li>•stocking with fry.</li> <li>•endeavouring for proper exploitation of the shoals of particular species.</li> </ul> 6. Realisation of passive and active methods of environmental protection. 7. Rational location of tourist infrastructure from the point of view of the most valuable nature areas as a result of spatial planning and local community education, creation of tourism development programmes taking into account preservation of biodiversity, promotion of ecotourism. 8. Creation of education programmes (certificates) for self-governmental administration and the society taking into account the principles of sustainable development of the area and broadening the awareness of importance of environmental protection in the area included in ICZM of the Szczecinski Lagoon. 9. Working out of operational programmes and publication of the available information. 10. Educational programmes showing future advantages for the local communities, intensification of the activities of non-governmental organisations, financial compensatory programmes. 11. Planning of transportation taking into account the ecological corridors. 12. Implementation of sustainable management of forest resources. 13. Adjusting the financial and human resources to pro-ecological management. 14. Programme of adjustment of legal regulations to international standards.

<p><b>2.2. Earth surface protection</b></p> <ul style="list-style-type: none"> <li>• Solid waste management.</li> <li>• Threats to the natural environment connected with mineral raw stock exploitation.</li> </ul>	<ol style="list-style-type: none"> <li>1. Working out of strategic plans for solid waste management.</li> <li>2. Carrying out of a detailed inventory of polluted sites and of the structure of produced and stored waste.</li> <li>3. Implementation of the programmes of complex pro-ecological undertakings in the field of elimination or securing of the polluted sites, including toxic waste storage sites.</li> <li>4. Implementation of programmes of selective waste collection for further reuse and implementation of the principle of full responsibility for the waste produced by the producers. Promoting of economic use of wastes.</li> <li>5. Control of the produced hazardous waste and creating possibilities of its utilisation or storage.</li> <li>6. Right exploitation (including improvement of safety devices) and building of new municipal solid waste storage sites.</li> <li>7. Working out of a system analysis of mineral raw stock management basing on geologic and economic maps and raw stock inventory.</li> <li>8. Working out of adequate projects and closing down of exploratory and exploitation bore-holes with particular regards to environmental protection.</li> <li>9. Carrying out of a complex geologic and economic analysis taking into account the environmental consequences - the assessment of influence on the environment.</li> <li>10. Carrying out of a detailed analysis of post-exploitation sites (organised and illegal) with identification of methods of reclamation.</li> <li>11. Securing adequate sites for dredging materials storage: <ul style="list-style-type: none"> <li>•for the dredging materials considered harmless to the environment,</li> <li>•for the dredging materials containing harmful substances.</li> </ul> </li> <li>12. Reclamation of storage sites or utilisation of harmful substances in the dredging materials using best available technologies.</li> <li>13. Working out and implementation of ecological education programmes.</li> </ol>
<p><b>2.3. Water protection</b></p> <ul style="list-style-type: none"> <li>• Threats to the surface water resources and groundwater resources in quality and quantity aspects.</li> </ul>	<ol style="list-style-type: none"> <li>1. Carrying out of a surface waters balance, water economy balance and the conditions of utilisation of the waters in the basin.</li> <li>2. Working out of the projects of geologic works, documentation of discretionary groundwater resources.</li> <li>3. Working out of a study of the water demand balance (including perspectives) with reference to the water resources of the basin with identification of the protection principles. Identification of the areas which are threatened together with the definition of dissemination and the depth of occurrence.</li> <li>4. Limiting or eliminating of the influence of point and area pollution discharge into surface waters and groundwater through programmes regulating water management and application of best farming practices.</li> <li>5. Working out of an effective system of prevention in case of accidental pollution.</li> <li>6. Optimisation of surface waters management and groundwater management for agriculture, industry and drinking water supply.</li> <li>7. Restoration of natural water relations.</li> <li>8. Working out and implementation of ecological education programmes.</li> </ol>
<p><b>2.4. Air protection</b></p>	<ol style="list-style-type: none"> <li>1. Working out of a programme securing the desired state of air quality through: <ul style="list-style-type: none"> <li>•limiting of emission,</li> <li>•promoting of pro-ecological fuels,</li> <li>•closing down of small power plants or change of the energy media,</li> <li>•common use of catalysers and unleaded fuels,</li> <li>•reorganisation of transport and limiting of motor traffic,</li> <li>•development of cycling paths.</li> </ul> </li> <li>2. Building and development of an air quality monitoring system.</li> <li>3. Working out and implementation of ecological education programmes.</li> </ol>

<p><b>2.5. Protection against noise</b></p>	<ol style="list-style-type: none"> <li>1. Limiting of emission from the sources through: <ul style="list-style-type: none"> <li>•definition of admissible standards of noise,</li> <li>•working out of the systems of effective enforcement of these standards,</li> <li>•limiting the motor traffic in the areas of particular nature values.</li> </ul> </li> <li>2. Building of acoustic safety devices in particularly threatened sites.</li> <li>3. Promoting the users of the environment lowering the emission of noise.</li> <li>4. Working out and implementation of ecological education programmes.</li> </ol>
<p><b>3. Utilisation of the resources of the Szczecinski Lagoon and of the coastal zones in accordance with the entries resulting from ICZM</b></p>	
	<ol style="list-style-type: none"> <li>1. Promoting and development of fishery in coastal areas. Undertaking the activities aiming to achieve the following goals: <ul style="list-style-type: none"> <li>•modernisation of the used methods of fishing,</li> <li>•endeavouring for the right exploitation of the shoals of particular species.</li> </ul> </li> <li>2. Promoting of farming production of high quality safe for the consumers' health: <ul style="list-style-type: none"> <li>•elimination of eutrophisation of water reservoirs and contamination of sources of drinking water with nitrogen compounds resulting from the use of fertilisers,</li> <li>•elimination of the influence of air pollution on agriculture,</li> <li>•regeneration and protection of natural biodiversity of the agricultural landscape,</li> <li>•improvement of the health condition of farm workers,</li> <li>•protection of high quality soils and cattle of high production potential.</li> </ul> </li> <li>3. Working out of an effective programme securing the values of the landscape of the coastal zone.</li> <li>4. Definition of the desirable and undesirable forms of landscape.</li> <li>5. Elimination of the undesirable forms of landscape, existing and planned.</li> <li>6. Working out of a building development plan for the coastal resorts in accordance with the architecture matching the landscape.</li> <li>7. Working out of a plan for building havens, piers, docks.</li> <li>8. Promoting, utilisation and protection of geologic peculiarities.</li> <li>9. Promoting, utilisation and protection of archaeological resources.</li> </ol>
<p><b>4. Drawing special attention to the fact that the development and performance of industry located in the coastal zone ought to be compliant with ICZM principles.</b></p>	
	<ol style="list-style-type: none"> <li>1. Development of an environmental friendly harbour infrastructure Szczecin-Swinoujscie.</li> <li>2. Development of maritime industry: big shipyards, yacht shipyards, repair shipyards with the use of best available technologies. Development, mining and utilisation of power industry raw stock: gas, oil and thermal waters respecting the resource renewal principle.</li> <li>3. Common use (promoting) of environmental friendly and renewable sources of energy (water and wind power plants, solar energy, bioenergy).</li> <li>4. Implementation of more effective market mechanisms of "unprofitableness" of polluting.</li> <li>5. Development of sea transport respecting the following principles: particular care about the cleanliness of harbour waters, possibilities of control and limiting of pollution discharges from ships, avoiding of intensified motor traffic, development of varied types of mass transit, improvement of traffic conditions.</li> <li>6. Promoting the development of processing and small catering business basing on local fishery in the coastal areas.</li> </ol>

<b>5. Development and promotion of tourism and recreation in the coastal areas of the Szczecinski Lagoon in accordance with ICZM.</b>	
	<ol style="list-style-type: none"> <li>1. Working out of a general strategy of development of tourism and recreation related with the use of water, landscape and architecture values.</li> <li>2. Working out of tourism promotion programmes basing among other things on local nature resources.</li> <li>3. Management of attractive terrains respecting the biodiversity protection principle.</li> <li>4. Creating of particular ecotourism facilities, such as thematic paths, observation points etc.</li> <li>5. Creating opportunities for the people to spend their time in a unique way, e.g. sea fishing, water sports, paragliding, participation in organ concerts, festivals - e.g. the Viking Festival or the festival of choral songs.</li> <li>6. Common access to the shores (except for the places under strict protection) - from the land (roads) and from the water (havens, docks) - is a key to deriving benefits from the diversified coastline.</li> <li>7. Co-ordination of the information on forms and places of rest.</li> <li>8. Building of an infrastructure for the diversity of forms of recreation mentioned above.</li> <li>9. Creating of an infrastructure serving tourists and marking the routes will lessen the risk of negative involvement in the natural environment and will broaden the ecological awareness of potential tourists and users.</li> </ol>
<b>6. Building of awareness of local communities of their identification with their place of residence and the possibility of influencing ICZM to achieve sustainable development and higher living standard.</b>	
	<ol style="list-style-type: none"> <li>1. Building of social support for the coastal problems.</li> <li>2. Education of local communities: <ul style="list-style-type: none"> <li>•building awareness of the people about the state of the environment and the need for its protection and preserving the biodiversity,</li> <li>•educational materials for schools,</li> <li>•environmental cleanliness actions,</li> <li>•environmental inspection actions,</li> <li>•actions aiming to inform parents with the help of their children,</li> <li>•films and reports on the TV.</li> </ul> </li> <li>3. Promoting of pro-ecological forms of rest.</li> </ol>
<b>7. Creating of a lobby allowing to influence state and European decisions concerning the coastal areas of the Szczecinski Lagoon</b>	
	<ol style="list-style-type: none"> <li>1. Promoting of the importance of the Szczecinski Lagoon and the coastal areas in Poland and Europe.</li> <li>2. Building relations with German partners for bilateral co-operation.</li> <li>3. Increasing of the contribution to the state and European "coastal" policy.</li> <li>4. Observation of progress in European and state coastal zone management.</li> </ol>

## 5. Guidelines for the management plan of the communes

### *Delimitation of the ICZM area of the Szczecinski Lagoon – threats, possibilities of development and needed actions.*

The basic task of ICZM is identification of economic and natural conditions of the coastal area of the Szczecinski Lagoon, taking into account the anthropogenic consequences of utilisation of nature resources and the influence of planned economic and pro-ecological undertakings. It requires working out of regionalisation of pro-ecological undertakings in relation with nature systems, defining priorities and the hierarchy of their realisation, indication of the levels of communication of governmental and non-governmental institutions as well as costs and sources of financial means.

An overall view on the Szczecinski Lagoon as a hydrological system in relation with other elements of the environment – hydroclimatic conditions, water balance, relations between surface waters and groundwater, protected objects, the structure of water outflow, amount of water intake, environmental consequences of water resources consumption, anthropogenic degradation of groundwater resources (in quality and quantity) – is a basic condition for the realisation of the ICZM conception.

Bearing on mind the fact that **water management is one of the most important factors of maintaining the balance between economic and social growth and development of natural environment**, in the case of Integrated Coastal Zone Management of Szczecinski Lagoon the most adequate method of delimitation (selection for particular tasks) of areas is delimitation in relation to the basins. This method of delimitation respects the principle of management in natural hydrographic boundaries and therefore it allows of rational surface waters and groundwater management, carried out in the areas of hydrographic basins, called catchment areas. The main tasks in the area of the river basin are reduction of discharges of pollutants from existing point and area sources and maintaining and restoration of the integrity of coastal ecosystems, including wetland ecosystems.

However, with the present management system it is very important to take into account the affiliation of the area divided in this way to the basic administrative unit, i.e. commune.

For the needs of the study area task teams of the coastal zone of the Szczecinski Lagoon have been appointed in particular catchment areas (the direct area of ICZM is about 2530 km<sup>2</sup>). In ICZM of the Szczecinski Lagoon the areas will be divided into two categories:

- **areas of homogenous functional and environmental qualities**- for example large water reservoirs (the Szczecinski Lagoon, the Kamienski Lagoon, Lake Dabie, Roztoka Odrzanska and the Oder River), large-area forms of nature protection (national park, nature reserve), forest complexes, large complexes of wetlands, meadows around the lagoons etc. for which local plans of protection or forest management are developed and where one model of economy or protection is realised,
- **other areas characterised by varied and often complex functions**, of diverse nature values, delimited in relation with their geographical location (sites in the physico-geographical delimitation of Poland according to Kondracki 1998), belonging to particular basins basing on the similarities and differences in their geologic construction, sculpture of the earth's surface, nature resources, values and threats of the environment and the grade of utilisation.

Location of the area task teams of sustainable development of the coastal zone of the Szczecinski Lagoon is shown on **Map 2** and their description is included in the table below.

## Legend:

- Nature values:** 6 – international (exceptional),  
5 – supraregional (very high),  
4 – regional (high),  
3 – local (significant),  
2 – mediocre,  
1 – low,  
0 – insignificant,  
a – area with minimally transformed environment with predominance of natural habitats,  
b – areas with slightly transformed environment with natural habitats,  
c – areas with strongly transformed environment with few natural biotopes,  
d – areas strongly transformed which have undergone a strong process of anthropoppression,
- Economic values:** I – areas of a strongly developed economic and industrial function,  
II – areas weakly or fairly developed economically,  
III – areas with domination of natural branches of economy (forestry, agriculture, fishery),  
0 – areas not utilised economically,  
P – areas of great development perspectives, e.g. in the field of management, economy, tourism and colonisation,
- Tourist values:** 4X – exceptional (international and state)  
3X – high (supraregional and regional)  
2X – local  
X – insignificant

*Threats, possibilities and activities for implementation of the ICZM of Szczecinski Lagoon*

Symbol of the unit	No of the balance region	Name of the unit	Administrative location		Natural values	Economic values	Tourist values	Threats/conflicts	Directions of activities
			District	Communes					
A	5107	The Wolin Island	Kamien Pomorski, Swinoujscie	Dziwnow, Miedzzyzdroje, Wolin, Swinoujscie	6 - 2 a - d	0 - III, P	4X - X	The basis of economic growth if this area is tourism, maritime economy and the transportation function of Swinoujscie. However, their abnormal development poses a threat to the most important natural values of this area as well as tourist and health resort values, especially to the Wolinski National Park. The source of the threats is the municipal infrastructure of the towns and villages which has not been sufficiently invested in, especially regarding Swinoujscie, water and road transport, planned and existing industrial and municipal investments and individual building which lately has been developing particularly dynamically. The problems that occur here are mainly problems in the field of water management, sewage management, waste management and protection of the most valuable resources of animated and inanimate nature.	Solving the presently existing problems and conflicts in the field of environmental protection, protection and restoration of the most valuable natural biotopes. Carrying out the activities for the benefit of the protection of nature resources of the Wolin Island is necessary, with particular regards to the Wolinski National Park. Potential and existing conflicts between the existing and planned investments, especially in the Swinoujscie harbour, and the function of this area as a tourist and health resort area of outstanding natural values require a solution. Monitoring of the changes taking place in this area is necessary as well.

A-1	5107	Wolin National Park (central part of Wolin Island and the Reverse Delta of Swina River)	same as above	Swinoujście, Miedzyzdroje, Wolin, Dziwnow	6-4, a-d,	0	4X-3X	<p><b>Threats/conflicts caused by:</b></p> <ul style="list-style-type: none"> <li>• road and railroad transport,</li> <li>• functioning of the Swinoujście harbour,</li> <li>• unorganised tourist traffic in the Park and in its vicinity,</li> <li>• environmental pollution, including waters, soils, bottom sediments, degradation of surface, groundwater and transitional retention,</li> <li>• solid waste storage sites located in the neighbourhood of the Park,</li> <li>• inadequate fishery and fish poaching,</li> <li>• nature forces (backwaters, winds and fires).</li> </ul>	<p><b>Suggested activities:</b></p> <ul style="list-style-type: none"> <li>• carrying out the investments in the field of solid waste management, sewage management in the neighbourhood of the Park, among other things for to protect and increase the retention of the main groundwater reservoir No 102,</li> <li>• the problem of transit, especially of lorries,</li> <li>• changing the technology of solid waste storage and processing in Swinoujście and Miedzyzdroje,</li> <li>• regulating the issue of water intake and supply on the Wolin and Uznam islands, including co-operation in exploitation of boundary intakes,</li> <li>• creation of an effective programme of the prevention against fish poaching and fishery management programme.</li> </ul> <p>Other tasks existing in the park area are regulated by the Protection Plan for the Park.</p>
-----	------	---	---------------	--	--------------	---	-------	---	--

A-2	5107	Eastern and central part of the Wolin Island	same as above	Dziwnow, Wolin	5 - 3, a - d	II - III	3X - 2X	<p><b>Threats/conflicts caused by:</b></p> <ul style="list-style-type: none"> <li>• environmental pollution, including waters, soils, bottom sediments, degradation of surface waters, groundwater and transitional retention,</li> <li>• road and railroad transport,</li> <li>• location of solid waste storage sites,</li> <li>• unorganised tourist traffic and recreational and seasonal traffic,</li> <li>• dynamically developing colonisation,</li> <li>• acquiring natural aggregates,</li> <li>• planned investments concerning e.g. wind power plants,</li> <li>• dredging materials storage sides,</li> <li>• nature forces (backwaters, winds and fires).</li> </ul>	<p><b>Suggested activities:</b></p> <ul style="list-style-type: none"> <li>• carrying out the investments in the field of solid waste management, sewage and water management, among other things to protect and increase retention in the main groundwater reservoir no 102,</li> <li>• working out in the stage of spatial management plan of the vision of communes' development regarding the sites where spatial structures can be built, with simultaneous definition of the conditions necessary to be fulfilled by potential investors and the areas that cannot be invested in due to the natural and legal conditions,</li> <li>• reservation of sites for storage of dredging materials to maintain the parameters of the waterway,</li> <li>• promoting of the activities aiming to implement the conception of sustainable management, colonisation and forestry,</li> <li>• implementation of practical protection of meadow and halophilous communes in the area around the Lagoon,</li> <li>• protection of seashore dunes, peatbogs and forests,</li> <li>• making valuable natural terrains accessible for educational and cognitive purposes, among other things through creating paths and nature trails,</li> <li>• development of the tourist base, above all for agrotourism and ecotourism, at the same time limiting the development of big objects for mass tourism,</li> <li>• implementation of the Agenda 21 conception and of the biosphere reserve,</li> <li>• promotion of archaeological and cultural values.</li> </ul>
-----	------	--	---------------	----------------	--------------	----------	---------	---	---

A-3	5107	Przytowski Peninsula	same as above	Miedzydroje, Swinoujscie	4 - 2, a - d	I – III, P	2X - X	<p><b>Threats/conflicts caused by:</b></p> <ul style="list-style-type: none"> <li>• environmental pollution, including waters, soils, bottom sediments, degradation of surface waters, groundwater and transitional retention,</li> <li>• road and railroad transport,</li> <li>• tourist traffic</li> <li>• functioning of the military units,</li> <li>• location of the solid waste storage site in Przytor,</li> <li>• planned investments concerning e.g. expanding the harbour, mass transit investments and location of wind power plants,</li> <li>• nature forces (backwaters, winds and fires).</li> </ul>	<p><b>Suggested activities:</b></p> <ul style="list-style-type: none"> <li>• carrying out the investments in the field of solid waste management, sewage and water management, among other things to protect and increase retention in the main groundwater reservoir no 102,</li> <li>• working out in the stage of spatial management plan of the vision of communes' development regarding the sites where spatial structures can be built, with simultaneous definition of the conditions necessary to be fulfilled by potential investors and the areas that cannot be invested in due to the natural and legal conditions,</li> <li>• promoting of the activities aiming to implement the conception of sustainable management,</li> <li>• implementation of practical protection of meadow and halophilous communes in the area around the Lagoon,</li> <li>• protection of seashore dunes and forests,</li> <li>• making valuable natural terrains accessible for educational and cognitive purposes, among other things through creating paths and nature trails,</li> <li>• development of the tourist base, above all for agrotourism and ecotourism,</li> <li>• implementation of the Agenda 21 conception and of the biosphere reserve.</li> </ul>
-----	------	----------------------	---------------	--------------------------	-----------------	---------------	--------	--	---

B	5107	The Uznam Island	Swinoujscie	Swinoujscie	6 - 0, a - d	I - III, 0, P	3X - X	<p>The basis of the economic growth of this area is tourism, maritime economy and the health resort function, for which very favourable conditions exist. However, their development poses a serious threat for the most precious natural values of the area and for the tourist and health resort values, especially for the Wolinski National Park. The source of the threats is the municipal infrastructure of Swinoujscie, water and road transport, planned and existing industrial and municipal investments, housing and transboundary pollution of water and air. Therefore the problems occurring here concern mainly water management, sewage management, solid waste management as well as protection and preservation of the most valuable resources of animated and inanimate nature.</p>	<p>Solving of the presently existing problems and conflicts in the field of environmental protection, protection and restoration of the most valuable natural biotopes. Carrying out of the activities for the benefit of the protection of nature resources of the Uznam Island as well as the Wolin Island is necessary, with particular regards to the Wolinski National Park. Potential and existing conflicts between the existing and planned investments, especially in the Swinoujscie harbour, and the function of this area as a tourist and health resort area of outstanding natural values require a solution.</p>
---	------	------------------	-------------	-------------	-----------------	------------------	--------	---	---

B-1	5107	Swinoujście (the Wolin and Uznam islands)	same as above	same as above	3 - 0, c - d	I, III, P	3X - X	<p><b>Threats typical for big cities, caused by:</b></p> <ul style="list-style-type: none"> <li>• maritime economy units, municipal and military units in the field of their influence on the state of the environment, including waters, soils, bottom sediments, degradation of the surface, groundwater and transitional retention, including transboundary influence,</li> <li>• road, railroad and water transport,</li> <li>• tourist traffic,</li> <li>• existence of military units,</li> <li>• location of the solid waste storage site in Przytor,</li> <li>• nature forces (backwaters, winds and fires),</li> <li>• degradation of environment by former German and Russian military bases.</li> </ul>	<p><b>Suggested activities:</b></p> <ul style="list-style-type: none"> <li>• urgent realisation of the documentation and technical tasks in the field of high quality drinking water supply, taking into account the transboundary problems,</li> <li>• realisation of the necessary investments or adjusting the existing investments to the requirements existing in the EU countries in the field of water management and sewage management, solid waste management, necessary for the functioning of the city and the economic complex included in the area of the task force for the protection of the Pomeranian Bay, the Szczecinski Lagoon, the Swina River and the Wolinski National Park,</li> <li>• working out of a consensus in the field of possibilities and range of location of particularly harmful investments, including fuel terminals and all investments whose plans cause social protests,</li> <li>• solving the issue of land transportation,</li> <li>• implementation of the solutions of environmental friendly technologies,</li> <li>• protection of seashore dunes and forests,</li> <li>• development of the health resort base,</li> <li>• further development and making accessible of the tourist and health resort base,</li> <li>• implementation of the Agenda 21 conception and the biosphere reserve, especially the sustainable development, including protection of valuable natural areas for educational and cognitive purposes,</li> <li>• defining the relation between the health resort function and the economic development including realisation of new harbour investments,</li> <li>• continuation of reclamation of solid waste storage sites, removing soil pollution with oil – derivative products, removing of remaining ammunition from the terrains of former military units.</li> </ul>
-----	------	--	---------------	---------------	-----------------	--------------	--------	--	---

<b>B-2</b>	5107	the southern part of the Uznam Island	same as above	same as above	5 - 4, a - b	II - III, 0	2X	<p><b>Threats/conflicts caused by:</b></p> <ul style="list-style-type: none"> <li>• environmental pollution, including waters and soils,</li> <li>• degradation of the groundwater and transitional retention,</li> <li>• road transport,</li> <li>• functioning of military units,</li> <li>• sea backwaters in the field of flood protection,</li> <li>• location of dredging materials storage sites,</li> <li>• nature forces (backwaters, winds and fires).</li> </ul>	<p><b>Suggested activities:</b></p> <ul style="list-style-type: none"> <li>• adjusting the groundwater intake to the environmental possibilities,</li> <li>• reservation of sites for storage of dredging materials of varied contamination degree to maintain the parameters of the waterway,</li> <li>• further realisation of the conception of sustainable forestry management,</li> <li>• implementation of practical protection of the halophilous and meadow communes around the bay,</li> <li>• protection of dunes and forests,</li> <li>• making valuable natural terrains accessible for cognitive and educational purposes through organisation of paths and trails,</li> <li>• implementation of the Agenda 21 conception and the biosphere reserve,</li> <li>• constant supervision and maintenance of flood banks in the necessary range.</li> </ul>
<b>B-3</b>	5107	The Karsibor Island	same as above	same as above	6 - 4, a - b	I - III, P	3X	<p><b>Threats/conflicts caused by:</b></p> <ul style="list-style-type: none"> <li>• economic units and inhabitants in the field of their influence on the condition of the environment, including waters, soils, bottom sediments and climate,</li> <li>• unorganised tourist traffic,</li> <li>• giving up the traditional agriculture in the areas of meadows and pastures,</li> <li>• nature forces (backwaters, winds and fires).</li> </ul>	<p><b>Suggested activities:</b></p> <ul style="list-style-type: none"> <li>• realisation of the necessary investments in the field of environmental protection</li> <li>• working out in the stage of spatial management plan of the vision of communes' development regarding the sites where spatial structures can be built, with simultaneous definition of the conditions necessary to be fulfilled by potential investors and the areas that cannot be invested in due to the natural and legal conditions,</li> <li>• promoting this area as particularly attractive due to its natural values,</li> <li>• implementation of the Agenda 21 conception and the biosphere reserve and in particular promoting the activities popularising the conception of sustainable development,</li> <li>• protection and making accessible of the valuable natural terrains for educational and cognitive purposes,</li> <li>• restoration of traditional methods of agriculture on meadows and pastures,</li> <li>• making the tourist base accessible, including agrotourism and ecotourism.</li> </ul>

C	5105	The Wkrzanska Plain, the Szczecinskie Elevations	Police	Police, Nowe Warpno, Dobra, Kolbaskowo	6 - 3, a - c	I - III, 0, P	3X - X	In this area the environment is very diversified: from the areas which are strongly anthropogenically transformed with negative consequences for the environment, to the places which are protected as a nature reserve (Swidwie). Threats typical for strongly urbanised regions exist here. The influence of new housing and economic investments carried out in the suburbs of Szczecin and Police, in the areas which have been traditionally agriculturally utilised so far, is not indifferent either.	Varied activities both protective and economic, with simultaneous implementation of the eco-development conception. At the same time comprehensive activities for the benefit of naturally valuable sites ought to be carried out.
C-1	5105	The Wkrzanska Plain, (the Wkrzanska Forest, the coastal area of the Szczecinski Lagoon	same as above	Nowe Warpno, Police, Dobra	5 - 3, a - b	II - III	2X	<b>Threats/conflicts caused by:</b> <ul style="list-style-type: none"> <li>influence of the Szczecin agglomeration and industrial pollution including the "Police" Chemical Plant on the health of living organisms, i.e. people, animals, plants including standing timber,</li> <li>degradation of water retention: surface, groundwater and transitional, pollution of groundwater and soils,</li> <li>intensive forest penetration in the period of mushrooming, picking berries, poaching,</li> <li>road transport, including the threats caused by the newly opened border crossing in Dobieszczyn and planned western ring road for Szczecin crossing the Oder River,</li> <li>nature forces (backwaters, winds and fires).</li> </ul>	<b>Suggested activities:</b> <ul style="list-style-type: none"> <li>realisation of necessary investments in the field of environmental protection limiting the negative impact on health of living organisms and condition of waters, among other things to protect and increase water retention of the main groundwater reservoir No 122,</li> <li>reservation of sites for storage of dredging materials to maintain the parameters of the waterway,</li> <li>protection of the marsh areas of the basin of the Gunica River and the coastal area of the Szczecinski Lagoon,</li> <li>implementation of the Agenda 21 conception and the biosphere reserve</li> <li>protection and making accessible of the valuable natural terrains for educational and cognitive purposes,</li> <li>creating cycling paths and tourist trails,</li> <li>restoration of traditional methods of agriculture on meadows and pastures,</li> <li>promoting this area as particularly attractive for development and creation of tourist base for agrotourism and ecotourism,</li> <li>working out in the stage of spatial management plan of the vision of communes' development regarding the sites where spatial structures can be built, with simultaneous definition of the conditions necessary to be fulfilled by potential investors and the areas that cannot be invested in due to the natural and legal conditions,</li> <li>carrying out activities for the benefit of limiting the influence of the border crossing in Dobieszczyn and planned western ring road for Szczecin crossing the Oder River on the state of environment.</li> </ul>

C-2	5105	„Swidwie” nature reserve	same as above	Police, Dobra	5, a - b	0	3X	same as above in C-1	<p><b>Suggested activities:</b></p> <ul style="list-style-type: none"> <li>• more efficient protection of the "Swidwie" nature reserve, including gradual elimination of the threats existing around this area,</li> <li>• carrying out protection tasks in the river basin of Gunica,</li> <li>• enlarging of the area of the reserve and creating an international nature reserve Swidwie-Goettesheide,</li> <li>• promoting of this reserve as a site of particular natural and cognitive values,</li> <li>• making the area accessible for educational purposes,</li> <li>• carrying out limited farming and other activities in accordance with the protection plan,</li> <li>• creating a core station of integrated environmental monitoring,</li> <li>• realisation of other tasks included in the protection plan of the nature reserve..</li> </ul>
-----	------	--------------------------	---------------	---------------	-------------	---	----	----------------------	---

C-3	5105	The Szczecinskie Elevations	same as above	Dobra, Kolbaskowo	4 - 3, b - c	II - III, P	2X - X	<b>Threats/conflicts caused by:</b> <ul style="list-style-type: none"> <li>influence of the Szczecin agglomeration on the state of the environment,</li> <li>road transport, with special regards to the influence of existing road border crossings and planned western ring road for Szczecin crossing the Oder River,</li> <li>excessive groundwater exploitation and water drainage systems,</li> <li>inorderly sewage and water management,</li> <li>location of toxic solid waste storage site in Wawolnica,</li> <li>planned western ring road for Szczecin crossing the Oder River,</li> <li>nature forces (backwaters, winds and fires).</li> </ul>	<b>Suggested activities:</b> <ul style="list-style-type: none"> <li>restoration of surface waters, transitional and groundwater retention among other things to protect and increase water retention of the main groundwater reservoir No 122,</li> <li>carrying out the necessary investments in the field of environmental protection, in particular protection of the area of Lake Swidwie,</li> <li>working out in the stage of spatial management plan of the vision of communes' development regarding the sites where spatial structures can be built, with simultaneous definition of the conditions necessary to be fulfilled by potential investors and the areas that cannot be invested in due to the natural and legal conditions,</li> <li>protection and restoration of the marsh areas of the basin of the Gunica River,</li> <li>implementation of the Agenda 21 conception and the biosphere reserve</li> <li>promoting the activities aiming to implement the conception of sustainable development,</li> <li>protection of valuable natural terrains, including cognitive and educational purposes,</li> <li>restoration of traditional methods of farming on meadows and pastures,</li> <li>promoting this area as particularly attractive for development and creation of tourist base for agrotourism, ecotourism and other forms of recreation e.g. gliding.</li> </ul>
-----	------	-----------------------------	---------------	-------------------	-----------------	----------------	--------	--	---

D	5103 5104 5105 5106 5107	The Szczecin-Police agglomeration	Szczecin, Police	Szczecin, Police	4 - 0, c - d	I, III P	3 X - 2X	<b>Typical for big industrial and municipal agglomerations.</b>	<b>The highest priority tasks are the tasks in the field of environmental protection and education, drinking water supply from main sources (groundwater), carrying out of the investments necessary for the surface water protection and other in the field of water and sewage management, solid waste management, in particular regarding functioning of the harbour, looking for the solutions for recycling of process waste including the "Police" Chemical Plant and storage of dredging materials.</b>
---	--------------------------------------	-----------------------------------	------------------	------------------	-----------------	-------------	-------------	---	--

E	5108	The Trzebiatowskie Coast, the Gryfińska and Goleniowska Plains	Kamien Pomorski, Goleniów	Dziwnów, Kamien Pom., Wolin, Przybiernów, Golezawo, Stepińca	5 - 1, a - b	II - III, 0, P	3X - X	An area of large nature diversification. Apart from the threats connected with water pollution among other things due to lack of efficient municipal waste treatment systems both on the coast of the Baltic Sea and the Kamiński Lagoon and in inland areas, problems of water pollution exist resulting from agriculture. The other problems are connected with transport routes, supply in high quality water, acquiring natural stock (gas, oil, therapeutic mud, saline water).	Due to the function performed by the whole Trzebiatowskie coast in the field of tourism, recreation and health resorts, in this area varied activities should be carried out for the benefit of protection and improvement of the state of water resources, through properly carried out sewage management, water management and solid waste management as well as protection and management of the coastal zone. The other tasks are: protection of nature resources and carrying out the activities in the field of environmental education.
E-1	5108	The Rozwarowskie Marshland (the outlet of the rivers Wolceznica and Grzybnica)	Kamien Pomorski	Wolin, Kamien Pomorski	5 - 4, b	III, 0	2X	<b>Threats/conflicts caused by:</b> <ul style="list-style-type: none"> <li>• environmental pollution including waters and soils,</li> <li>• excessive water drainage systems and drying of water and mud areas and peatbogs,</li> <li>• in disorderly sewage management and solid waste management,</li> <li>• location of toxic waste storage site,</li> <li>• cane acquiring for economic purposes,</li> <li>• nature forces (backwaters, winds and fires).</li> </ul>	<b>Suggested activities:</b> <ul style="list-style-type: none"> <li>• carrying out the necessary investments in the neighbourhood of this area in the field of environmental protection including removing of the toxic waste storage site in Chrzastowo,</li> <li>• protection of the marsh areas,</li> <li>• implementation of the Agenda 21 conception and the biosphere reserve,</li> <li>• promoting the activities aiming to implement the conception of sustainable development,</li> <li>• protection of valuable natural terrains, including educational and cognitive purposes,</li> <li>• restoration of traditional farming methods on meadows and pastures,</li> <li>• promoting this area as attractive for its natural values and for tourism, development and making accessible of the tourist base including ecotourism and agrotourism.</li> </ul>

E-2	5108	The right bank side of the Dziwna River	some as above	Wolin, Kamien Pomorski	3 - 1, b	II - III P	2X - X	<b>Threats/conflicts caused by:</b> <ul style="list-style-type: none"> <li>• environmental pollution, including waters and soils,</li> <li>• in disorderly solid waste management and liquid waste management,</li> <li>• road and railroad transport,</li> <li>• location of dredging materials,</li> <li>• nature forces (backwaters, winds).</li> </ul>	<b>Suggested activities:</b> <ul style="list-style-type: none"> <li>• carrying out necessary investments in the field of environmental protection,</li> <li>• protection of marsh areas,</li> <li>• working out in the stage of spatial management plan of the vision of communes' development regarding the sites where spatial structures can be built, with simultaneous definition of the conditions necessary to be fulfilled by potential investors and the areas that cannot be invested in due to the natural and legal conditions,</li> <li>• reservation of sites for storage of dredging materials to maintain the parameters of the waterway,</li> <li>• implementation of the Agenda 21 conception and the biosphere reserve,</li> <li>• promoting the activities aiming to implement the conception of sustainable development,</li> <li>• protection of valuable nature areas, including educational and cognitive purposes,</li> <li>• restoration of traditional farming methods on meadows and pastures,</li> <li>• creating a tourist base including agrotourism and ecotourism.</li> </ul>
E-3	5108	The river basins of Wolczenica and Grzybnica (including the area of the Goleniowska Forest)	some as above	Kamien Pomorski, Wolin, Golezewo, Przybiernow	4 - 3, a - b	II - III	2X - X	<b>Threats/conflicts caused by:</b> <ul style="list-style-type: none"> <li>• environmental pollution, including waters, soils, bottom sediments,</li> <li>• planned water exploitation for Swinoujscie,</li> <li>• excessive water drainage and drying of water and mud areas and peatbogs,</li> <li>• in disorderly solid waste and liquid waste management,</li> <li>• road and railroad transport,</li> <li>• the factors posing a threat to the health of forests,</li> <li>• transformations of agricultural areas,</li> <li>• exploitation of oil and natural gas,</li> <li>• nature forces (backwaters, winds and fires),</li> <li>• fish poaching.</li> </ul>	<b>Suggested activities:</b> <ul style="list-style-type: none"> <li>• carrying out the investments in the field of water and sewage management, solid waste management, among other things for the protection and increasing water retention in the lakes Ostrowo and Piaski,</li> <li>• implementation of practical protection of water and mud areas,</li> <li>• promoting activities aiming to implement the conception of sustainable management, among other things for the benefit of implementation of the Agenda 21 conception and the biosphere reserve,</li> <li>• making valuable natural areas accessible for educational and cognitive purposes through organisation of paths and trails,</li> <li>• creating of a tourist base above all for ecotourism and agrotourism,</li> <li>• creation of an effective programme of the prevention against fish poaching and fishery management programme.</li> </ul>

E-4	5108	The region of Kamien Pomorski (the river basins of Swiniec and Niemica)	some as above	Dziwnow, Kamien Pom.	4 - 2, b	II - III, P	3X - 2X	<p><b>Threats/conflicts caused by:</b></p> <ul style="list-style-type: none"> <li>• environmental pollution, including waters, soils,</li> <li>• excessive exploitation of groundwater in the area of the coast of the Baltic Sea,</li> <li>• excessive water drainage (polder management),</li> <li>• drying of mud and water areas and peatbogs,</li> <li>• solid and liquid waste management,</li> <li>• location of toxic waste storage site,</li> <li>• geogenic threat (saline water),</li> <li>• utilisation of the gas and oil deposits for economic purposes,</li> <li>• intensification of abrasion processes resulting from technoanthropression in the coastal zone,</li> <li>• nature forces (backwaters, winds and fires),</li> <li>• fish poaching.</li> </ul>	<p><b>Suggested activities:</b></p> <ul style="list-style-type: none"> <li>• bringing the investments in the field of water management, sewage management and solid waste management to an end,</li> <li>• working out in the stage of spatial management plan of the vision of communes' development regarding the sites where spatial structures can be built, with simultaneous definition of the conditions necessary to be fulfilled by potential investors and the areas that cannot be invested in due to the natural and legal conditions,</li> <li>• implementation of practical protection of water and mud areas,</li> <li>• removing of the toxic waste storage site,</li> <li>• promoting of the activities aiming to implement the Agenda 21 conception and the biosphere reserve,</li> <li>• making valuable natural terrains accessible for educational and cognitive purposes through organisation of paths and trails,</li> <li>• development of tourist base above all for agrotourism and ecotourism,</li> <li>• development of health care in sanatoria with the use of natural balneological stock, mineral waters and saline waters,</li> <li>• creation of an effective programme of the prevention against fish poaching and fishery management programme.</li> </ul>
F	5108	The basin of the Gowienica River (the Goleniowska Plain)	Goleniow	Wolin, Stepnica, Przybiernow, Goleniow	4 - 2, a - b	II - III, P	3X - X	<p>The basin of the Gowienica River is mostly a forestal and agricultural area. Therefore the threats existing here are typical for this type of environment.</p>	<p>The main activities are: carrying out tasks for the benefit of water protection and elimination of existing and potential threats.</p>

F-1	5108	The valley of the Gowienica River	some as above	Przybiernow, Stepnica, Goleniow	3 - 2, a - b	II - III, P	3X - X	<b>Threats/conflicts caused by:</b> <ul style="list-style-type: none"> <li>• environmental pollution including waters, soils and bottom sediments,</li> <li>• excessive drainage (polder management)</li> <li>• drying of water and mud areas and peatbogs,</li> <li>• solid and liquid waste management,</li> <li>• fish poaching,</li> <li>• nature forces (winds and fires).</li> </ul>	<b>Suggested activities:</b> <ul style="list-style-type: none"> <li>• carrying out investments in the field of water and sewage management, solid waste management among other things for to protect and increase water retention in the main groundwater reservoir No 123,</li> <li>• implementation of practical protection of water and mud areas,</li> <li>• promoting of the activities aiming to implement the Agenda 21 conception and the biosphere reserve,</li> <li>• making valuable natural terrains accessible for educational and cognitive purposes through organisation of paths and trails,</li> <li>• development of tourist base above all for agrotourism and ecotourism,</li> <li>• creation of an effective programme of the prevention against fish poaching and fishery management programme.</li> </ul>
F-2	5108	The Czarnocinski Basin, marsh areas of the Czarnocin region		Stepnica	4 - 2, a - b	III, P	3X - 2X	<b>Threats/conflicts caused by:</b> <ul style="list-style-type: none"> <li>• environmental pollution including waters, soils and bottom sediments,</li> <li>• excessive drainage (polder management)</li> <li>• drying of water and mud areas and peatbogs,</li> <li>• hitherto solid and liquid waste management,</li> <li>• giving up traditional farming,</li> <li>• storage of dredging materials coming from waterway dredging,</li> <li>• nature forces.</li> </ul>	<b>Suggested activities:</b> <ul style="list-style-type: none"> <li>• carrying out investments in the field of water and waste water management and solid waste management,</li> <li>• implementation of practical protection of water and mud areas,</li> <li>• promoting of the activities aiming to implement the Agenda 21 conception and the biosphere reserve,</li> <li>• making valuable natural terrains accessible for educational and cognitive purposes through organisation of paths and trails,</li> <li>• development of tourist base above all for agrotourism and ecotourism,</li> <li>• dredging materials management.</li> </ul>

G	5106	The basin of Ina River (the Goleniowska Plain)	Goleniow	Stepnica, Goleniow, Przybierow	5 - 2, a - c	I - III, 0, P	2X - X	An area of widely diversified natural functions and economic utilisation. Therefore apart from the areas extensively utilised and even protected by law there are areas intensively utilised or assigned for intensive utilisation. Conflicts in the field of environmental pollution and environment transformation occur particularly in the latter.	It is recommended for this area to carry out rational natural spatial management.
G-1	5106	The nature reserve Olszanka-Wilcze Uroczysko	same as above	Stepnica, Goleniow	5 - 4, a - b	0	X	<b>Threats/conflicts caused by:</b> <ul style="list-style-type: none"> <li>environmental pollution including waters and soils with particular regards to the influence of the "Police" Chemical Plant,</li> <li>excessive water drainage (polder management)</li> <li>drying of water and mud areas and peatbogs,</li> <li>solid and liquid waste management,</li> <li>poaching,</li> <li>storage of dredging materials,</li> <li>nature forces (fires).</li> </ul>	<b>Suggested activities:</b> <ul style="list-style-type: none"> <li>carrying out investments in the field of water and waste water management, solid waste management among other things to protect and increase water retention in the main groundwater reservoir No 123 with identification of its discretionary resources,</li> <li>limiting the pollution influencing the nature reserve,</li> <li>sanitation of water management</li> <li>promoting of the activities aiming to implement the Agenda 21 conception and the biosphere reserve,</li> <li>making valuable natural terrains accessible for educational and cognitive purposes through organisation of paths and trails.</li> </ul>
G-2	5106	The Goleniowska Forest (the marshlands of Krepa River)	same as above	Stepnica, Goleniow	5 - 3, a - b	II - III	2X - X	<b>Threats/conflicts caused by:</b> <ul style="list-style-type: none"> <li>environmental pollution including waters and soils with particular regards to the influence of the "Police" Chemical Plant,</li> <li>excessive water drainage (polder management)</li> <li>drying of water and mud areas and peatbogs,</li> <li>solid and liquid waste management,</li> <li>location of the toxic waste storage site in Marszewo,</li> <li>poaching,</li> <li>nature forces.</li> </ul>	<b>Suggested activities:</b> <ul style="list-style-type: none"> <li>carrying out investments in the field of water and waste water management, solid waste management among other things to protect and increase water retention in the main groundwater reservoir No 123 with identification of its discretionary resources,</li> <li>removing of the toxic waste storage site in Marszewo,</li> <li>limiting the pollution influencing the area,</li> <li>promoting of the activities aiming to implement the Agenda 21 conception and the biosphere reserve,</li> <li>making valuable natural terrains accessible for educational and cognitive purposes through organisation of paths and trails,</li> <li>creation of an effective programme of the prevention against poaching.</li> </ul>

<b>G-3</b>	5106	The valley of the Ina River	some as above	Goleniow	3 - 2, a - b	I - III, P	2X - X	<p><b>Threats/conflicts caused by:</b></p> <ul style="list-style-type: none"> <li>• environmental pollution including waters, soils,</li> <li>• excessive water drainage (polder management)</li> <li>• drying of water and mud areas and peatbogs,</li> <li>• solid and liquid waste management,</li> <li>• fish poaching,</li> <li>• giving up farming,</li> <li>• nature forces (floods).</li> </ul>	<p><b>Suggested activities:</b></p> <ul style="list-style-type: none"> <li>• carrying out investments in the field of water and waste water management, solid waste management among other things to protect and increase water retention in the main groundwater reservoir No 123,</li> <li>• flood-safety,</li> <li>• implementation of practical protection of water and mud areas,</li> <li>• promoting of the activities aiming to implement the Agenda 21 conception and the biosphere reserve,</li> <li>• making valuable natural terrains accessible for educational and cognitive purposes through organisation of paths and trails,</li> <li>• creating of a tourist base, above all for agrotourism and ecotourism,</li> <li>• creation of an effective programme of the prevention against fish poaching.</li> </ul>
<b>G-4</b>	5106	Meadows around Lake Dabie	some as above	Goleniow	4 - 2, a - b	II - III, P	X	<p><b>Threats/conflicts caused by:</b></p> <ul style="list-style-type: none"> <li>• environmental pollution including waters, soils and bottom sediments,</li> <li>• excessive water drainage (polder management)</li> <li>• drying of water and mud areas and peatbogs,</li> <li>• solid and liquid waste management,</li> <li>• giving up farming,</li> <li>• high water levels.</li> </ul>	<p><b>Suggested activities:</b></p> <ul style="list-style-type: none"> <li>• carrying out investments in the field of water and waste management, solid waste,</li> <li>• flood-safety,</li> <li>• implementation of practical protection of water and mud areas,</li> <li>• promoting of the activities aiming to implement the Agenda 21 conception and the biosphere reserve,</li> <li>• making valuable natural terrains accessible for educational and cognitive purposes through organisation of paths and trails,</li> <li>• creating of a tourist base, above all for agrotourism and ecotourism.</li> </ul>

H	5107	The Lower Oder Valley (Oder River, Lake Dabie, Roztoka Odrzanska, the Szczecinski Lagoon, the Kamienski Lagoon, the rivers Dziwna, and Swina)	Szczecin, Police, Goleniow, Kamien Pomorski, Swinoujscie	Kolbaskowo, Szczecin, Police, Nowe Warpno, Goleniow, Stepnica, Wolin, Swinoujscie, Miedzzydroje, Kamien Pomorski, Dziwnow	6 - 3, a - d	I - III, P	4X - 2X	<p>Threats/conflicts caused by:</p> <ul style="list-style-type: none"> <li>• environmental pollution including waters, soils and bottom sediments, from regional and local sources,</li> <li>• solid and liquid waste management,</li> <li>• fishing and fishery poaching,</li> <li>• passing of the flood wave and occurring of sea backwaters,</li> <li>• exploitation of oil and natural gas,</li> <li>• nature forces.</li> </ul>	<p>Suggested activities:</p> <ul style="list-style-type: none"> <li>• carrying out investments in the field of water and waste water management, solid waste management and above all a complex solution of the issue of sewage treatment in Szczecin,</li> <li>• in the field of flood-safety and in particular verifying of the actual needs regarding maintaining the system of flood dykes in its today's shape,</li> <li>• working out of a new model of fishery management in the waters of the Szczecinski Lagoon and the Reverse Delta of Swina River, taking into account the present and future political, economic and social situation and the natural specificity of the bodies of water included in the Wolinski National Park,</li> <li>• implementation of practical protection of water and mud areas,</li> <li>• promoting of the activities aiming to implement the Agenda 21 conception and the biosphere reserve,</li> <li>• making valuable natural terrains accessible for educational and cognitive purposes through organisation of paths and trails,</li> <li>• creating of a tourist base, above all for agrotourism and ecotourism,</li> <li>• creation of an effective system of inspection and prevention from accidental pollution,</li> <li>• effective programme of protection of harbour waters against pollution.</li> </ul>
---	------	---	--	---	-----------------	---------------	------------	---	---

I		The Pomeranian Bay			6 - 4, a - b	II - III, P	3X - 2X	<p>Threats/conflicts caused by:</p> <ul style="list-style-type: none"> <li>• environmental pollution including waters, soils and bottom sediments, from regional and local sources,</li> <li>• solid and liquid waste management,</li> <li>• uncontrollable inflow of tourists in the summer season,</li> <li>• fishing and fishery poaching,</li> <li>• storm situations.</li> </ul>	<p>Suggested activities:</p> <ul style="list-style-type: none"> <li>• carrying out investments necessary for protection of the Pomeranian Bay in the field of water and waste water management, solid waste management above all regarding maritime economy,</li> <li>• working out a consensus in the field of location possibilities and range of the investments concerning fuel terminals</li> <li>• working out of a model of fishery management in the waters of the Pomeranian Bay taking into account the present political, economic and social situation and the specificity of the bodies of water of the Wolinski National Park,</li> <li>• implementation of practical protection of selected fragments of the coast,</li> <li>• promoting of the activities aiming to implement the Agenda 21 conception and the biosphere reserve,</li> <li>• development of tourism and recreation,</li> <li>• making valuable natural terrains accessible for educational and cognitive purposes through organisation of paths and watercourses (surface and underwater),</li> <li>• creation of an effective system of inspection and prevention from accidental pollution,</li> <li>• effective programme of protection of harbour waters against pollution.</li> </ul>
---	--	--------------------	--	--	-----------------	-------------------	------------	---	--



## 6. Financing of realisation of the ICZM tasks

The planned undertakings will be costly and sometimes even impossible to carry out basing on the budgets of the communes, districts, governmental administration, natural persons and corporate bodies. Therefore one of the main financing sources might be:

- state funds, including the National Environmental Protection and Water Management Fund (*Narodowy Fundusz Ochrony Srodowiska i Gospodarki Wodnej*), Voivodeship Fund of Environmental Protection and Water Management (*Wojewodzki Fundusz Ochrony Srodowiska i Gospodarki Wodnej*), Ministry of Environment (*Ministerstwo Srodowiska*), the State Board of National Parks (*Krajowy Zarzad Parkow Narodowych*), the Management Board of State Forests (*Generalna Dyrekcja Lasow Panstwowych*), the Marshalship (*Urzad Marszalkowski*), the Voivodeship Office (*Urzad Wojewodzki*), the Eco-Fund foundation (*Fundacja Eko-Fundusz*), the Agency of Structural Reconstruction and Modernisation of Agriculture (*Agencja Restrukturyzacji i Modernizacji Rolnictwa*), the Scientific Research Committee (*Komitet Badan Naukowych*), the Department of International Co-operation and European Integration (*Departament Wspolpracy z Zagranica i Integracji Europejskiej*).
- foreign funds, including PHARE, EU funds for sustainable development investments ISPA, SAPARD, EU funds for the realisation of the sustainable development conception and EU framework programmes in the field of realisation of joint policy, governmental programs and regional programs – e.g. Polish and German, the governmental Kingdom of Norway or Holland, the programme of the Danish Environmental Protection Agency.

Planning of the realisation of the tasks in the field of sustainable development, the structure of particular programmes and the planned possibilities of financial support should be thoroughly researched. More and more often complex projects and programmes are required and the tasks that are supported or financed are mainly investment tasks. At the same time we should remember that especially in the instance of means coming from the EU the technical and technological solutions and the ecological effects of the activities must refer to the EU directives and the procedure of assessment of influence on environment must meet the requirements of the EU.

The problems mentioned above have been tested within the framework of implementation of the "Programme of complex pro-ecological tasks in the area of the Wolin Island" being part of the "Programme of sustainable development of environment of the area of the Union of Communes of the Wolin Island" (Dziwnow, Miedzyzdroje, Wolin). The experience gained through the realisation of the programme indicate the necessity of taking into account the cost of assessment of influence on environment and the cost of technical projects of ecological effect monitoring together with its implementation and realisation.

### *Selected aspects of financing of pro-ecological investments*

The Environmental Protection and Water Management Funds (national, voivodeship, commune and lately established district funds) can be and undoubtedly are a significant source of investment financing. The financing is carried out by grants, loans, additional financial means granted when taking preferential credits and remissions.

The government and governmental administration are responsible for supervision, inspection and interventions.

**The basic function that the ministries have to perform in the new constitutional system is preparing of governmental programmes (National Programme of Preparations for European Union Membership), legislation and carrying out of the state policy in the adequate field. It must be based on voivodeship programmes which have to be consistent and possible to carry out (the Strategy of Voivodeship Development). Basing on them the department responsible for regional development (at present in operating mode the Ministry of Economy) prepares the National Plan of Development. In this way a medium-term strategy of economic and social development of the state will be created, which will take into account the goals included in regional plans.**

The National Environmental Protection and Water Management Fund assigns its means for financing of environmental protection tasks in accordance with the State Environmental policy and the Executory Programme for the State Environmental Policy, the National Programme of Preparations for European Union Membership and the Strategy of Environmental Integration with the European Union.

Polish obligations to the Helsinki Convention can be found on the list of goals of the State Environmental Policy. The appeal of the European Commission to set up the priorities in the campaign against environmental pollution in the fastest possible way and work out a schedule of adjustment to the EU standards of environmental protection should have its reflection in the New State Environmental Policy. There is a chance of taking advantage of the changes introduced together with the administrative reform of the country.

The Voivodeship Environmental Protection and Water Management Fund is a very important participant of the tasks which result from the environmental policy of the self-governments. Together with the national, district and commune funds it makes a significant part of the financial system supporting realisation of the environmental policy.

Among the priorities of the National Environmental Protection and Water Management Fund for the year 2000 the following priorities can be found:

- regulation of sewage management in the river basins,
- protection of boundary waters,
- elimination of so-called hot spots being the realisation of the resolutions of the Helsinki Convention,
- protection of coastal waters,
- limiting of low emission,
- reduction of pollution in waste gas,
- limiting of emission of nitric oxides and sulphur dioxide,
- elimination of arduousness of toxic waste,
- neutralisation of industrial waste.

Due to the fact that changes occurred in returns from fees and fines for environment utilisation, in the rules of supporting and of the priorities of the National Environmental Protection and Water Management Fund, the access to financial means is supposed to be more difficult.

The voivodeship funds have been established basing on the "old" voivodeship funds, whose means coming from fees and fines were very diversified. It is feared that the funds supporting ecological investments in new voivodeships might be divided unequally. It is very important not to allow of leaving out the areas previously short of funds.

The fifteenfold surplus over the average revenue of the commune and district fund will be transferred to the Voivodeship Environmental Protection and Water Management Fund. At the same time limiting of financing of sewage treatment facilities of flow capacity over 2000 m<sup>3</sup>/day and sewage systems loading the sewage treatment plans of flow capacity over 300 m<sup>3</sup>/day eliminates the possibility of endeavouring for financial means in most communes.

Undoubtedly the condition essential for achieving the desired state of "interest" of the society in the process of elimination of the sites particularly arduous for the environment, also called hot spots, from the areas inhabited and managed by them, is education broadening the ecological awareness, necessity of integration with the European Union, necessity of respecting the international obligations including the Helsinki Convention.

The means within the European Union aid for the countries endeavouring for membership, so-called ISPA fund, Pre-accession Instrument of Structural Policy, supporting development of infrastructure for environmental protection and transport and the SAPARD fund, assigned to finance modernisation of agriculture, development of farming and food industry and countryside development, can provide a chance for supporting the investments.

A significant condition of obtaining the ISPA means is the size of the undertaking, not less than 5 mln euro and that the payee cannot be a private company. In the first period large investment projects carried out in urban areas are preferred, which gives a chance to eliminate significant hot-spots. The at-

tempts to use the means from foreign funds have often shown incompetence of the parties striving to obtain them and that the rules of allocation and settling accounts have often been ignored. Therefore education of self-governments in this field will be an important stage.

It seems that the chance of obtaining financial support will augment when the communes, towns or users of the environment aim to solve their environmental problems in a thorough way establishing unions of towns, communes and users of the environment. There are already many positive examples in our country.

From January 1, 2000 in the ten countries aspiring to be a member of the European Union with full rights a new programme of financial support for agriculture SAPARD comes into force.

It is believed that Poland might obtain a large part of the funds assigned for the programme (500 mln euro a year).

The projects in the public and private sector which serve environmental protection can be financed from the SAPARD fund. Among other things development and improvement of rural infrastructure and water resources management will be included in the programme.

There are many other possibilities of endeavouring for financial support to improve the state of the environment. The institutions worth mentioning are: the World Bank, the Global Environmental Fund, the Ecofund etc., whose priority programmes might help in financing the process of elimination of hot-spots in Poland.



## **7. Aspects of institutional implementation of the assumptions of Integrated Management**

As Integrated Management must be carried out at two levels, i.e.:

- within the framework of Polish and German co-operation,
- within the Polish part of the Szczecinski Lagoon,

the process of preparation and implementation of the assumptions of Integrated Management should be adjusted to these conditions.

Bearing on mind the facts mentioned above it should be assumed that the body taking care of the right direction of implementation, i.e. reaching agreements and drawing up recommendations within the framework of Integrated Coastal Zone Management of the Szczecinski Lagoon in the transboundary dimension should be the Joint Environmental Protection Committee of the West-Pomeranian Voivodeship and Mecklenburg – West Pomerania.

On the other hand, in case of adopting of the assumptions of Integrated Management by adequate local bodies, the leading bodies should be the particular levels of self-governmental administration supported by governmental administration. As for the obligatory tasks which must be carried out by particular services and governmental administration, e.g. the Board of the Wolinski National Park or maritime and forestry administration, they should also be included in the Integrated Management of this area.

At first, the assumptions of Integrated Management should be incorporated in the Strategy of Development of the West-Pomeranian Voivodeship which is worked out by an adequate department of the Marshalship and also in local plans of spatial management in communes and towns, the programme of sustainable development of natural environment of the district etc.

It seems that the associations of communes located around the Lagoon, which are established to implement particular elements of Integrated Management, might play a leading role in the implementation process. Implementation of Integrated Management through the mediation of these associations which are able to work out the most optimal organisational structure, individual methods of searching for organisational, legal and financial solutions and hierarchy of tasks and goals has already been put into practice and proved effective on the Wolin Island.



## 8. Social conditions

The analysis of conditions that has been carried out allows of stating that not only the inhabitants of the communes located within the borders of the area of ICZM of the Szczecinski Lagoon or the units carrying out economic activity in this area but also people coming to this area on vacation or in business will be influenced by the consequences of ICZM. We assume that the suggestions of activities which aim to implement ICZM of the Szczecinski Lagoon will be addressed to several millions of people and tens of thousands of economic units altogether.

To make the conception of activities within the framework of ICZM of the Szczecinski Lagoon succeed, its implementation must be accepted by:

- the citizens of the communes,
- self-governments of communes and districts and the self-government of the West-Pomeranian Voivodeship,
- the Union of Communes of the Wolin Island ,
- administration responsible for carrying out particular tasks, e.g. economic or educational,
- informal groups, unions, non-governmental organisations, political parties existing in the ICZM area,
- individual people actively engaged in economic work as well as their organisations,
- other economic units.

Therefore undertaking activities basing on full partnership of particular sectors of government and institutions, especially on partnership of self-governmental and governmental administration, is necessary.

The social conditions of carrying out the ICZM project of the Szczecinski Lagoon should be investigated in three dimensions:

- wide consultations of the conceptions of projects and of the aims with the representatives of self-governments,
- active participation of the representatives of self-governments,
- carrying out information policy – from publications and information materials to symposia and workshops.

In the light of the changes that are taking place in the economy of the West Pomerania and the observed changes in the mentality of the society it seems that the right time to implement the ICZM conception has come.



## 9. Sustainable development indicators for ICZM of the Szczecinski Lagoon

For the control of the Integrated Management Process (and sustainable development) a monitoring system and assessment of changes in an indicatory aspect are necessary.

The possibility of using objective indicators in the assessment of changes taking place in the environment is the condition for making a proper diagnosis and starting carrying out the activities.

However, it has been stated that no single optimum indicator exists, therefore a group of indicators should be found in accordance with the OECD model: pressure-state-reaction or in a similar formulation, divided into direct and indirect indicators. The direct indicators are these indicators, basing on which conclusions can be directly drawn concerning the state of environment and indirect indicators are these indicators, which reflect the changes but it is difficult to indicate the cause of the changes basing on them.

### ***The monitoring system***

The need of monitoring concerns:

- ♦ grade of meeting the demands,
- ♦ use and state of non-renewable resources, such as space, human capital and natural environment (waters, forests, fish, air, fauna and flora – the issue of biodiversity),
- ♦ quality and effectiveness of the sustainable development policy and/or integrated management of the coastal zone.

Monitoring should be of a double-track character:

- ♦ It should use the existing information on quantity, factually indicating the processes and phenomena connected with sustainable development.
- ♦ In case of lack of such information it should refer to standardised opinion of experts and other forms of monitoring of a quality character.

### **Monitoring should be carried out in the following aspects characterising the area:**

- Satisfying of needs:
  - material,
  - non-material.
- Human capital.
- Space.
- Natural environment:
  - air,
  - water,
  - biodiversity,
  - forests,
  - fish.
- Quality (effectiveness) of the sustainable development policy:
  - satisfying of needs – quality of the policy,
  - human capital – quality of the policy,
  - space – quality of the policy.

### **1. Selected indicators of sustainable development, possible to apply in ICZM**

#### **1.1. D-type indicators (UNCSD – United Nations Department for Policy Co-ordination and Sustainable Development)**

- unemployment rate [% of the population],
- population growth rate [%/year],
- rate of growth of urban population [%/year],
- human and economic loss due to natural disasters [number of people; thousands of PLN],
- domestic consumption of water per capita [l/inhabitant/day],
- population growth in coastal areas [number of people/km<sup>2</sup>/year],

- discharge of oil into coastal waters [t],
- release of nitrogen and phosphor to coastal waters [kg],
- land use change [description],
- land use change [kg/ha],
- energy use [kWh/ha],
- wood harvesting density [description],
- household solid waste and sewage disposed per capita [l/inhabitant/day].

## **2.2. State indicators - S (UNCSD):**

- population density [number of people/km<sup>2</sup>],
- percent of population in urban areas [%],
- groundwater reserves [thousands of m<sup>3</sup>],
- changes in land condition [description],
- national monthly rainfall index [mm/m<sup>2</sup>/year],
- arable land per capita [ha/inhabitant],
- forest area change [description],
- potential scientists and engineers per million population [number of people/1 mln inhabitants].

## **2.3. reaction indicators - R (UNCSD):**

- infrastructure expenditure per capita [PLN/inhabitant],
- environmental protection expenditures as a percent of GDP [%],
- technical co-operation grants [thousands of PLN],
- waste-water treatment coverage [km<sup>2</sup>],
- density of hydrological networks [description],
- protected forest area as a percent of total forest area [%],
- protected area as a percent of total area [%],
- municipal waste treatment [description].

## **2.4. Sectorial indicators: transport (Baltic 21):**

- NOx emissions by total sector and by road, rail, air and sea transport [kg/year],
- mean annual NO2 concentration in central urban areas,
- emission of fossil CO2 by total transport sector [kg/year],
- length of railways and main roads [km],
- length of public transport net [km],
- share of areas larger 100km<sup>2</sup> not separated by motorways [description],
- intensity of motor traffic [vehicles/h],
- day and night time noise value in residential mixed and industrial areas [dBA],
- number of fatalities and injuries in transport [number of people].

## **2.5. Sectorial indicators: industry (Baltic 21):**

- number of firms with environmental statement / total number of firms [%],
- average length of life for the industrial workforce [years],
- industrial injuries and occupational diseases [description],
- releases of hazardous substances [description],
- emissions to air complying with WHO [description],
- standards for air quality [description].

## **2.6. Sectorial indicators: energy (Baltic 21):**

- actual emissions of Nox and SO2 in relation to local limit values [kg/year],
- net energy / population [mln kWh/number of people],
- net energy / final energy [%],
- combination of heat and power as % of electricity [%],
- combination of heat and power as % of heat.

The set of indicators does not cover all the issues and it is designed for discussion with the German side. The basic and significant set of indicators should be chosen taking into account access to data and importance of the indicators for the management process.

A set of indicators for the main identified issues existing in the ICZM area of the Szczecinski Lagoon can be found in Annex No 8.



## 10. Recapitulation

Analysis of the problems and methods of utilisation of the resources of the area of ICZM of the Szczecinski Lagoon has shown that water resources, their quality and quantity influence the economic development of the area as well as protection and preservation of unique resources of animated nature. The possibility of maintaining and developing the hitherto functions of the area, especially those which influence the life standard of a large part of inhabitants of the communes around the Lagoon (fishery, tourism, health-care, agriculture, services connected with tourism) depends on water resources.

1. The presented ICZM programme of the Szczecinski Lagoon is an example of interactive planning of sustainable development, being an element of merging rules and superior and inferior procedures, with the use of knowledge and experience of the bodies participating in the project.
2. The area of ICZM of the Szczecinski Lagoon is an important tie of environmental protection on regional and European scale. All economic activities and investments should be related to the requirements of environmental protection respecting the standards set in the Directives of the European Union.
3. Integrated Coastal Zone Management of the Szczecinski Lagoon is characterised by a large grade of complexity and the importance of the issue, therefore its realisation should be carried out gradually and respecting the basic priorities of economic growth (nature protection, water management, agriculture, forestry, tourism and recreation).
4. Implementation of the principles of sustainable development of the coastal area of the Szczecinski Lagoon should take into account carrying out pro-ecological tasks:
  - distinctive activities (inventories and research),
  - repair activities (reconstruction and investments),
  - inspection of the ecological effect (monitoring).
5. The basic tool of environmental management and spatial planning of the coastal zone of the Szczecinski Lagoon should be environmental delimitation taking into account:
  - delimitation of areas with homogenous habitat characteristics,
  - delimitation of areas basing on river basins.
6. One of the basic ties of integrated management of the coastal area of the Szczecinski Lagoon is water protection and implementation of an open planning process in water management, especially in the system of water resources management.
7. The conception of sustainable development of the area, which requires equal treatment of all functions related to water, is advisable in planning of water management for the coastal area of the Szczecinski Lagoon.

**8. It is suggested to take into account the entries of ICZM of the Szczecinski Lagoon in the regional spatial management plan (commune plans, local plans, studies of directions and conditions of spatial management in communes).**

9. The basic tools of water management should be: water-economy balances, conditions of water utilisation in the basin taking into account the natural conditions of water circulation and protection, the amount of discretionary resources and the grade of their distribution and the conditions indicating the necessity of carrying out of water resources management in the field of water intake, industrial and municipal water consumption, the change of structure of sewage in quality and quantity and increasing of water retention.
10. The strategy of water protection in quality and quantity aspects should result from system water management in particular basins, carried out by the Regional Water Management Board in Szczecin.
11. The essence of integrated management of water resources is introducing rules regarding water utilisation for various sectors of economy and industry, agriculture, power industry, tourism,

shipping and urbanised areas.

12. The issue of groundwater management in the area of ICZM of the Szczecinski Lagoon is defined through:
  - a) the regional identification state of discretionary water resources,
  - b) quality and trend of chemical changes (geogenic and anthropogenic),
  - c) location of groundwater intakes, the amount of intake and grade of satisfying the demand,
  - d) the grade of distribution of groundwater resources,
  - e) the necessity of assignation of areas with perspectives for building water intakes and water supply systems, among other things taking into account enlargement of water retention and water transit.
14. The programme of water ecosystems and water resources protection is included in the detailed list of tasks to be carried out with specification of short-, medium- and long-term tasks and in the recommendations of the system approach to the issue through water-economy balances, conditions of water consumption in the basins, programmes of sustainable development of districts, water management plans of the communes and small retention programmes.
15. In the coastal area of ICZM of the Szczecinski Lagoon many valuable resources can be found which should be managed in a sustainable way so that they will exist at least for the next few decades.
16. The strategy of environmental protection of the coastal area of the Szczecinski Lagoon must take into account the problems connected with the issue of sustainable development with respect to the protected and particularly sensitive areas.
17. Basing on the evaluation of the area that has been carried out and on the gradation of particular reconstruction activities in the coastal area of the Szczecinski Lagoon, implementation of two basic directions of activity is suggested:
  - protection of water ecosystems and water resources,
  - protection of animated nature.
18. The ICZM programme of the Szczecinski Lagoon includes far-going restoration of wetland habitats aiming to restore the old water circulation system and peatbog-forming process and consequently reconstruction of habitat conditions and formation of an ecological landscape with a wide diversity of ecosystems.
19. Active protection of ecosystems within the small retention programme should be carried out in stages taking into account:
  - delimitation of peatbog areas,
  - working out of a protection programme,
  - planning of technical activities,
  - implementation of reclamation stages.
20. In the coastal zone many conflicts arise. They should be solved through compromising, co-operation, implementation of adequate procedures and unification of the Polish law with the Directives of the European Union.
21. Assessment of influence on the environment, used for identification of quantitative definition of environmental effects caused by investments during the development of the Integrated Management plan, should be an integral part of the process of development of the projects carried out within the ICZM programme of the Szczecinski Lagoon.
22. A system of cycling paths of international, regional and local importance has been designed in the area of ICZM of the Szczecinski Lagoon. The paths are synchronised with the elements of the environment of significant nature values and with cultural and recreational infrastructure.
23. In the ICZM process the communes should work out a vision of rational management of various resources of the coastal area. Experts and governmental agencies might be helpful in this case. In the future the local authorities should have their own experts.

24. The presented strategy of sustainable development of the coastal area of the Szczecinski Lagoon is already partially carried out by local self-governments. "The programme of complex pro-ecological undertakings in the area of the Wolin Island", carried out by the Union of Communes of the Wolin Island , deserves special attention.
25. Realisation of the goal of sustainable development in its full range requires undertaking complex activities with large organisational and financial involvement, with delimitation of areas and identification of priority tasks. The schedule and range of tasks should be drawn up in the realisation programme.

## **Annex 1. Characteristics of the area of ICZM of the Szczecinski Lagoon**

**Annex 2. Protected areas and areas worth protection on the area of ICZM  
of the Szczecinski Lagoon**

**Annex 3. State of the environment on the area of ICZM of the  
Szczecinski Lagoon**

## **Annex 4. Water management of ICZM of the Szczecinski Lagoon**

## **Annex 5. Conflicts between the environment and the economy**

**Annex 6. Needs of the communes in the field of environmental protection  
and improvement of the state of the environment**

**Annex 7. Setting up of priority tasks for water management, nature protection, monitoring and in the light of activities of the Maritime Office**

## **Annex 8. Sustainable development indicators for ICZM of the Szczecinski Lagoon**

*(among other things serving the assessment of economic, social and environmental aspects of implementation of the plans and reflecting the trends connected with the long-term goals)*

# 1. Characteristics of selected physical and geographical elements of the area

## 1.1. Geology, geomorphology and genesis of the landscape included in the Integrated Management

The geologic structure that has been formed within the compass of ages, the types of rocks and sediments connected with it and the sculpture of the earth's surface in the analysed area which formed as a result of geomorphological processes form the base which conditions to a large extent the development of the remaining elements of the system of the coastal area. Lithological formation of rocks and useful stock (minerals) contained in them might be of a key importance to the strategy of development of particular regions of the analysed area. Water-permeability and existence of water-bearing layers together with climatic conditions and sculpture of the earth's surface are important for development of water relations with which they condition the variety of landscapes and their biodiversity.

The geologic structure, geomorphology and genesis of the area included in ICZM was an object of many examinations carried out by a number of researchers in the last century [B.Krygowski 1959; H.Kliwe 1960; A.Karczewski 1968; R.K.Borówka, S.Musielak 1997]. Therefore these issues are not presented in this study more precisely and only some particular elements or conditions are indicated for adequate selection of directions of activities within ICZM.

In the geologic bedding of the area of the Szczecinski Lagoon and its surroundings two main structural units exist: the northern part of the Szczecin syncline, being part of the Szczecin-Lodz-Miechow synclinorium and a fragment of the anticlinorium of Kujawy and Pomerania enclosing the areas located east to the Dziwna River together with the Kamienski Lagoon and the Wrzosowska Bay. Due to this fact the geologic formations filling the syncline and their thickness differ (up to more than 5 km of thickness – a complex of undulating Permian and Mesozoic sediments) which applies also to the formations covering the north-eastern region of the analysed area, where solid Mesozoic (Jurassic) limestones can be found here and there directly on the surface (Czarnoglowy, Kleby) or they exist under a not very thick layer of post-glacial sediments. The specificity of geologic structure has a direct influence on the existence and availability of rock raw materials, power raw materials and the raw materials connected with outcrops of some types of geologic layers, mineral waters and thermal waters.

The definitive appearance of the contemporary landscape of the whole area included in ICZM began forming when huge continental glaciers overfolded from Scandinavia in quaternary. They brought in enormous amounts of erratic blocks and moraine formations. From the moment when the continental glacier began to melt (about 16 000 years ago) in the vicinity of its withdrawing edge new complexes of post-glacial and fluvio-glacial forms came into existence, both accumulative and erosive forms. Rising of the sea level which proceeded for about 8000 years was an important moment for the sculpture of this area. The area of the present Szczecinski Lagoon had been a land area before. About 6000 years ago the sea invaded the area of the Pomeranian Bay and Szczecinski Lagoon. Its waters formed the today's shape of the shores.

The sculpture of the Earth's surface of the surroundings of the Szczecinski Lagoon is quite diverse. From the south-west, south and south-east it is surrounded by sandy plains being remnants of the outflow of post-glacial waters in the final stage of the last glaciation, when flat mud and peat plains were developed. In many sites their surface is diversified by dunes, post-glacial depressions and young river valleys with terrace levels.

The north-eastern surrounding of the Szczecinski Lagoon is a flat or rolling upland of a ground moraine spreading to the Baltic shores built of clays and post-glacial sands. Its surface is fairly diversified and it is elevated to about 20 m above the sea level with only 5 metres' drops. Many depressions without outlet exist here left by dead ice which are filled either by peatbogs or by lakes which become covered with a growth. There are also numerous fluvio-glacial formations and former gullies used by contemporary rivers (Niemica, Wolcza, Wolczenica, Dziwna). From the north the area of the Lagoon is surrounded by the islands Uznam and Wolin which are elevated to the height of more than 100 m above the sea level and separated with the Swina strait. The shoreline of the islands Uznam and Wolin is evened to a large extent on the coast of the Pomeranian Bay and strongly dismembered on the coast of the Szczecinski Lagoon. The shores with actively developing cliffs differentiated in respect of their

formation and the dynamics of their development as well as the flat and low accumulating shores and accumulating dune shores are an attraction of this area. The cliff shores of the Wolin and Uznam islands are reckoned to be one of the most picturesque geologic formations in the Baltic region.

The facts from geologic history of the analysed area presented above explain why the today's shape of the areas of the coastal zone of the Szczecinski Lagoon is characterised by such unique landscape values of animated and inanimate nature. On the described area accumulative and erosive post-glacial forms of moraine elevations (flat, rolling and hummocky), terminal moraines, marginal plains, drumlins, sanders, proglacial stream valleys, subglacial gullies, Holocene sandbars formed after the glacier had receded as well as accompanying dunes, beaches, cliff sea precipices, river valleys, river accumulation plains and lagoon accumulation plains.

On the vast flat plain of snowmelt water surrounding the Lagoon post-glacial and deflation depressions filled with gyttjas and peats and varied groups of inland dunes can be found. The swamp accumulation drift fills the vast valley of Miedzyodrze, the valley of the Swiniec River, the bottoms of the young river valleys and deep subglacial gullies transformed by the rivers. Sandbar drifts have developed in the mouths of the straits connecting the Szczecinski Lagoon with the Pomeranian Bay. They close the estuaries of the Dziwna and Swina rivers. In the area of the sandbar of the Swina River (the gate of the Swina River) reverse delta drift accumulates as a result of the influence of a specific, estuarial hydrographic system. In the gate of the Swina River three generations of dunes have developed following the cyclic accumulation of sandbar drift. The dune ranges accompany nearly the whole coastline, also in the cliff shore parts, but generally they can be found on the sandbar, accumulative stretches of the sea shore.

Among today's superficial drifts some anthropogenic drifts occur as well. They are represented by dumping area sands and silts, banks of linear and superficial engineering objects and heaps of process waste (phosphate gypsum and smoke ashes) and municipal solid waste.

The construction of the terrain, strongly genetically related with the geologic history of development of the area, has a significant influence on the specificity of local climate and hydrological conditions. All these elements altogether determine the development of the animated nature and its biodiversity. Thanks to these elements particular sea coastal areas and areas located around the Lagoon obtained the status of a national park, area of mass tourism and recreation and they were, are and will be an object of interest of the industrial lobby.

## **1.2. The climate**

The climate of the surroundings of the Szczecinski Lagoon is formed under the influence of air-masses approaching from various geographic regions of Europe. Usually they are polar-maritime air-masses approaching from the Atlantic Ocean which are often accompanied by precipitation. Their influence on weather conditions in summer manifests itself in increased cloudiness and significant air temperature cooling with a simultaneous increase in humidity. On the other hand, in winter they bring warming up and sudden snow-melting.

More seldom than presented above polar-continental air-masses appear, approaching from the area of central Russia. These air-masses are characterised by low humidity. They usually approach the area of ICZM in winter and spring, causing cooling and keeping up of sunny weather. In spring and winter from the area of northern Russia and arctic seas sporadically dry and very cool arctic air might come. The ground frosts occurring in late spring are connected with these air-masses.

The most rare air-masses in the area are tropical air-masses. They might approach from south-east as hot and humid air from the area of the Azores or from south, from the areas of North Africa and from south-east (Asia Minor). The air-masses approaching from North Africa and Asia Minor are dry, hot and not very transparent (they contain particles of desert dust). They cause sporadic, sudden heating up in spring and autumn. The hottest heat-waves in the summer are connected with them.

On the many years' scale in the described area the most common winds are westerly and south-westerly winds. The highest velocities are those of the winds blowing from the north-westerly direction. The most rare winds come from the northerly direction. However, in winter season they may

reach the highest velocities and cause storm accumulation of waters in the Pomeranian Bay and in the Szczecinski Lagoon. High storm accumulations occur with varied frequency, once in every three years on average and then the water level might rise even by 100 centimetres. In extremal cases of disasters that took place on the turn of the 19<sup>th</sup> century (the years: 1874, 1883, 1904, 1913) the water level rose by nearly 2 meters in the Pomeranian Bay and 1.5 meters in the Lagoon. During such disasters, which cannot be forecasted in the ICZM plan, all the areas located low around the Szczecinski Lagoon, Lake Dabie and the Valley of the Oder River are flooded. Acceptation of a certain strategy of proceedings is necessary then, which is preceded by definition of the vision of functions which should be performed by these areas in the whole ICZM system.

In the climatic regionalisation of the Szczecinski Lagoon region several zones can be identified, related to pelagic zone, coastal zone and land surroundings.

In the dynamics of changes of the climate elements two basic periods are recognised – cool (October – March) with large variability and warm (April – September), less changeable.

The orographical variability has a high significance in the regulation of climatic conditions and topoclimatic conditions (the Warszawskie Hills, the Bukowe Hills, the Wolinskie Range). The contact of big water reservoirs and varied relief leads to formation of specific thermal conditions and wind conditions (which can be profitable for wind power plants development).

The precipitation, estimated at 520-660 mm yearly, is reckoned an average quantity in Poland, and at the same time with high air humidity and a large area of wetlands, the retention of precipitation water is high.

Bearing on mind the large variability of the climate elements in the area of the Integrated Management of the Coastal Zone in the Szczecinski Lagoon area, a detailed regionalisation of the topoclimate should be developed, with the valorisation of the leading characteristics for different spheres of development and environmental protection.

### **1.3. Hydrography and hydrology**

The coastal area of the Szczecinski Lagoon is characterised by a particular abundance of waters. The catchment area of the Szczecinski Lagoon is about 129.000 km<sup>2</sup> (excluding the waters of the Lagoon and the straits). The Szczecinski Lagoon is a wide inland water reservoir, the main outlet of the waters of the Oder River and several other bigger rivers. The hydrographic and hydrological characteristics of the Szczecinski Lagoon give it some particular qualities, among them: wide area (912 km<sup>2</sup>), high water volume (3.159 bln m<sup>3</sup>) and a long shoreline (243 km). The Szczecinski Lagoon is connected with the Baltic Sea with three outlet-type straits: Peenestrom, Swina and Dziwna, through which fresh water mixes up with salt water. The yearly amount of water inflowing to the Oder River and outflowing is 17 bln m<sup>3</sup> on average. However, the water exchange with the Baltic Sea is limited and the salinity is low. Due to its geomorphological and hydrological qualities and a large catchment area with a high contamination factor, the Szczecinski Lagoon is one of the most ecologically endangered lagoons in the Baltic region.

The most important characteristics of the region, from the point of view of the shipping industry are: low diversification of the bottom configuration of the Lagoon, low average depth (3.8 m) and the existence of numerous shoals (25% of the area of the Lagoon). The largest lake located in the Oder River catchment is Lake Dabie, with the area of 5.570 ha. Since the lake is connected directly with the Szczecinski Lagoon, the water level is dependent on the water level in the Lagoon. Pollutants and biogenic substances discharged into Lake Dabie and coming mainly from the Szczecin agglomeration are a heavy burden for the whole estuary of the Oder River.

The particular role of the Lagoon is:

decreasing the velocity of the water flow in the Oder River and other tributaries and in consequence decreasing the sedimentation,  
forming of periodically flooded and wet coastal zones, including the reverse delta of the Swina River,

- creating and supporting the habitat for salt-water organisms, fresh-water organisms and transitory organisms, for which the sea water infusion is the necessary condition of their existence.

**The direct area of the Management Plan covers 2533 km<sup>2</sup>.** In this area 4 balancing regions have been staked out within the framework of the statutory tasks of the Regional Water Management Board in Szczecin (see Map 2).

### *Hydrology – the river system*

The hydrographical axis of the area is the lower stretch of the Oder River, Lake Dabie, the Roztoka Odrzanska, the Szczecinski Lagoon, the Dziwna River, the Swina River and the Piana River. This configuration causes that a complex system of rivers and specific hydrogeologic conditions exist in this area, which is typical for estuarial areas. The hydrographical system of the land surrounding the Szczecinski Lagoon represented by the river system of the river basin of the rivers: Plonia, Ina, Gowienica, Wolczenica, Swiniec, Gunica, Mysliborska Struga and Wka is well-developed. The existence of several channels linking the Regalica River, Lake Dabie, the Oder River and the shipping channel Szczecin-Swinoujscie is the anthropogenic element of the hydrographical system

### *Hydrological conditions*

The hydrological conditions of the Szczecinski Lagoon basin are described by means of data concerning the resources of surface waters and the discretionary resources of groundwater. The quantity of water resources is nearly unlimited but in the balance it should be taken into account that part of the resources is polluted. Consequently the sites of water intakes and discharges require a detailed analysis. Bearing on mind the hydrological specificity of the area, utilisation of a particular methodology of identifying discretionary flows and intangible flows is necessary. The water economy balances of particular basins carried out by the Regional Water Management Board in Szczecin contribute to the detailed identification of surface waters resources.

### *Groundwater resources*

In many regions of the area there is a groundwater shortage for consumption needs. The shortage affects the areas of Swinoujscie, Kamien Pomorski, the coastal zone and the Szczecin agglomeration.

By the 90s a detailed hydrogeologic examination was conducted on the Wolin and Uznam islands and in Lake Ostrowo area. The documentation of the other regions has been carried out since 1995 within the framework of the regional identification of discretionary groundwater resources (the left-bank side of the Oder River with the Gunica River, the basin of the Dziwna River and the Wolin Island). Most of the documented discretionary and tangible resources of groundwater are presented on **Maps 3 and 4**.

The main groundwater reservoirs play a particular role as a future consumption water supply for the inhabitants, since they are affluent in water and they require special protection. Unfortunately, resulting from the degradation in quality and quantity, the main groundwater reservoir 101 on the Uznam Island has lost its importance.

According to the identification that has been carried out so far, the following areas have been delimited:

- areas with a disturbed hydrological balance, due to overexploitation (the river basin of the Gunica River)
- areas of groundwater degraded in quality (part of the Uznam Island, the Przytorski Peninsula, the coastal zone from Swietoujscie eastwards)
- areas of favourable groundwater conditions (the central part of the Wolin Island, the river basin of the Wolczenica River, the Goleniow-Stargard area)

For the areas mentioned above the demonstration of the water resources condition and needs in a detailed water economy balance is necessary.

**Table 1.1. Specification of basic information characterising the estuarial balance regions (sprawdzić)**

Name and number of the balance region	Main rivers in the balance region	Attachment to a physico-geographical region	Administrative location of the area included in the plan		General characteristics of the area	Natural characteristics of the area
			District	Communes		
<b>5104 Plonia</b>	The rivers: Plonia, Gowienica, Krzekna, Sicina	The Lower Oder Valley	Szczecin	Szczecin	The area remains under a strong influence of anthropogenic factors and is strongly transformed.	In the area included in the plan only a small fragment of the Plonia Valley is located. The Plonia Valley is an environmental corridor of a regional importance.
<b>5105 Gunica, Szczecin (the left bank of the Oder River)</b>	The rivers: Gunica, Mysliborska Struga, Karwia Struga	The Wkrzanska Plain, The Szczecinskie Elevations	Szczecin, Police	Szczecin, Nowe Warpno, Police, Dobra, Kolbaskowo	An area performing important environmental functions and the site of many industrial developments, including chemical industry, light industry, shipyards etc. The main parts of Szczecin (a city with more than 400.000 inhabitants) and Police are located here. Therefore a strong pressure of the development of the Szczecin agglomeration on the Wkrzanska Forest complex can be noticed.	An area of strong environmental habitats diversification. In the north the coastal zone of the Szczecinski Lagoon is located, in the central part the Wkrzanska Forest complex. The nature reserve "Swidwie" is located in this area as well. The reserve is included on the list of the Ramsar Convention. In the south - agricultural areas surrounding Szczecin. An important area for the vertebrates.
<b>5106 Ina</b>	The rivers: Ina, Mala Ina, Krapiel	The Lower Oder Valley, The Goleniowska Plain	Goleniów	Goleniów, Stepnica, Przybiernów	Areas with predominance of forestry and agriculture over the economic function but these proportions tend to change. A variety of economic investments are planned in this area in the future. The factors having a bearing on this state of matters are the presence of state and international communication lines and the airport in Goleniów.	An area of high environmental value. The presence of the Goleniowska Forest complex, peat-bogs which used to be cultivated over ten years ago and numerous swamps. In the area rare plant communities, plants and animals can be found.
<b>5107 The Oder River, the Szczecinski Lagoon</b>	The Oder River, the Szczecinski Lagoon, the Roztoka Odrzanska, the rivers Dziwna and Swina.	The Lower Oder Valley, the Uznam and Wolin islands, the Trzebiatowskie Coast.	Szczecin, Police, Goleniów, Kamien Pomorski, Swinoujscie	Kolbaskowo, Szczecin, Police, Nowe Warpno, Goleniów, Stepnica, Wolin, Swinoujscie, Miedzdroje, Kamien Pomorski, Dziwnów,	An area of a special importance due to its economic functions – existing commercial, ferry and naval harbours, shipyards, fishery, attractiveness for tourism, water tourism, nature tourism and hiking. Health resorts are located in this area. The Oder River, the Szczecinski Lagoon and the Swina River are a water lane linking Szczecin and the Baltic sea. The Wolin and Uznam islands are the object of interest for many investors. The localisation of the Wolinski National Park across the Wolin Island is a serious obstacle for the development and modernisation of the land communication route from Szczecin to Swinoujscie. In the area of the Wolin Island the Union of Communes of the Wolin Island carried out a line of pro-ecological investments in the past few years.	An area of unique natural qualities. Among other things a place of procreation and rest during the migration and wintering of fish, birds and mammals of an international importance. The Wolinski National Park has been created here. The existence of the Szczecin agglomeration has an influence on the condition of the nature. Next to the areas of highest natural value huge industrial units are located, having an impact on the condition of nature resources. The area is predisposed for the implementation of the sustainable development programme, among other things within the idea of the Biosphere Reserve "Ujscie Odry" (The Mouth of the Oder River).
<b>5108 Wolczenica, Gowienica</b>	The rivers: Wolczenica, Gowienica, Swiniec	the Trzebiatowskie Coast, the Gryficka Plain	Goleniow, Kamien Pomorski,	Stepnica, Przybiernow, Wolin, Kamien Pomorski, Dziwnow	Includes cultivated areas and forests. The area is practically lacking in industrial plants. The terrains have been utilised as a holiday place and for recreation for years. Kamien Pomorski has been known as a famous health resort for years.	Valuable water and mud ecosystems exist here, related to the outlet part of the rivers: Wolczenica and Grzybnica, Swiniec and Niemica.

#### **1.4. The shores of the Szczecinski Lagoon**

In the shoreline of the ICZM area of the Szczecinski Lagoon, which is conditioned by the geologic construction, a few deeply incised bays can be found: Lake Nowowarpienskie, Lake Wicko and the Skoszewska Bay. The most diversified shoreline can be found in the area of the reverse delta of the Swina River. In this area, located between the Old Swina and Lake Wicko a line of aits of alluvial and maritime accumulation exists (Wielki Krzek, Lysa Wyspa and others). An artificial formation created as an effect of dredging is the Chelminek Island located between Roztoka Odrzanska and the Szczecinski Lagoon.

The shores of the Szczecinski Lagoon are strongly morphologically and geologically diversified. In the eastern part the shores are low, flattened, built of peat covering sands, gravelly sands, slimes and lacustrine sediments such as gyttyas. In the vicinity of Kopice and Czarnocin eolian sands can be found which cover fluvial and fluvioglacial sands. The southern shores of the Lagoon are built of sands or more seldom of fluvial and fluvioglacial slimes. Sometimes these sediments are covered by peats (the area of Brzozki and Warnoleka, the shores of Lake Nowowarpienskie, Warsin). In many locations eolian sands can be found, forming local dunes (the areas in the vicinity of Trzebiez, Trzebieradz, Miroszewo, Podgrodzie). The northern shores of the Lagoon in the area of the Gate of the Swina River are low and flat. They are built of delta sediments such as fluvio-marine sands, low peats on sands or delta silts and peat silts. The highest shore of the Lagoon can be found in its north-eastern part. It is formed by a moraine and kame cliff of the Wolin Island, built of boulder-clay of the accumulated terminal moraine and of post-glacial sands and gravelly sands. In the Wolin direction the shore of the Island becomes lower and lower and in some depressions peats can be found (the area of Plocin). Southwards from Wolin the shore cuts into the Lagoon with the Row Peninsula, whose shores are built of fluvio-marine sands with interbeddings of slimes and peats. The stretch of shores from Wolin to Skoszewo is built of boulder-clays of flat ground moraine and fluvioglacial sands and gravelly sands. In the direct neighbourhood of the coastal waters of the Lagoon peaty silts or peats on sands and slimes can be found.

The presented geologic construction of the shores of the Szczecinski Lagoon and their morphology indicate low resistance of these shores to abrasion, and above all they indicate that a serious threat exists that they will be flooded when the water level in the Lagoon is high. The possible storm accumulation of waters which was mentioned when describing the climate of the area might pose a disastrous threat of flooding of the shore, which might be particularly dangerous for the eastern and south-eastern stretches of the shore.

#### **1.5. Minerals**

The issue of protection and rational utilisation of the geologic resources, according to the assumptions of the national strategy of lithosphere protection, is a priority task in the development of the economic strategy and the sustainable development strategy. The exploitation of mineral deposits should be economically justified and carried out rationally, in a way that would minimise environmental damage. Therefore mineral deposits are under particular protection according to the state law.

The following deposits of basic minerals that exist in the coastal area of the Szczecinski Lagoon have been documented so far: natural gas, crude oil and thermal and curative brine waters. The following common minerals exist in the area: limestones, marls, natural aggregate, quartz sand used in the production of lime-sand brick, silty raw stock for the production of building ceramics and lightweight aggregate, lacustrine chalk, mud peats and garden peats.

##### ***Power raw materials***

Deposits of natural gas and crude oil have been discovered in the area of Kamien Pomorski, Wrzosowo, Przytor, Miedzzyzdroje, Rekowo and Wysoka Kamienska. Brown coal deposits have been found in the area of Jezierzycze, Tanowo and Goleniow.

##### ***Rock raw materials***

In the coastal area limestone and marl deposits for cement industry can be found. They are located in the vicinity of Czarnoglowy and Kleby and in the Golczewo area. The silty raw stock deposits for the production of building ceramics and lightweight aggregate are mainly Tertiary silts and slimes, located

in the Szczecin area on the Skolwin slope, in Plonia and in the neighbourhood of Wawelnica and Siadło Górne.

### ***Gravel aggregates***

Gravel aggregates are the dominating mineral in the voivodeship. More significant deposits of these aggregates are located in the area of Mokrzyca Wielka, Dargobadz, Kolczewo, Budno, Mosty, Ostrowice, Radziszewo and the deposits of quartz sands – in Loznica near Goleniów.

### ***Peats***

Particular topographic properties have been conducive to accumulation of organic matter and development of peatbogs in the Oder Valley and around the Szczecinski Lagoon. Therefore the widest peatbogs of the voivodeship are located in this region. They cover an area of more than 300 km<sup>2</sup>. The peatbogs considered to be the biggest around the Szczecinski Lagoon are: Uznamskie peats, Wolinskie peatbogs, Czarnocinskie peatbogs, the peatbogs over Roztoka Odrzanska (one of the biggest highmoor peatbogs of the Baltic type in Poland), the peatbogs of the valley of the river Ina and the peat basin on Lake Dabie. At present they are not practically exploited. They are only utilised as greenlands and pastures in agriculture. Peat is at a premium in gardening. The latest analysis (Dobrcki and others, 1999) has indicated that there has not been any demand for opening new peat mines in the coastal area of the Szczecinski Lagoon.

Peatbogs are not only a place where organic matter containing valuable chemical ingredients is stored, but above all they are retention reservoirs of water, they play a levelling role in the reduction of pollution and they perform the function of creating settlement sites. Therefore they are the areas where many unique complexes of flora and fauna exist, some of them under legal protection.

### **Curative raw materials**

#### ***Mud peats***

Mud peats are exploited for health-care in sea health resorts (deposits: Miedzyzdroje, Kamien Pomorski). The conditions for peat exploitation as a curative raw material exist in the area of the Wkrzanska Forest as well, which together with the possibility of accessing mineralised elevated temperature waters in the Szczecin area provide real circumstances for opening a physiotherapeutic centre in this region (e.g. on the coast of the Szczecinski Lagoon between Nowe Warpno and Trzebiez).

#### ***Mineral waters***

The deposits of mineral waters in the coastal area have been exploited for years. Mineral waters are used in sea health resorts. The areas of Kolczewo, Miedzywodzie, Wrzosowo and Szczecin are considered to be promising for acquiring mineralised waters, including elevated temperature waters.

#### ***Thermal waters***

In the coastal area of the Szczecinski Lagoon included in the Management Plan the existence of thermal waters of elevated temperature has been recorded. Their significant deposits allowing to acquire these waters, including these designated for health-care, have been found in the area of Szczecin and Stargard Szczecinski and in the seashore area in Miedzywodzie and Dziwnówek.

The documentation status of unanimated nature is shown on **Map 5**.

## 2. Description of social and economic characteristics of the area

### 2.1. Demography

The area of the coastal zone is located in twelve communes which belong to five districts: 2 municipal districts (Szczecin, Swinoujscie) and 3 rural districts (Kamien Pomorski, Goleniow, Police). The Management Plan area does not cover exactly the whole area of particular communes, yet bearing on mind the necessity of characterising the economic, demographic and other conditions, the data shown below refer to whole communes.

*Table 1.2.*

Name of the administrative unit	Area in km <sup>2</sup>	Population in 1997	Population density in 1997 per km <sup>2</sup>
Dobra	110	6531	59,4
Dziwnow	38	4447	117,0
Goleniow	443	31553	71,3
Kamien Pomorski	209	15356	73,5
Kolbaskowo	105	5839	55,6
Miedzzydroje	117	6474	57,8
Nowe Warpno	197	1808	8,9
Police	252	41687	165,4
Stepnica	294	4593	15,6
Szczecin	301	418985	1392,0
Swinoujscie	195	43492	223,0
Wolin	327	12913	39,5

Source: *The Western-Pomeranian Voivodeship*, Voivodeship Bureau for Statistics, 1998

### 2.2. Exploitation of arable areas

The majority of the grounds situated along the Szczecinski Lagoon and Lake Dabie are cultivated or used to be cultivated, as it is shown in the table below. Due to the low position in relation to the water level in the adjacent water reservoirs these areas can be exploited only after previous embanking and mechanical drainage.

*Table 1.3.*

Name of the administrative unit	Area (ha)	Arable land area (ha)	Cultivated area (ha)	Grassland area (ha)
Dobra	11000	6442	4174	2200
Dziwnow	3800	590	274	315
Goleniow	44300	15212	7334	7826
Kamien Pomorski	20900	13293	9142	4105
Kolbaskowo	10500	6929	6251	472
Miedzzydroje	11700	288	193	83
Nowe Warpno	19700	1659	502	1147
Police	25200	5451	3120	2246
Stepnica	29400	7396	2182	5192
Szczecin	30100	5895	4222	1480
Swinoujscie	19500	1409	337	1059
Wolin	32700	14435	10431	3911

Source: *The Western-Pomeranian Voivodeship*, Voivodeship Bureau for Statistics, 1998

### 2.3. Economic situation of the communes in the coastal area of the Szczecinski Lagoon

Statistical data analysis according to the numbers as for 1997, regarding:

- the number of economic units registered in particular communes, including trade and transport units,
- the number of the employed and unemployed,
- the individual income of the commune budgets per capita,
- the municipal and housing infrastructure,
- the infrastructure of tourism

indicates that the situation in particular communes is as follows:

**Table 1.4.**

Name of the administrative unit	Area in km <sup>2</sup>	Population	Number of economic units		Number of units in:		Number of employed		Number of unemployed	Tourism		
			public	private	industry and building engineering	services	in agriculture	excluding agriculture		Number of objects	number of lodging places	number of nights spent
Dobra	110	6531	15	869	208	649	234	2241	110	1	5268	178
Dziwnów	38	4447	9	644	63	540	8	965	329	118	15959	893298
Goleniów	443	31553	46	2380	579	1740	1143	7695	938	4	131	13928
Kamień Pomorski	209	15356	32	1112	259	847	380	1021	868	9	1011	24402
Kolbaskowo	105	5839	8	629	124	492	266	1260	128	–	–	–
Międzyzdroje	117	6474	19	1375	144	1201	58	1811	289	115	9510	611428
Nowe Warpno	197	1808	6	118	21	85	70	298	49	2	206	14101
Police	252	41687	52	2794	927	1854	564	10892	1028	8	716	37480
Stepnica	294	4593	7	240	56	132	430	931	230	3	126	2234
Szczecin	301	418985	497	46880	10173	36931	1117	144275	4477	46	5060	497452
Swinoujście	195	43492	52	5164	585	4551	193	12541	497	84	8532	649950
Wolin	327	12913	20	912	152	694	1048	1227	632	29	2742	126007

Source: *The Western-Pomeranian Voivodeship*, Voivodeship Bureau for Statistics, 1998

The coastal zone of the Szczecinski Lagoon is the most dynamically developing area in the voivodeship in every respect. This statement can be confirmed by the following numbers:

characterising the individual income of the communes per capita. The leading communes in this area are Międzyzdroje and Dziwnów with 1000 PLN and more per capita, followed by Swinoujście, Nowe Warpno, Dobra, Kolbaskowo with 600-1000 PLN per capita. The income per capita in Szczecin and Police tends to fall between 400 and 600 PLN,

characterising the population, proving that Szczecin, Police, Swinoujście and Dziwnów are some of the most populated communes in this voivodeship, with over 100 people per km<sup>2</sup>,

- characterising the economic growth, giving the evidence that these communes possess the biggest number of economic and industrial units.

It is worth mentioning that in this area:

three big cities are located: Szczecin, Police and Swinoujście,

the whole of the sea trade, water transport, harbours, sanatoria and industry of the Western-Pomeranian Voivodeship are located,

- the major part of the touristic base of the voivodeship is located.

### 3. Characteristics of the animated nature of the area

The presence of the Szczecinski Lagoon has an influence on the environmental resources existing in this area. The most significant factors are:

unsteadiness of salinity of the waters of the Szczecinski Lagoon and the Pomeranian Bay, which conditions the prospects of existence of communities typical for coastal areas and inland areas, e.g. saltwater communities,

these waters are the habitat of a variety of organisms, including fish which find the coastal area a perfect place for procreation (spawning), wintering and a rest place during the migration,

periodical flooding of some coastal terrains, making the existence of wetlands (particularly attractive as a habitat for birds) possible,

the presence of islands, a very dismembered coastline (ranging from wetlands – periodically flooded – through sandy coasts, dunes to cliff coasts), large complexes of meadows by the Lagoon, peatbogs

and forests (the forests: Wkrzanska, Goleniowska, Bukowa), varied forms of land configuration: ranging from flat and rolling forms to spatial elements, being the remains of the end moraine and elevated to over 130 m above the sea level,

- mild, specific climate

**The preservation and protection of the elements mentioned above is a condition for maintaining the specificity of this unique area (on the scale of the country and of the world). Therefore especially in this area the sustainable development principle must be implemented (together by Poland and Germany).**

The coastal area of the Szczecinski Lagoon is a habitat for plant communities, plants and animals being the object of concern of many conventions and of the Polish Environmental Protection Act.

The areas of particular natural qualities are: the waters of the Pomeranian Bay, the whole Szczecinski Lagoon area together with the Reverse Delta of the Swina River and the waters of the Kamienski Lagoon, the Wolin and Uznam islands, the meadows around the lagoons, the valley of the Swina River, the mouth of the Oder River and the Roztoka Odrzanska, the valley of the rivers Wolczenica and Grzybnica, the valley of the rivers Swiniec and Niemica, the valley of the rivers: Ina, Gowienica, Krepa and Gunica, Lake Dabie with its islands and the meadows surrounding the lake from the eastern side, Miedzyodrze, the forest complexes in the forest areas: Wkrzanska, Goleniowska and Bukowa, Lake Swidwie. The most valuable areas in respect of nature resources are presented on **Map 6**.

### **3.1. The present state of knowledge about the nature of the area of the Lagoon**

Before and after 1945 the Szczecinski Lagoon, the Kamienski Lagoon as well as their surroundings, the Pomeranian Bay, the outlet stretch of the Oder River and Lake Dabie have been the subject of various studies. However, the analysis of these studies shows that most of the publications concerning this area should be regarded as fragmentary. There is a significant scarcity of thorough studies on flora, fauna and the communities of the area.

Practically after 1945 only once an interdisciplinary study on the Szczecinski Lagoon was published (the Institute of Meteorology and Water Management 1980), however, the description of animated nature is not up-to-date and it does not comply with the today's state of knowledge and needs. Therefore preparation of a study being a wide and detailed compendium of knowledge among other things about the nature of the area is an especially important issue. The study should include the results of the pre-war botanical research, among other things carried out by Holzfuss, and the post-war works carried out by the teams of professor Czubiński, Urbański, Celiński, Piotrowska, Lisowska, Szweykowski, Fałtynowicz and other botanists and phytosociologists. The same applies to fauna resources. Practically the best recognised resources are ichtyofauna resources thanks to the many years' research carried out by the workers of MIR, including Wesołowska-Garbacik, Wolnomiejski, Wysockiński. The ornithofauna resources are well-recognised as well. The other phyla of invertebrates and vertebrates need further detailed research.

### **3.2. Forests**

The forests located in the Management Plan area are one of the most important ecosystems from the economic and environmental point of view. Apart from the production function (wood, nursery stock) they supply mushrooms, berries, herbs, game etc. They are a climate-forming, soil-protective, water-protective (water retention) element, they protect against strong winds and increased water levels, they are a habitat for specific species and plant communities. Several thousand plant and animal species have been identified so far in their area, including many protected species and species included in the red lists of threatened and vanishing species and in the Bern Convention. Apart from these functions, the forests due to the varied forest complexes, environmental conditions and land configuration, play an important role as a place of active recreation.

The forests are a property of the Treasury nearly in 100% (Regional Forest Management Board in Szczecin and the Wolinski National Park). Their spatial configuration in particular communities is illustrated by the table below:

**Table 1.5.**

Name of the administrative unit	Area of the commune in ha	Area of forests in ha	Forestation in %
Dobra	11000	2403	21,8
Dziwnow	3800	820	21,6
Goleniow	44300	21312	48,1
Kamien Pomorski	20900	2111	10,1
Kolbaskowo	10500	720	6,9
Miedzzydroje	11700	4780	40,9
Nowe Warpno	19700	7462	37,9
Police	25200	12372	49,1
Stepnica	29400	9455	32,2
Szczecin	30100	4886	16,2
Swinoujscie	19500	4329	22,2
Wolin	32700	7327	22,4

Source: *The Western-Pomeranian Voivodeship*, Voivodeship Bureau for Statistics, 1998

### 3.3. Wetlands as a particular nature value

The existence of wetlands, i.e. periodically, regularly or sporadically flooded areas, determines the specificity of this area. They are a habitat of a specific flora and fauna, most of them being halophytes, and a subject of state and international legal regulations. However, these areas, resulting from many hundred years of human activity including land irrigation, hydrotechnical activities (incl. levees), forming polders, have been disturbed in many parts of the area. One of the most urgent activities for the next few years is protection and reconstruction of water - mud dykes. We will be obliged to carry out these activities among other things because of the requirements arising from the directives existing in EU countries (called the habitat directive and the bird directive).

**According to the experience of many countries, such areas are a Mecca for millions of nature observers and for common people as a place of their weekend rest. Therefore the coastal area of the Szczecinski Lagoon, due to the specificity of its location and the wealth of its natural configurations, can become one of the main touristic attractions of the West Pomerania and of the country.**

### 3.4. Plants and invertebrates as a natural treatment plant of the waters of the Lagoon

The existence of shore-plants, mostly reeds, as well as the existence of a whole range of invertebrates is a factor which conditions the ability of the Lagoon to self-treatment. In consequence the pollution carried by the current of the rivers inflowing into both Lagoons is caught and the major part of it is stabilised in the organisms of plants and animals. At the same time these organisms are the source of nourishment for other, higher species such as fish and birds.

Reassuring it should be stated that attaching importance to the state of the waters in this reservoir is a condition of protection of the nature resources which exist here. Therefore this element as one of a set of elements should be an object of special care in the management plan for the area of the Lagoon.

This is even more important as selected species of vertebrates can be one of the most objective indicators for the assessment of changes taking place on the area included in the management plan.

### 3.5. The region of the Lagoon as an important area from the point of view of ichthyofauna protection

In the waters of the Lagoon existence of at least 72 species of fish has been stated so far. The list includes non-migratory species, estuarial (semi-migratory), migratory and accidental species. Among them there are some species which are economically used and some species which are used in practice to a small extent.

It should be stated that in the waters of the Lagoon particularly favourable conditions exist for fish as a place of their reproduction, feeding, wintering and growing-up. The most important areas for the existence of ichthyofauna are:

The waters of the Pomeranian Bay and of the Szczecinski Lagoon – this area due to the diversity of

habitat conditions (variable depth), oxygen conditions, varying currents and affluence in food is a place of procreation and a habitat of fish of different ages.

The waters of the Swina River and of the channels: Piastowski, Mielinski and Mulnik. The channel is important not only as a spawning-ground and wintering site but above all as an ecological corridor, one of the three corridors connecting the Pomeranian Bay with the estuary of the Oder River.

Lake Wicko Wielkie. Low depth of the lake, numerous bays and shore overflows, diversified and plentiful vascular plants create especially favourable conditions for spawning of many species of fish as well as for the development of their juvenile forms. Due to this fact this lake is not only of a local importance but it also plays an important role in the whole estuarial ecosystem as a procreation base for ichthyofauna. Particular protection of ichthyofauna of the lake should concern the shore area overgrown with shore-plants where the most intensive process of procreation takes place.

The Old Swina River. The river possesses a diversified sculpture of the river bed and the current is slowed down. Thanks to this fact the area is a habitat for a number of valuable species of fish. These waters are an important link between more salty sea waters and less salty waters of the Lagoon, where the fish are able to accommodate to the changing salinity during their migration. Moreover, thanks to numerous hollows in the river bed, these waters are a wintering site for a number of species.

Arms and branches of the Old Swina River. They perform a function of a link between the waters of the Old Swina River, the lakes Wicko Wielkie and Wicko Male and the Lagoon. These water-courses are periodically populated by most estuarial species, including sea fish, shifting fry of pike-perch, bream and other fish. Economically, the area does not have any particular value but the species moving to lakes for spawning and after spawning moving on to feeding grounds should be taken under protection. In the last years a protection area of pike has been established on all water-courses flowing north from the Old Swina River and it is still in force.

The waters of the Kamienski Lagoon. The sculpture of the bottom is diversified, in virtue of this fact the area is a habitat for a number of valuable species of fish. These waters are an important link between more salty sea waters and less salty waters of the Szczecinski Lagoon, where the fish can gradually accommodate to the changing salinity during their migration and shifting. Moreover, these waters are a wintering area for a number of species.

The waters of the Dziwna River. The importance of the reservoir, apart from the function of a spawning ground and wintering site, concerns above all its function of an ecological corridor, one of the three corridors linking the Pomeranian Bay with the estuary of the Oder River.

- The waters of Lake Dabie. They perform a function of a spawning ground, feeding ground and wintering site and they are a place of periodical existence of some species during their migration.

**Bearing on mind the facts mentioned above, it should be stated that carrying out rational fishery in this reservoir is a condition for protection of nature resources existing here. Therefore this element as one of a set of elements should be an object of particular care in integrated management of the area of the Lagoon. Any negligence in the field of the state of waters or overexploitation of the reservoir by fishery will have a particularly negative influence on the reserves of living species, not only fish, existing here.**

This is even more important due to the fact that ichthyofauna might be one of the indicators for assessment of changes taking place in the area included in the management plan.

### **3.6. Bird refuges as special units in the structure of valuable areas.**

The many years' ornithological observations that have been carried out so far allowed of indicating a list of areas particularly important for breeding, inhabiting, migratory and wintering birds. They have been included among other things in a number of Polish and foreign studies. They are e.g.: the Pomeranian Bay, the outlet of the Swina River, the Reverse Delta of the Swina River, the Szczecinski Lagoon, the Row Peninsula, the Kamienski Lagoon, meadows on the coast of the Lagoon in the Dziwnow commune between Kolczewo and Dziwnow, the marshlands in the valley of the rivers Niemica and Swiniec, the Rozwarowo Marshlands, Skoszewskie Meadows, meadows in the area of Stepnica, the Stepnicki Forest, Lake Dabie, meadows around Lake Dabie, Miedzyodrze, meadows in the area of Police, the Wkrzanska Forest, the lakes Swidwie and Karpino, the areas on the coast of the Lagoon

between Nowe Warpno and Trzebiez. Their detailed location is presented on **Map 7**.

**The area of the Szczecinski Lagoon is one of the most important bird refuges in Poland and one of the most important areas for water and mud birds and for the golden eagle in the period of migration and wintering. The quantities of some ducks and mersangers indicate that this reservoir in the autumnal and winter season performs a key function in the strategy of survival of these species as a place of feeding and rest.**

Reassuring the facts stated above – the bird refuges should be an object of particular care in the management plan of the area of the Lagoon. This is even more important as birds can be one of the indicators for assessment of changes taking place in the area included in the management plan.

## 1. State legal regulations concerning protection of nature resources of the area of the Szczecinski Lagoon

The basic document regulating the issues of nature protection in the area of the whole country is the Constitution of the Republic of Poland, articles no 5, 74 and 86 in particular. The sources of the law in the area of the organs which have introduced it are local legal acts.

The Act on environmental protection of October 19, 1991 (Government Regulation and Laws Gazette no 114, item no 492 with further changes) indicates a few methods of nature resources protection – among other things through establishing particular forms of protection, creating international areas, the procedure of spatial planning, ecological education etc. The most common method applied so far is creating nature reserves and monuments or taking selected species of flora and fauna under protection.

Also the nature resources of this area are protected basing on other legal acts, such as the Act on protection and development of the environment of 1980, the Act on inland fishery of 1985, the Act on sea areas and maritime administration of the Republic of Poland of 1991, the Act on forests of 1991, the Act on protection of arable areas and forests of 1995, the Hunting Law act of 1995, the Act on sea fishery of 1996 and the Act on protection of animals of 1997.

### 1.1. Protected areas in the region of the Szczecinski Lagoon

In the area of the Szczecinski Lagoon nearly all forms of nature protection allowed by the Act on nature protection of 1991 have been established (**Table 2.1., Map 8**).

**Table 2.1.**

<b>National park</b>	
<b>The Wolinski National Park</b>	<p><b>Location:</b> the park covers valuable areas in Świnoujście, the Miedzyzdroje commune, Wolin and Dziwnów, on the Wolin Island, the Pomeranian Bay, the Szczecinski Lagoon and the Reverse Delta of the Swina River. Its area is 10 937 ha. Six strict reserves are located in the park. They are:</p> <ul style="list-style-type: none"> <li>the Stefan Jarosz Reserve located east from Wiselka in the vicinity of the “Kikut” lighthouse with an area of 9.68 ha – for protection of a cluster of pure stand beech trees in pine stand,</li> <li>the Professor Marian Raciborski Reserve located north west from Wiselka covering the area of 11.74 ha – for protection of localities of woodbine and twinflower,</li> <li>the Professor Zygmunt Czubiński Reserve east from the Gosan Mountain with an area of 37.52 ha stretching from the cliff on Swidna Kepa nearly to Lake Grodno – for protection of localities of Pomeranian beech and orchids,</li> <li>the Dr. Bohdan Dyakowski Reserve located in the vicinity of Trzciagowo covering the area of 40.92 ha – for protection of a locality of beech with monochlamydeous melic grass,</li> <li>The Professor Wladyslaw Szafer Reserve located in the foot of the Lelowa Mountain east from Wapnica on the area of 41.19 ha – for protection of a locality of beech with bulbous toothwort,</li> <li>The Professor Adam Wodziczko Reserve covering a narrow stretch of the cliff over the Szczecinski Lagoon from Lubin to Karnocice of an area of 24.19 ha – for protection of the cliff with localities of xerothermic plants.</li> </ul> <p><b>Goal of protection:</b> it was established with a decree of the Cabinet in 1960 for preservation of a great wealth of land and water (both fresh and saltwater) habitats. The flora of vascular plants of the Park counts more than 1300 species and fauna – a few thousand or more than ten thousand species of animals. Some of these animals have one of few Polish localities here.</p>

<b>Nature reserves</b>	
<b>„Karsiborskie Paprocie”</b>	<b>Location:</b> located on the Uznam Island within the Swinoujscie town, in the area of the Miedzzydroje Forest Inspectorate. The area of the reserve is 37.8 ha. <b>Goal of protection:</b> a flora reserve, established in 1989 for preservation of the biggest locality of fern – royal fern and woodbine and a locality of the golden eagle.
<b>„Luniewo”</b>	<b>Location:</b> located on the Wolin Island in the Wolin commune, in the vicinity of the borders of the Wolinski National Park near Luniewo. It is located in the area of the Miedzzydroje Forest Inspectorate. Its area is 10.54 ha. It covers a lake, transitional and high peatbog and a fragment of the Miedzzydroje Forests. <b>Goal of protection:</b> A fauna reserve, created in 1973 for protection of the peatbog, where protected species of plants and animals can be found, as well as rare species related with water and mud habitats.
<b>„Cisy Rokickie”</b>	<b>Location:</b> the Przybiernow commune. It is located in the area of the Rokita Forest Inspectorate. It covers a fragment of the Goleniowska Forest in the Rokita Inspectorate. <b>Goal of protection:</b> a forest reserve established in 1987 for preservation of the biggest population of yew-tree in Poland.
<b>„Czarnocin”</b>	<b>Location:</b> the Stepnica commune, north-east from Czarnocin, the area of the Goleniow Forest Inspectorate. <b>Goal of protection:</b> a flora reserve established in 1974 for preservation of a low and transitional peatbog of the Atlantic type with valuable species of plants and animals.
<b>„Białodrzew Kopicki”</b>	<b>Location:</b> the Stepnica commune, on the coast of the Szczecinski Lagoon, near Kopice. Area: 10.5 ha. <b>Goal of protection:</b> a flora reserve established in 1985 for preservation of a fragment of a natural poplar and willow marshy meadow, rare water plants (rushes and thicket) and grand individuals of white poplar.
<b>„Wilcze Uroczysko”</b>	<b>Location:</b> the Stepnica and Goleniow communes, the area of the Goleniow Forest Inspectorate, area: 62.83 ha. <b>Goal of protection:</b> a peatbog reserve established in 1985 for protection of a mosaic of alder swamp and alder and ash-tree swampy meadows with localities of rare species of plants and animals.
<b>„Olszanka”</b>	<b>Location:</b> the Stepnica and Goleniow communes, around the existing reserve “Wilcze Uroczysko”, area: 1290.51 ha. <b>Goal of protection:</b> a fauna reserve created in 1998 for protection of a mosaic of plant communities with rare and protected species of plants and procreation sites of rare species of animals.
<b>„Uroczysko Święta”</b>	<b>Location:</b> the Goleniow commune, the Goleniow Forest Inspectorate, in the area of the Goleniowska Forest, area: 9.5 ha. <b>Goal of protection:</b> a flora reserve established in 1973 for preservation of a fragment of the forest with numerous localities of protected plants, including localities typical for Atlantic communities.
<b>„Zdroje”</b>	<b>Location:</b> Szczecin, in the Bukowa Forest, area: 2.12 ha. <b>Goal of protection:</b> a landscape reserve established in 1959 for protection of a site where naturally restoring yew-tree can be found.
<b>„Bukowe Zdroje”</b>	<b>Location:</b> Szczecin, the Stare Czarnowo commune, in the Bukowa Forest, area: 207.90 ha. <b>Goal of protection:</b> a forest reserve established in 1956 for protection of landscape values of the location and a fragment of Pomeranian beech and ash-tree marshy meadow.
<b>„Kurowskie Błota”</b>	<b>Location:</b> the Kolbaskowo commune, in Miedzzydrze, area: 30.63 ha. <b>Goal of protection:</b> a fauna reserve established in 1965 for protection of a colony of egret and cormorant (although the cormorant has not nested here for tens of years).
<b>„Kanal Kwiatowy”</b>	<b>Location:</b> the Kolbaskowo commune, in Miedzzydrze. Area: 3.0 ha. <b>Goal of protection:</b> a flora reserve established in 1965 for protection of localities of rare species of mud and water plants.
<b>„Wzgórze Widokowe nad Międzyodrzem”</b>	<b>Location:</b> the Kolbaskowo commune, in the area of the bank of the Oder River, area: 4.19 ha. <b>Goal of protection:</b> a landscape reserve established in 1973 for protection of a fragment of the slope of the Valley of the Oder River, of particular geomorphologic values, with rare species of xerophylous plants.
<b>“Świdwie”</b>	<b>Location:</b> the Police and Dobra communes, area: 891,28 ha. <b>Goal of protection:</b> a fauna reserve established in 1963 for protection of a natural bird habitat.

<b>Landscape parks</b>	
<b>„Dolina Dolnej Odry” Landscape Park</b>	<b>Location:</b> the area of Miedziodrze, the Kolbaskowo, Gryfino and Widuchowa communes, area: 6.000 ha. <b>Goal of protection:</b> established in 1993 for protection of a fragment of the Valley of the Oder River.
<b>The Szczecin Landscape Park „Puszcza Bukowa”</b>	<b>Location:</b> Szczecin, the Stare Czarnowo commune. <b>Goal of protection:</b> created in 1981 for protection of the Bukowa Forest complex.

<b>Ecological grounds</b>	
<b>„Półwysep Rów”</b>	<b>Location:</b> the Wolin commune, on the Wolin Island, area: 80.59 ha. <b>Goal of protection:</b> established in 1998 with a decree of the Szczecin Voivode for protection of a natural foreland cutting into the Szczecinski Lagoon, where valuable species of plants can be found, including orchids, halophylous plants and where birds nest and rest.
<b>„Dzicze Uroczysko”</b>	<b>Location:</b> the Wolin commune, the Wolin Island, the Miedziodroje Forest Inspectorate, area: 3.5 ha. <b>Goal of protection:</b> created in 1998 with a decree of the Voivode for protection of natural peatbog ecosystems.
<b>„Rosiczka”</b>	<b>Location:</b> the Wolin commune, the area of the Wolin Island, the Miedziodroje Forest Inspectorate, area: 1.7 ha. <b>Goal of protection:</b> established in 1998 with a decree of the Szczecin Voivode for protection of a high peatbog with sundew.
<b>„Szmanc”</b>	<b>Location:</b> the Wolin commune, the Wolin Island, the area of the Miedziodroje Forest Inspectorate, area: 0.51 ha. <b>Goal of protection:</b> created in 1998 with a decree of the Szczecin Voivode for protection of transitional peatbog with sundew.
<b>„Mokrzyckie Torfowisko”</b>	<b>Location:</b> the Wolin commune, the area of the Wolin Island, the Miedziodroje Forest Inspectorate, area: 247.89 ha. <b>Goal of protection:</b> created in 1999 with a decree of the West-Pomeranian Voivode for protection of the peatbog with European wax-myrtle.
<b>„Jelenie Błota”</b>	<b>Location:</b> the Wolin commune, the area of the Wolin Island, the Miedziodroje Forest Inspectorate, area: 14.12 ha. <b>Goal of protection:</b> created in 1999 with a decree of the West-Pomeranian Voivode for protection of the peatbog being a place of existence of rare and protected species of plants and animals.
<b>„Martwa Dziwna”</b>	<b>Location:</b> the Dziwnow commune, the area of the Wolin Island, area: 95.68 ha. <b>Goal of protection:</b> created in 1995 with a resolution of the Commune Council in Dziwnow for protection of the remnants of the old river bed of the Dziwna River, where rare and protected species can be found.
<b>„Stawek na Gumieńcach”</b>	<b>Location:</b> Szczecin, area: 1.7 ha. <b>Goal of protection:</b> created in 1994 with a resolution of the Town Council. An object of a local importance. More than ten species of vertebrates have been found here which are taken under protection, most of them being common vertebrates.
<b>„Stawek przy ul. Śródleśnej”</b>	<b>Location:</b> Szczecin, area: 2.7 ha. <b>Goal of protection:</b> created in 1994 with a resolution of the Town Council. An object of a local importance. More than ten species of vertebrates have been found here which are taken under protection, most of them being common vertebrates.
<b>„Dolina strumienia Żabieniec”</b>	<b>Location:</b> Szczecin, area: 5.75 ha. <b>Goal of protection:</b> created in 1994 with a resolution of the Town Council for protection of the Valley of the Zabiniec Stream. An object of local values.
<b>„Dolina strumieni: Skolwinki, Stołczynki i Żółwinki”</b>	<b>Location:</b> Szczecin, area: 57.6 ha. <b>Goal of protection:</b> created in 1994 with a resolution of the Town Council. An object of a local importance. Tens of species of vertebrates have been found here which are taken under protection, most of them being common vertebrates.
<b>„Dolina strumienia Grzęziniec”</b>	<b>Location:</b> Szczecin, area: 56.4 ha. <b>Goal of protection:</b> created in 1994 with a resolution of the Town Council. An object of a local importance. Tens of species of vertebrates have been found here which are taken under protection, most of them being common vertebrates.

<b>„Klucky Ostrów”</b>	<b>Location:</b> Szczecin, area: 49.7 ha. <b>Goal of protection:</b> created in 1994 with a resolution of the Town Council. It is an object of a local importance but due to its location in the valley of the Regalica River it performs together with the surrounding areas a function of a very important ecological corridor. Tens of species of vertebrates have been found here which are taken under protection, most of them being common vertebrates.
<b>„Półwysep Podgrodzie”</b>	<b>Location:</b> the Nowe Warpno commune, the foreland on the northern end of the Nowowarpieski Peninsula together with adjacent waters, area: 26.08 ha. <b>Goal of protection:</b> created in 1998 with a decree of the Szczecin Voivode, for protection of remnants of natural lagoon ecosystems, being a place of existence of many rare and protected species of plants and animals.
<b>„Lysa Wyspa”</b>	<b>Location:</b> the Nowe Warpno commune, an island on the Szczecinski Lagoon, area: 8.09 ha. <b>Goal of protection:</b> created in 1998 with a decree of the Szczecin Voivode, for protection of remnants of natural lagoon ecosystems, being a place of existence of many rare and protected species of plants and animals.

<b>Nature and landscape complexes</b>	
<b>„Wiejkowski Las”</b>	<b>Location:</b> the Wolin commune, a fragment of the Goleniowska Forest in the Rokita Forest Inspectorate, area: 301.94 ha. <b>Goal of protection:</b> created in 1996 with a decree of the Szczecin Voivode for protection of the existing biodiversity.
<b>„Dolina Siedmiu Młynów i źródła strumienia Osówka”</b>	<b>Location:</b> Szczecin, area: 82.0 ha. <b>Goal of protection:</b> created in 1994 with a resolution of the Town Council. It is an object of a local importance and also an important ecological corridor. Tens of species of vertebrates under protection have been found here.
<b>„Wodozbiór”</b>	<b>Location:</b> Szczecin, area: 65.1 ha. <b>Goal of protection:</b> created in 1994 with a resolution of the Town Council. It is an object of a local importance. It is the beginning of an important ecological corridor which is the Grzeziniec stream. Tens of species of vertebrates under protection have been found here.
<b>„Zespół Parków Kasprowicza-Arkoński”</b>	<b>Location:</b> Szczecin, area: 57.8 ha. <b>Goal of protection:</b> created in 1994 with a resolution of the Town Council. It is an object of a local importance. Tens of species of vertebrates under protection have been found here.
<b>Nature monuments</b>	Tens of monuments located on the Uznam and Wolin Islands, in the communes in the area of the Szczecinski Lagoon, for protection of trees, tree complexes, erratic blocks, etc.
<b>Species protection, including procreation and residence sites of the animals of protected species</b>	Tens of thousands of sites on the Uznam and Wolin Islands and in the communes in the area of the Lagoon.

## 1.2. Areas worth protection around the Szczecinski Lagoon

After 1945 a number of scientists indicated the necessity of protection of a number of sites where valuable populations of plants and animals existed. Some of these plans succeeded, some remained only a project.

The nature assessment of the communes and the developed plan of protection of the Wolinski National Park have verified many previous conclusions regarding:

the need of establishing of a network of new forms of nature protection necessary for protection of nature resources,

the need of special protection of the valuable areas performing an important role in maintaining the nature values of the area of the Lagoon.

## 1.3. Planned protected areas

The results of the nature assessment of the communes indicate that a number of terrains in the coastal area of the Szczecinski Lagoon are in need of protection. The list of these areas together with a short description is presented by the table below and on **Map 8**.

Table 2.2.

Planned nature reserves	
„Rytka”	<p><b>Fauna and flora nature reserve.</b>  <b>Location:</b> the Nowe Warpno commune, the southern coast of Lake Nowowarpieskie, the outlet of the Mysliborka River.  <b>Goal of protection:</b> preservation of rushes and forest communities being a place of existence of endangered species of water birds.</p>
„Wielki Karcz”	<p><b>Peatbog nature reserve.</b>  <b>Location:</b> the Nowe Warpno commune, the Wielki Karcz peatbog in the Wkrzanska Forest, 3 km south-west from Brzozki.  <b>Goal of protection:</b> preservation of peatbog communities with a valuable relict flora of the phylum Bryophyta and endangered species of animals.</p>
„Jezioro Mysliborskie Wielkie”	<p><b>Fauna nature reserve.</b>  <b>Location:</b> the Nowe Warpno Commune, Lake Mysliborskie Wielkie.  <b>Goal of protection:</b> preservation of water communities, rushes and forest communities as well as endangered species of water birds.</p>
„Jezioro Piaski”	<p><b>Peatbog nature reserve.</b>  <b>Location:</b> the Nowe Warpno Commune, Lake Piaski in the Wkrzanska Forest together with the adjacent peatbog.  <b>Goal of protection:</b> preservation of water, peatbog and forest complexes together with valuable flora and habitats of endangered species of animals.</p>
„Krzewina”	<p><b>Landscape nature reserve.</b>  <b>Location:</b> the Stepnica commune, south from Kopice.  <b>Goal of protection:</b> a complex of grey dunes, stretching along the Szczecinski Lagoon, with specific plant communities.</p>
„Karsiborska Kępa”	<p><b>Flora and fauna nature reserve.</b>  <b>Location:</b> Swinoujscie, the Karsiborska Kępa Island.  <b>Goal of protection:</b> protection of one of the islands located in the Reverse Delta of the Swina River, being a very valuable nature object as a bird refuge and a site of halophylous flora.</p>
„Bagno Rozwarowo”	<p><b>Flora and fauna nature reserve.</b>  <b>Location:</b> the Wolin commune, the Kamien Pomorski commune, the outlet stretch of the rivers Grzybnica and Wolczenica, having their outlet in the Cicha Bay (in the Kamienski Lagoon).  <b>Goal of protection:</b> the naturally valuable area is located in a river valley where many rare and vanishing phytocenosis and species of plants and animals can be found.</p>
„Bobry nad Iną”	<p><b>Flora and fauna nature reserve.</b>  <b>Location:</b> the Goleniow commune, a fragment of the outlet of the Ina River, between Ina and Inski Row.  <b>Goal of protection:</b> a low forest peatbog with specific plants and localities of valuable species of animals, including beavers.</p>
„Żółwia Błoc”	<p><b>Flora nature reserve.</b>  <b>Location:</b> the Goleniow commune, south-west from Niewiadow.  <b>Goal of protection:</b> a forest heath peat with localities of valuable plants.</p>
„Łąka koło Gniazdowa”	<p><b>Flora and fauna nature reserve.</b>  <b>Location:</b> the Goleniow commune, the meadows along the road from Wierzchoslaw to Miekowo.  <b>Goal of protection:</b> protection of procreation sites of many species of birds and amphibians.</p>

Planned landscape parks	
„Puszcza Wkrzańska”	<p><b>Location:</b> the Nowe Warpno commune, the Police commune, the area of the Wkrzanska Forest and the surroundings of the Szczecinski Lagoon together with Lake Nowowarpieskie.  <b>Goal of protection:</b> protection and management of the resources of the area and promotion of the area.</p>
„Wolińsko-Uznamski Park Krajobrazowy”	<p><b>Location:</b> Swinoujscie, the Wolin commune, the Dziwnow commune, the Miedzyzdroje commune, the Kamien Pomorski commune. Concerns also the area of the Wolin Island, the Uznam Island, the Reverse Delta of the Swina River, the Dziwna River, Lake Wrzosowskie and the Kamienski Lagoon with the Chrzaszczewska Island.  <b>Object of protection:</b> a valuable area from the point of view of nature, landscape and culture. A place of existence of many valuable species of plants and animals and also many interesting geologic and landscape forms can be found here.</p>

Planned areas of protected landscape	
„Chroniony Pas Nadmorski”	<p><b>Location:</b> the Dziwnow, Kamien Pomorski and Wolin communes, the areas around the Kamienski Lagoon.</p> <p><b>Goal of protection:</b> protection of areas which are valuable from the point of view of nature, landscape and culture.</p>
„Brzeg Zalewu Szczecińskiego i doliny Odry”	<p><b>Location:</b> the Stepnica and Goleniow communes, a wide area along the eastern coast of the Szczeciński Lagoon north from Stepnica and a stripe of meadows, marshlands and forests over Lake Dabie and the Oder River, from the Sadlinskie Marshy Meadows in the area of Szczecin-Dabie to Stepnickie Meadows near Stepnica.</p> <p><b>Goal of protection:</b> protection of a unique ecosystem of the littoral and alluvial terrace of the Szczeciński Lagoon and the outlet of the Oder River with valuable wetland habitats, an ecological corridor of a regional importance (especially for ichtyofauna and avifauna) and a particularly picturesque fragment of landscape.</p>
„Dolina Gowienicy i Świdnianki”	<p><b>Location:</b> the Stepnica commune, the Valley of the Gowienica River in its whole unregulated stretch within the borders of the commune and its tributary Świdnianka from the road from Stepnica to Przybiernow to its outlet.</p> <p><b>Goal of protection:</b> protection of natural, particularly picturesque river valleys.</p>
„Stepnickie Łąki”	<p><b>Location:</b> the Stepnica and Goleniow communes, a wide area south from Stepnica along the coast of the Szczeciński Lagoon, surrounding and enclosing the planned reserves “Olszanka” and “Wilcze Uroczysko”, continued in the Goleniow commune.</p> <p><b>Goal of protection:</b> protection of a unique ecosystem of the littoral and alluvial zone of the terrace of the Szczeciński Lagoon with valuable wetland habitats, an ecological corridor of an supraregional importance for birds with complexes of wet-ground forests.</p>
„Nadmorski Pas Chronionego Krajobrazu”	<p><b>Location:</b> The Kamien Pomorski and Dziwnow communes, the areas located east from the Dziwna River along the Baltic Sea.</p> <p><b>Goal of protection:</b> a valuable area from the point of view of landscape and nature. The area is a place of existence of many valuable species of plants and animals and also where interesting landscape and geologic forms can be found.</p>

Planned ecological grounds	
„Świnoujskie Wydmy”	<p><b>Location:</b> Swinoujście, a stretch of white and grey dunes on the left bank of the Swina River.</p> <p><b>Goal of protection:</b> preservation of a large complex of white dunes with small fragments of grey dunes located on the shore of the Baltic Sea, being a place of existence of plants and a wintering and procreation site for animals.</p>
„Wydmy na Warszawie” and ”Przytorskie Wydmy”	<p><b>Location:</b> Swinoujście on the right bank of the Swina River between the Miedzzydrojski Forest complex and the sea shore and the central part of the Przytor Peninsula, in the eastern part adjacent to the border of the Miedzzydroje commune and in the western part to military areas.</p> <p><b>Goal of protection:</b> protection of the strand with a stripe of adjacent dunes which are part of the best-preserved fragments of the dune coast in Poland, together with the valuable plants covering yellow, white and brown dunes, being a place of existence of plants and a wintering and procreation site for animals.</p>
„Wyspy Bielawki z Półwyspem Mielinek”	<p><b>Location:</b> Swinoujście: the Swina River and the Old Swina River.</p> <p><b>Goal of protection:</b> protection of the 5 islands located in the Reverse Delta of the Swina River, being a place of existence of many valuable species of halophylous plants and a wintering and procreation site for animals.</p>
„Zajęcze Łęgi”	<p><b>Location:</b> Swinoujście, the Miedzzydroje commune, the Reverse Delta of the Swina River.</p> <p><b>Goal of protection:</b> preservation of a large meadow complex impregnated with soil reedy areas surrounding these meadows, located in the Reverse Delta of the Swina River, being a site of procreation for many valuable species of animals.</p>
„Dziwnowskie piaski”	<p><b>Location:</b> the Dziwnow commune, small fragments of the beach on all its length on the left and right side of the outlet of the Dziwna River.</p> <p><b>Goal of protection:</b> protection of fragments of sea strand where specific halophylous plants can be found.</p>
„Mikołajkowa wydma”	<p><b>Location:</b> the Dziwnow commune, dunes in Miedzzywodzie, Dziwnow and Dziwnówek.</p> <p><b>Goal of protection:</b> protection and restoration of one of the biggest localities of sea-holly in Poland and also protection of a number of other species of halophylous plants, being a place of existence of specific species of animals.</p>

„Dziwnowskie klify”	<b>Location:</b> the Dziwnow commune, fragments of the cliff between Dziwnówek and the border of the commune. <b>Goal of protection:</b> protection of nature biodiversity on the cliff shore of the Dziwnow commune.
„Dziwnowskie grążele”	<b>Location:</b> the Dziwnow commune, fragment of the Kamiński Lagoon and part of the reservoir delimited by the borders of the Dziwnow and Wolin communes and from the southern side – by the border of the Dziwnow and Kamień Pomorski communes. <b>Goal of protection:</b> protection of a fragment of the Kamiński Lagoon being a place of existence of communities of water plants and rushes and a procreation and residence site of animals of protected species.
„Półwysep Rów”	<b>Location:</b> the Wolin commune, a fragment of the Row Peninsula which has not been taken under protection yet. <b>Goal of protection:</b> protection of the area over the lagoon, including a low peatbog with rare and protected plant species, where protected animal species can be found.
„Jezioro Zatorek”	<b>Location:</b> the Wolin commune, Lake Zatorek which is located south from the road from Kolczewo to Wiselka. <b>Goal of protection:</b> preservation in the most natural form of a lake in a subglacial gully with high, afforested slopes with numerous protected species.
„Tereny podmokłe koło Korzęcina”	<b>Location:</b> the Wolin commune, the areas east from Korzęcin. <b>Goal of protection:</b> protection of forest swamps and ponds close to natural ecosystem, creating perfect conditions for the existence of vertebrates.
„Dolina Szczuczyny”	<b>Location:</b> the Wolin commune, the valley of the Szczuczyna River. <b>Goal of protection:</b> protection of the valley being a valuable fauna habitat area. It is also an ecological corridor.
„Łęg z pióropusznikiem strusim nad jez. Piaski”	<b>Location:</b> the Wolin commune, the eastern coast of Lake Piaski. <b>Goal of protection:</b> protection of a valuable complex of marshy forest with numerous localities of protected plants.
„Murawa kserotermiczna koło Parłówek”	<b>Location:</b> the Wolin commune, the sward is located south from the road Parłowko-Troszyn. <b>Goal of protection:</b> protection of natural xerothermic swards.
„Szuwar nad Zatoką Skoszewską”	<b>Location:</b> the Wolin commune, the peatbog forming a narrow stretch along the Skoszeńska Bay, south from Zagorze to the commune border. <b>Goal of protection:</b> protection of natural rushes, being a refuge for animals and plants.
„Bagno za Gorzelcem”	<b>Location:</b> the Wolin and Kamień Pomorski communes, marshlands between the resorts: Kukulowo-Kolonia and Rozwarowo-Sibin. <b>Goal of protection:</b> protection of wetlands in the valley of the Szczuczyna River being a natural residence site for protected and vanishing animal species.
„Skoszewskie Łąki”	<b>Location:</b> the Stepnica commune, a wide area from the Skoszeńska Bay south along the coast of the Szczeciński Lagoon together with the coastal zone, reaching deep inland. <b>Goal of protection:</b> protection of a complex of wet meadows and of an open fragment of the waters of the Szczeciński Lagoon with an adjacent peatbog, being a place of existence of rare and protected species of plants and animals.
„Dolgie”	<b>Location:</b> the Stepnica commune, areas in the vicinity of the Machowica resort. <b>Goal of protection:</b> protection of a forest lake which is becoming grown over with consecutive stages of plant succession and a complex of forest and peatbog sites of animal feeding and procreation.
„Jezioro koło Krokorzyc”	<b>Location:</b> the Stepnica commune, the Goleniów Forest Inspectorate, branches 84 a, c, d, f, h, j, north from Krokorzyc. <b>Goal of protection:</b> protection of a forest lake which is becoming grown over with rare plants specific for high peatbogs in further stages of succession.
„Śródleśne bagno koło Krokorzyc”	<b>Location:</b> the Stepnica commune, the Goleniów Forest Inspectorate, The Forest District Krokorzyc, branch 179 b. <b>Goal of protection:</b> protection of a high forest peatbog with rare and protected species of plants, being a place of existence of protected species of animals.
no name	<b>Location:</b> the Goleniów commune, a forest pond west from Niewiadów. <b>Goal of protection:</b> protection of a valuable water ecosystem with numerous protected species of plants and animals.
no name	<b>Location:</b> the Goleniów commune, north from Goleniów. <b>Goal of protection:</b> protection of a valuable ecosystem with numerous protected species of plants and animals.
no name	<b>Location:</b> the Goleniów commune, along the road from Zabrodzie to Goleniów, Goleniów Forest Inspectorate, forest department no 79. <b>Goal of protection:</b> protection of a valuable ecosystem of a forest marshland with many protected species of plants and animals.

„Noclegowisko Kormoranów”	<b>Location:</b> the Goleniow commune, wet peatbogs located south from the road from Swieta to Boleslawice. <b>Goal of protection:</b> a valuable flora and fauna locality, a place of residence and procreation for animals.
„Ujście Krepy”	<b>Location:</b> the Goleniow commune, outlet of the Krepa River. <b>Goal of protection:</b> a valuable biocenosis locality. Numerous localities of protected plants and animals.
no name	<b>Location:</b> the Goleniow commune, on the eastern border of the commune, near Danowo. <b>Goal of protection:</b> protection of a valuable biocenosis – wet meadows.
„Łąka storczykowa nad Iną”	<b>Location:</b> the Goleniow commune, the Valley of the Ina River along the border of the forest, on the both sides of the road from Stawno, crossing the valley. <b>Goal of protection:</b> protection of a valuable flora locality with protected animal and plant species.
no name	<b>Location:</b> the Goleniow commune, a pond near Borzyslawiec, among the meadows on Lake Dabie. <b>Goal of protection:</b> protection of a valuable biocenosis with protected animal and plant species.
no name	<b>Location:</b> the Goleniow commune, a forest swamp in the vicinity of Krepsk. <b>Goal of protection:</b> protection of a valuable flora locality with protected animal and plant species.
„Podgrodzkie Łąki”	<b>Location:</b> the Nowe Warpno commune, east from Lake Nowowarpienskie, between Podgrodzie and Nowe Warpno. <b>Goal of protection:</b> protection of areas of an important biocenosis and fauna, being a mosaic of sedge phytocenosis, halophylous communities being a procreation or residence site for many rare animal species.
„Dolinka Myśluborki”	<b>Location:</b> the Nowe Warpno commune, the valley of the Myśluborka River. <b>Goal of protection:</b> protection of the valuable landscape of the river valley being a place of existence of marsh, meadow and forest communities and also localities of endangered species of plants and animals.
„Mszczuje”	<b>Location:</b> the Nowe Warpno commune, a forest meadow north from the Wielki Karcz peatbog near Mszczuje. <b>Goal of protection:</b> protection of a meadow and forest complex located in the Wkrzanska Forest, being a locality of endangered species of animals.
„Nowowarpienskie Wody”	<b>Location:</b> the northern part of Lake Nowowarpienskie. <b>Goal of protection:</b> protection of a fragment of the water ecosystem as a procreation or residence site for a number of animal species.
„Karcznińskie Płoso”	<b>Location:</b> the Nowe Warpno commune, the southern part of Lake Nowowarpienskie. <b>Goal of protection:</b> protection of a fragment of the water ecosystem as a procreation or residence site for a number of animal species.
„Miroszewskie Estuarium”	<b>Location:</b> the Nowe Warpno commune, a fragment of the Szczeciński Lagoon along the shore from Miroszewo to Warnoleka. <b>Goal of protection:</b> protection of a fragment of the water ecosystem of the Szczeciński Lagoon which is a place of existence of a number of fauna species and performs a function of a procreation, migration and wintering site.

<b>Planned nature and landscape complexes</b>	
„Świdny Las”	<b>Location:</b> near the Polish and German state border in the western part of Swinoujście. <b>Goal of protection:</b> protection of biodiversity of the forest complex, remnants of a high peatbog located in the area of the Miedzzydroje Forest Inspectorate in the process of rational management.
„Koprzywskie Łęgi”	<b>Location:</b> the Dziwnow commune, meadows located between the northern shore of Lake Koprowo and the road Kolczewo-Miedzzywodzie-Zastan. <b>Goal of protection:</b> preservation of the semi-natural environment of the meadows based on the soil impregnated with salt.
„Dziwnowskie słonawy”	<b>Location:</b> the Dziwnow commune, meadows south from Dziwnow eastwards to the shore of Lake Wrzosowskie, southwards to the Kamiński Lagoon and westwards to the road from Miedzzywodzie to Zastan. <b>Goal of protection:</b> preservation of the semi-natural environment of the meadows based on the soil impregnated with salt.
„Dziwnowskie łęgi”	<b>Location:</b> the Dziwnow commune, fragments of marshy meadows south from the road Kolczewo-Miedzzywodzie-Dziwnow. <b>Goal of protection:</b> protection of marshy meadows being a place of existence of valuable plant and animal species.

„Góry Mokrzyckie”	<b>Location:</b> the Wolin commune, elevations in the neighbourhood of Mokrzyca. <b>Goal of protection:</b> preservation of the semi-natural environment of high nature and landscape values.
„Klif nad Zalewem Szczecińskim”	<b>Location:</b> the Wolin commune, the coast of the Szczeciński Lagoon from Karnocice to Plocino and the elevated plain on its base. <b>Goal of protection:</b> preservation of the natural cliff of unique nature and landscape values.
„Park leśny w Wolinie”	<b>Location:</b> the Wolin commune, protection of an esker dike formed over the Dziwna River, south from the town, near the base of the Row Peninsula, together with the archaeological reserve “Wzgorze Wisielców” located here and with the coastal zone of the Dziwna River at the bottom of the Gologora Mountain. <b>Goal of protection:</b> preservation of the area of particular nature and landscape values.
„Gąsienickie Mokradła”	<b>Location:</b> the Nowe Warpno commune, the area of meadows between Karczno and the Szczeciński Lagoon together with a 100 m stripe of the adjacent waters of the Lagoon. <b>Goal of protection:</b> protection of water, marsh, meadow and forest communities, including localities of valuable plant and animal species.
„Cieszkowickie Łąki”	<b>Location:</b> the Nowe Warpno commune, the area of meadows and adjacent fragments of forests over the tributary of the Mysliborka River. <b>Goal of protection:</b> preservation of peatbog, marsh, meadow and forest communities as well as endangered species of animals.
„Trzebieradzki Las”	<b>Location:</b> the Nowe Warpno commune, the area located by the Szczeciński Lagoon in the neighbourhood of Trzebieradz, including some areas of the Wkrzaska Forest and the coastal zone of the Lagoon (about 100 m). <b>Goal of protection:</b> protection of the semi-natural environment of the coastal zone of the Lagoon, wet meadows and the pine forests surrounding them, localities of endangered animal species.
„Dobiesławskie Mokradła”	<b>Location:</b> the Nowe Warpno commune, meadows and forests near Dobiesław, south from Lake Malomysliborskie. <b>Goal of protection:</b> protection of the interesting landscape, wet meadows and overmature pine stand with the localities of endangered animal and plant species.
„Piaskowa Góra”	<b>Location:</b> the Nowe Warpno commune, the dune complex of the Piaskowa Mountain together with Lake Piaski and its surroundings reaching beyond the borders of the commune. <b>Goal of protection:</b> protection of the interesting landscape and nature of the area of the Wkrzaska Forest including a lake, peatbogs and dune-hills covered by coniferous forests with localities of rare species of plants and animals.
„Karwia Struga”	<b>Location:</b> the Nowe Warpno commune, the valley of the Karwia Struga River and adjacent fragments of the Wkrzaska Forest. <b>Goal of protection:</b> preservation of the semi-natural environment of wet meadows and the old coniferous forests surrounding them as well as the endangered species of animals.

<b>Planned documenting sites</b>	
„Wyrobiska po kopalni kredy k. Zastania”	<b>Location:</b> gm. Wolin, a complex of a few drifts on the top and on the slopes of the elevation of an end moraine, north-west from Zastan. <b>Goal of protection:</b> protection of artificial water reservoirs, being an example of spontaneous succession of primeval biocenosis. They are a refuge for wild water fowl and a habitat of herpetofauna.
no name	<b>Location:</b> the Nowe Warpno commune, coast of the Szczeciński Lagoon near Miroszewo. <b>Goal of protection:</b> an interesting geologic formation – cliff coast.
no name	<b>Location:</b> the Nowe Warpno commune, on the Mysliborka River. <b>Goal of protection:</b> an interesting geologic formation – an erosion inselberg on a peat plain.
no name	<b>Location:</b> the Nowe Warpno commune, on the meadow in the area of Nature and Landscape Complex „Cieszkowickie Łąki”. <b>Goal of protection:</b> an interesting geologic formation – erosion inselbergs on a peat plain.
„Wapno”	<b>Location:</b> the Dziwnow commune, a former limestone quarry located in the neighbourhood of Wapno, a resort which does not exist any more, in department no 522 of the Gryfice Forest Inspectorate. <b>Goal of protection:</b> location of early-Jurassic shell limestone which can be found in the glacial float east from Dziwnówek.

Moreover, the places where there are many protected and vanishing plant species, interesting plant communities, residence and procreation of varied species of fauna and concentration of old trees should

be included in the protection activities. These areas perform and should still perform in the future varied economic functions, mainly in forestry, agriculture and fishery. Within their boundaries settlement units can be found as well. Due to these reasons the areas ought to be protected by the local law, i.e. through suitable entries in local spatial management plans.

#### 1.4. The area of the Lagoon as a place where valuable vanishing , endangered and protected species exist

In this point complexes of valuable natural areas are listed, which perform diverse and even strategic functions in nature, connected with preservation of biodiversity. In most cases they are a place where many protected and vanishing plant species as well as interesting plant communities and overmature stand can be found and they are a residence and procreation site for many species of fauna. On **Map 6** areas of the most interesting plant communities are shown. They often include protected areas (reserves, ecological grounds etc.) or there are suggestions of establishing new ones for protection of the main centres of the most valuable nature resources. At the same time these areas perform and they should perform varied economic functions, mostly concerning agriculture, forestry and fishery. Within their borders settlement units exist as well. Due to these reasons they should be (they have to be) protected by local law, i.e. adequate entries in local spatial management plans and they should be an object of particular care of ecological organisations. Taking decisions on acting on these areas should be performed in agreement with specialists – scientists, who can indicate collisions of planned undertakings with the environment and – if possible – they will identify guidelines for particular sites.

The results of the research that has been carried out so far and of the nature assessment clearly show that these areas perform a key function in the strategy of nature protection. In effect, areas of particular nature values have been identified, which are called further on ‘valuable areas’ (VA). Their list and a short description are presented in the table below.

**Table 2.3.**

<b>the Dziwnow commune</b>	
1	The eastern shore of Lake Wrzosowskie. This area adjoins the planned ecological ground “Dziwnowskie grązele”. Many valuable animal species exist here.
2	Sea coast coniferous forests together with small areas covered with peats – in the whole commune, with many valuable plant species and being a place of procreation, residence and feeding of valuable animal species.
3	Areas in the east of the commune, adjoining the Rewal commune, being part of the proglacial stream valley. It is a valuable area for herpetofauna and ornithofauna.
<b>the Nowe Warpno commune</b>	
1	Meadows over the Szczecinski Lagoon east from Podgrodzie, habitats of herpetofauna and ornithofauna.
2	The coastal zone and meadows along the Lagoon from Miroszewo to the planned Nature and Landscape Complex-I, habitats of herpetofauna and ornithofauna.
3	Old German graveyard in department 3 i; overmature stand; protected plants: sea-buckthorn, royal fern.
4	Saline meadows between Karczno and Nowe Warpno on Lake Nowowarpienskie and a locality of vanishing and protected animal species.
5	A stripe of coastal meadows along the Szczecinski Lagoon from Warnoleka to Popielewo being a habitat of herpetofauna and ornithofauna (breeding and migratory).
6	Forest departments no 25 and 26 and an old German graveyard – overmature stand, decorative plant species; localities of protected plants.
7	The coastal zone and meadows along the Szczecinski Lagoon from the border of Nature and Landscape Complex-III to Trzebiez valuable due to the localities of vanishing and protected animal species.
8	Forest departments no 224-230 and 264-276 near Mazancyce. Rich localities of forest flora and localities of vanishing and protected animal species.
9	The zone around Lake Karpino. Localities of vanishing and protected animal species.
<b>the Stepnica commune</b>	
1	A wide area of meadows and the coastal zone of the Szczecinski Lagoon, including among other things Skoszewskie Meadows. Vanishing and protected animal and plant species can be found here.
2	Complex of wet-ground forests and meadows together with the “Olszanka” and “Wilcze Uroczysko” reserves south from Stepnica to the border of the commune. Vanishing and protected animal species can be found here.
3	Valley of the rivers Gowienica and Swidnianka. A residence and procreation site of fish (including trout) and other vertebrates.
4	Forest ponds and wetlands in the woods of the Goleniowska Forest, being localities of vanishing and protected animal species.
5	A lake near Zielonczyn and the highest elevation in the commune with a scenic view on the Szczecinski Lagoon.

<b>Swinoujscie</b>	
<b>1</b>	A fragment of crowberry coniferous forest on the Przytorska sandbar.
<b>2</b>	A fragment of crowberry coniferous forest on the Uznamska sandbar.
<b>3</b>	A fragment of crowberry coniferous forest on the Uznamska sandbar.
<b>4</b>	„Ognickie Łęgi”. A procreation and residence site of numerous species of vertebrates.
<b>5</b>	An islet in the waters of Mlynska Ton. A procreation and residence site of numerous species of vertebrates.
<b>6</b>	Two islets in the waters of the Old Swina River. A procreation and residence site of numerous species of vertebrates.
<b>the Miedzyzdroje commune</b>	
<b>1</b>	Reverse Delta of the Swina River. These areas are mostly close to their natural state. The most common plants are halophilous plants, rushes and sedges. It is an important accommodation and wintering site for avifauna and a bird refuge of European importance (IBAE Poland 005). It borders directly area no 2.
<b>2</b>	The waters of the Szczecinski Lagoon. A very important area for fauna. A bird refuge of European importance (IBAE Poland 005).
<b>3</b>	The Trzciagowska Valley, being foreland of the Wolinski National Park. An important area for animals' existence.
<b>the Wolin commune</b>	
<b>1</b>	The western bank of the Dziwna River. A place of existence for many valuable animal species. It is covered by valuable plants – mostly halophytes.
<b>2</b>	A wet wood north-west from the resort Zastan, being a place of existence for many valuable plant species and a procreation, residence and feeding site for vertebrates.
<b>3</b>	Lake Koprowo and the surrounding meadows. Areas where many valuable species of birds can be found.
<b>4</b>	A fragment of a forest complex in the seashore stripe, between the Wolinski National Park and the road from Kolczewo to Dziwnow. It is a valuable site of crowberry coniferous forest with numerous protected plant species. The area is located in the direct neighbourhood of the Wolinski National Park.
<b>5</b>	Lake Wiselka. A valuable area, being a place of existence of a number of valuable plant species and a procreation, residence and feeding site of valuable animal species.
<b>6</b>	Lake Kolczewo. A valuable area, being a place of existence of a number of valuable plant species and a procreation, residence and feeding site of valuable animal species.
<b>7</b>	Lake Zolwinski. A valuable area, being a place of existence of many valuable plant and animal species.
<b>8</b>	Wet meadows near Kodrab on both sides of the road from Kodrab to Kolczewo, being a place of existence of many valuable plant species and a procreation, residence and feeding site for animals.
<b>9</b>	Wet meadows north from Warnowo, being a place of existence of many valuable plant species and a procreation, residence and feeding site for valuable animal species.
<b>10</b>	Wet meadows west from Kodrabek, being a place of existence of many valuable plant species and a procreation, residence and feeding site for valuable animal species.
<b>11</b>	Wet meadows „Wielka Pla” and wet meadows west from Mokrzyca to the Szczecinski Lagoon, being a place of existence of many valuable plant species and a procreation, residence and feeding site for valuable animal species.
<b>12</b>	Wet meadows west from the road from Mokrzyca to Warnowo, being a place of existence of many valuable plant species and a procreation, residence and feeding site for valuable animal species.
<b>13</b>	The eastern bank of the Dziwna River in the neighbourhood of Laska. It is a place of existence of many valuable animal species. The bank of the Dziwna River is covered with valuable plants – mostly halophytes.
<b>14</b>	Lake Piaski and its surroundings, including a valuable water and forest ecosystem and the park and palace complex in Piaski. A fragment of a marshy meadow on the eastern shore of the lake is suggested to become an ecological ground. In the lake and the Grzybnica River which flows across the lake and in the coastal marshlands and marshy meadows there are many localities of protected plants and animals. Mixed coniferous forests and forests are distinguished by overmature stand which is 100-130 years old and mass restorations of yew-trees and firs.
<b>15</b>	Lake Ostrowo and local wet meadows including a valuable water and meadow ecosystem. In the lake and the Grzybnica River which flows across and in the coastal marshlands and marshy meadows many localities of protected plants and animals exist. The area borders directly the existing Nature and Landscape Complex „Wiejkowski Las”.
<b>16</b>	The eastern bank of the Dziwna River near Zagorze. It is a place of existence of many valuable animal species. The bank of the Dziwna River is covered with valuable plants.
<b>17</b>	This area is a part of the Row Peninsula which is not included in the planned ecological ground „Półwysep Rów - II”. It includes among other things wet meadows periodically flooded during backwaters. Numerous localities of halophytes and a site of procreation and rest during migration for animals.
<b>18</b>	Natural landscape of the coastal stripe between Karnocice and Plocin, with valuable nature, which is a fragment of wide shoals with bulrush plants, clusters of floating water plants and shore rushes with numerous breeding sites of many species of water and mud birds.
<b>19</b>	Wet meadows north-west from Kolczewo, being a place of existence of a number of valuable plant species and a breeding, existence and feeding site of valuable animal species.
<b>20</b>	Wet meadows on the southern border of the commune, being a place of existence of many valuable plant species and a procreation, residence and feeding site for valuable animal species.

the Goleniow commune	
1	Wet forests and meadows north from the Ina River, being a procreation, residence and feeding site for many animal species. In this area following existing reserves are located as well: „Wilcze Uroczysko”, „Olszanka”, „Uroczysko Święta” and a planned reserve „Bobry nad Iną” and planned ecological grounds: „Ujście Krępy” and „Noclegowisko Kormoranów”. Numerous localities of protected plants exist here as well.
2	Meadows, marshlands and forests near Lake Dabie and the Oder River being a place of procreation, residence and feeding for valuable animal species and numerous localities of protected plants. In this area a planned ecological ground is located as well.
3	A small swamp located in the forest on the north-eastern border of the Goleniow commune, on the left bank of the Gowienica River. Many protected species can be found here.
4	Wet forests near Niewiadow and Zolwia Bloc, being localities of protected plants and animals.
5	Meadows along the Gowienica River southwards, where valuable animal species have been found in the breeding season.
6	Forest swamps and ponds near Zolwia Bloc and Glewice, being a procreation, residence and feeding site for protected and vanishing animal species.
7	Wet-ground forests near the road from Goleniow to Mosty with localities of protected plants.
8	A fragment of a wet meadow near Danowo, where a large number of rare animal species can be found.
9	The Wiselka River, where localities of vanishing animal species have been identified.
10	A stretch of the Ina River rich in breeding birds related with wet meadows. In this area an ecological ground „Łąka storczykowa nad Iną” is planned.
11	A meadow south-east from Pucice, between the railroad and the highway, being a residence site of rare species of reptiles.
12	Rurzyca, a production forest near the new cemetery outside the village - a locality of rare and protected plant species.
13	The resort Rurzyca – a valuable park with a yew-tree restoration site.
14	On the road from Kepa Lubczynska to Goleniow in the forest – a locality of valuable and protected plant species.
15	The valley of the Ina River west from Goleniow - a residence site of numerous species of birds.
16	The valley of the Ina River – a residence site of numerous species of birds.
17	Forest ponds near Niewiadow – an amphibian refuge.

### 1.5. International legal regulations in the field of protection of nature resources of the area of the Szczecinski Lagoon.

According to art. no 87 of the Constitution of the Republic of Poland the sources of the law are legal acts, ratified international agreements and resolutions. Without doubt the regulations of international law, the EU law in the field of nature protection indicate or they will regulate in the near future the scope of management, utilisation of grounds, etc. in the areas of particular nature values, among which the area of the Szczecinski Lagoon can be counted as well.

Reassuming, after the analysis of international regulations it should be stated that most of the areas of the Szczecinski Lagoon included in the management plan fulfil the requirements of at least one convention and also of the regulations of the European Union in the field of nature protection.

**Table 2.4.**

Location of the area	1	2	3	4	5	6	7
waters of the Pomeranian Bay	+		+ ++	+	+	+	+
waters of the Szczecinski Lagoon (together with the islands in its southern part)	+	+ Σ	+ ++	+	+	+	+
waters of the Kamienski Lagoon together with the Chrzaszczewska Island	+		+	+	+	+	+
the Reverse Delta of the Swina River	+		++	+	+	+	+
the Karsibor Island	+ Σ		++	+	+	+	+
the Row Peninsula	+ Σ			+	+	+	+
the Swina River with its outlet stretch	+ Σ			+	+	+	+
the outlet of the Oder River and Roztoka Odrzańska	+ Σ			+	+	+	+
Lake Koprowo and wetlands surrounding the lake	+ Σ			+	+	+	+
Lake Nowowarpieskie	+ Σ			+	+	+	+
Lake Dabie with the islands and meadows surrounding the lake in the east	+			+	+	+	+
meadows along the coast of the lagoon on the islands Wolin i Uznam	+ Σ		++	+	+	+	+

Location of the area	1	2	3	4	5	6	7
meadows along the coast of the lagoon in the Wolin commune	+ $\Sigma$			+	+	+	+
meadows along the coast of the lagoon in the Dziwnow commune	+ $\Sigma$			+	+	+	+
meadows along the coast of the lagoon in the Kamien Pomorski commune	+ $\Sigma$			+	+	+	+
meadows along the coast of the lagoon in the Stepnica commune	+ $\Sigma$			+	+	+	+
meadows along the Oder River in the Goleniow commune	+ $\Sigma$			+	+	+	+
meadows along the Oder River in Szczecin	+ $\Sigma$			+	+	+	+
meadows along the coast of the lagoon in the Police commune	+ $\Sigma$			+	+	+	+
meadows along the coast of the lagoon in the Nowe Warpno commune	+ $\Sigma$			+	+	+	+
the valley of the Dziwna River	+ $\Sigma$			+	+	+	+
the valley of the rivers Wolczenica and Grzybnica, including the area called Bagna Rozwarowskie	+			+	+	+	+
the valley of the rivers Swiniec and Niemica	+ $\Sigma$			+	+	+	+
the valley of the Gowienica River	+ $\Sigma$			+	+	+	+
the valley of the Krepa River	+ $\Sigma$			+	+	+	+
the valley of the Ina River	+ $\Sigma$			+	+	+	+
the valley of the Gunica River	+ $\Sigma$			+	+	+	+
Miedzyodrze	+			+	+	+	+
forests in Miedzyzdroje Forest Inspectorate				+	+	+	+
forests in Wolinski National Park			++	+	+	+	+
forests in Gryfice Forest Inspectorate				+	+	+	+
forests in Rokita Forest Inspectorate				+	+	+	+
forests in Goleniow Forest Inspectorate (terrains of the Goleniowska Forest)				+	+	+	+
forests in Kliniska Forest Inspectorate (terrains of the Goleniowska Forest)				+	+	+	+
forests in Gryfino Forest Inspectorate				+	+	+	+
forests in Trzebiez Forest Inspectorate (terrains of the Wkrzanska Forest)				+	+	+	+
Lake Swidwie	++			+	+	+	+

Legend:

- 1 Convention on Wetlands of International Importance Especially as Wildfowl Habitat (the Ramsar Convention):
  - + – area fulfilling the requirements,
  - +  $\Sigma$  - area fulfilling the requirements of the Convention only together with other neighbouring areas,
  - ++ – area listed in the Convention.
- 2 Convention for the Protection of the World Cultural and Natural Heritage (the Paris Convention):
  - +  $\Sigma$  – together with the neighbouring and surrounding areas as a complex.
- 3 Convention on the Protection of the Marine Environment of the Area of the Baltic Sea (the Helsinki Convention):
  - + – area fulfilling the requirements for listing in the Convention,
  - ++ – area partially listed in the Convention.
- 4 Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention):
  - + – area fulfilling the requirements for listing in the Convention.

- 5 Convention on the Conservation of Migratory Species of Wild Animals (the Bonn Convention) with additional agreements:
  - + – area fulfilling the requirements for listing in the Convention.
- 6 Directive 79/409/EEC of April 2, 1979 on the protection of wildfowl (the Bird Directive):
  - + – area fulfilling the requirements for listing in the Directive.
- 7 Directive 92/43/EEC of May 21, 1992 on the protection of natural habitats and wild fauna and (the Habitat Directive):
  - + – area fulfilling the requirements for listing in the Directive.

## **2. The area of the Szczecinski Lagoon as an supraregional and supranational ecological corridor and core area**

During the observations carried out for a few years it has been stated that the area of the Lagoon performs the function of an ecological corridor and is a core area.

### ***Ecological corridors***

In the area of the Lagoon a number of linear or spatial objects can be identified performing the function of an ecological corridor. They can be classified as corridors of local, regional, supraregional and supranational importance. Without doubt classifying the area to one of the categories listed above depends on a number of factors. In consequence a particular fragment of the Lagoon can be classified in one category, some of them or even all of the categories.

**In the area of the Lagoon the ecological corridors of supraregional importance are:**  
 the Swina River and the Reverse Delta of the Swina River together with the Old Swina River, the Dziwna River together with the Kamienski Lagoon and Lake Wrzosowskie, the Oder River, the Lagoon evenly with the parallel of latitude, the line of forest complexes of the Wkrzanska and Goleniowska Forests .

**Areas of supranational importance:**  
 the Szczecinski Lagoon evenly with the parallel of latitude together with the Swina River, the Dziwna River, the Kamienski Lagoon and Lake Wrzosowskie, the line of forest complexes of the Wkrzanska Forest (Ückermünder Heide) and Goleniowska Forest.

### ***Ecological barriers***

The nature assessment which has been carried out allows of the statement that in the area of the Lagoon a few types of ecological barriers exist. They are:

- 1. natural barriers**, i.e. geographic barriers. They are geographic objects which make contacts of many groups of animals impossible. The barriers that should be counted among them are e.g. large areas of the lagoons and the width of the waters of the rivers Oder, Dziwna and Swina, which are impossible to cross for some animal and plant species.
- 2. artificial barriers**, i.e. e.g. technological barriers or barriers which have evolved as a result of some actions of people. They are artificial objects, created as a result of human activity. They are:
  - settlement areas, industrial and production plants, construction objects, etc.,
  - roads and railroads,
  - powerlines,
  - fishery nets placed within the framework of fishery,
  - existing beaches and havens,
  - the frontier-line,
  - periodical deep excavations,
  - other objects.

In consequence these barriers cause that for many animal and plant species periodical migrations become impossible or very difficult, including migrations on tooting grounds, feeding grounds and wintering sites. Moreover, they contribute to the extinction of individuals, e.g. small amphibian, mammals and birds as a result of collisions with cars, trains and powerlines.

### 3. The area of the Szczecinski Lagoon in the concept of the European and State Ecological Network (ECONET).

The countries of the European Union, undertaking subsequent activities for the benefit of integration of co-operation in the field of nature protection, have come out with an initiative of creating of the European Ecological Network (ECONET). In the intentions of the inventors ECONET is to be a network of areas whose values determine the natural heritage of Europe. These areas are or they will be spatially and functionally linked and taken under varied, complementary forms of protection. Moreover, a requirement of creating and performance of the ECONET programme is developing of a network administration system, which would be responsible for implementation of the ECONET concept in the policy of particular countries. ECONET is a hierarchic structure based on European nature protection strategy and state, regional and local strategies.

The primary goal of creating of ECONET is integration of particular protected areas existing in particular European countries and potential areas planned to be protected in a compact system – ECONET, in accordance with international criterions and standards. It is believed that ECONET will allow of:

- forming of a compact spatial network of the least environmentally transformed areas, which will reflect the specificity of diversification of the European nature;
- better protection of species and habitats, which have been attributed a special importance in Europe due to the threat of becoming extinct;
- easier expansion and migration of the species on our continent through preservation of the areas on the way of migration;
- forming of a common European strategy of protection of the least transformed ecosystems and landscapes, aiming also to effectively counteract the processes of vanishing of species from the European plant and animal resources;
- development of a map of the ecological network common for the whole Europe, which will demonstrate the environmental qualities of the continent and visualise the scope of responsibility for their stable duration.

ECONET consists of the following elements:

- 1. core areas.** They are characterised by strong biodiversity, varied landscape formations and habitats, they are an important refuge for native and migratory species, especially rare and vanishing species. The size of these areas can be varied but not smaller than 500 ha. Within core areas we can identify:
  - biocentres, i.e. areas possessing the most important nature values;
  - buffer zones surrounding biocentres but possessing distinctive values. Buffer zones delimitate the range of spatial functional links (biotic and abiotic) in the whole core area. In the future buffer zones will be designated for protective activities and optimisation of management so that the existing nature values will be preserved and the lost values will be restored.
- 2. ecological corridors.** They are spatial structures which make expansion of species between core areas and adjacent areas possible. They are:
  - uninterrupted linear forms, which can be easily distinguished among the surrounding areas because of their natural structure, of lower intensity of utilisation and management;
  - areas forming stripes linking particular core areas and indicating main directions of connections between them;
  - corridors of the “*stepping stones*” type, which do not have a structural continuity but they maintain functional continuity, such as migratory bird refuges.

Dimensions are a significant characteristic of the corridor. Its width should not be less than 500 meters and a corridor of European importance should not be narrower than a few kilometres. Narrowings should be regarded as areas of augmented threat to the continuity of the corridors. Length of the corridor is also a significant characteristic. It can be assumed that the longer the corridor is, the less is the effectiveness of its performance, as the conditions of existence of animals and plants are worse in corridors than in core areas.

**3. nature development areas.** They can be the basic elements of the network (core areas and ecological corridors). They might be degraded as a result of contamination and intensive utilisation but with preserved habitat values, which allow of a chance of restoration of the previous scheme, e.g. dried peatbogs. The areas whose values can be restored through pro-ecological forms of management are counted among them as well, e.g. production forests and utilised agrocenosis.

#### ***Principles of development of the ECONET network***

During the development of the European Ecological Network the following principles should be taken into consideration:

- extend the existing protected areas which are often too small;
- complete the existing systems of areas with areas possessing nature values of state and European importance, deserving to be included in ECONET;
- take into consideration the hierarchic structure of the ECONET network, which means that the areas might perform their functions at different levels: local, regional, state and international;
- identified the areas where the lost nature values should be restored as they maintained high ecological potential;
- secure communication between core areas through ecological corridors.

#### ***Concept of the State Ecological Network ECONET***

The State Ecological Network ECONET is to be a system of areas of the highest state and international rank. The criteria of selection of areas for ECONET-PL are:

- biodiversity,
- naturalness,
- density of existence,
- level of hazard.

#### ***The place of the area of the Szczecinski Lagoon in ECONET-Poland***

Liro (1995) analysing the geographic and nature conditions attributes the following characteristics to the area of the Szczecinski Lagoon:

In consideration of geomorphological conditions – existence of:

- geomorphological structures favourable for preservation of hydrogenic habitats,
- geomorphological structures favourable for preservation of wide plant complexes of a semi-natural character,
- geomorphological structures favourable for preservation of small spatial fragments of highly-natural plants,
- geomorphological structures favourable for habitat biodiversity.

In consideration of hydrographic conditions areas, where the following forms can be found:

- lakes covering even more than 1% of the area,
- bigger peatbog complexes.

In consideration of the ecological network – core areas of international importance with biocentres and buffer zones, performing at the same time the function of an ecological corridor of international importance.

In consideration of nature refuges – counted among big nature refuges of European importance.

An area of bird refuges of European and state importance.

An area where otters are strongly represented.

#### **4. The destined legal status of the area of the Szczecinski Lagoon**

The transboundary co-operation carried out as well as research and analysis realised for the past ten years clearly indicate that the process of protection of the area of the Szczecinski Lagoon both on the Polish and German side has not been finished yet and even in some aspects it requires implementation of adequate procedures.

As the information is gathered and nature and environment analysis is carried out, new needs in the field of protective tasks are discovered. They indicate the necessity of creating favourable conditions for carrying out environmental-friendly management which would also be favourable for economic growth with simultaneous elimination or limiting of existing hazards.

Especially on the Polish side it is a known fact that the values of particular elements require a varied conservation attitude. Generally for some areas of the Wolinski National Park, part of nature reserves and other areas existing and planned for protection it is necessary to maintain or stimulate a number of economic activities whose effect would be maintaining the habitats necessary for existence of a number of valuable plant and animal species. It concerns mostly the areas located on the border of the Lagoon and land.

Moreover, it should be taken into consideration that the whole area of the Wolin Island and part of the Uznam Island together with some areas around the Lagoon should become a landscape park. Also part of the areas around the Lagoon and some fragments of the Lagoon should become nature reserves. This is an innovatory attitude but it has a full explanation among other things in the wealth of habitats and species (including unique habitats and species) and in the fact that up to this time the nature of the Lagoon has been taken under protection to a very small extent. Furthermore, none of the fragments of Roztoka Odrzanska, outlet of the Oder River, the Dziwna River and the Kamienski Lagoon have acquired the status of a form of nature protection.

Therefore, bearing on mind the facts mentioned above and the data gathered during nature assessment, activities should be undertaken for the benefit of:

- expansion or verifying of the existing nature reserves, for which nature reserve protection plans should be prepared,
- taking under protection the most valuable places as nature reserves, for which nature reserve protection plans are necessary, which will allow of carrying out systematic, many years' conservation activities,
- taking under protection a number of places as ecological grounds or nature and landscape complexes, delimitation of the borders of procreation and residence sites of the animals of protected species,
- undertaking activities for the benefit of including the area of the Lagoon in the list of areas of the Ramsar Convention and assigning it the status of a biosphere reserve, which was suggested as a conclusion of the celebration *Landscape of the year 1993/94* and in the study "*Biosphere reserves in Poland*" – Warsaw 1997.

## **5. The biosphere reserve as a model system of management of the area of the Szczecinski Lagoon.**

The spatial system of nature protection and environmental protection in the form of biosphere reserve was designed within the framework of the international UNESCO programme *Man and Biosphere* (MaB). Its goal was to connect the achievements of ecology more strongly to the practical problems of management in the threatened ecosystems. During the General Conference of UNESCO in 1970 bringing into being the MaB programme, the need of relating the theoretical and practical aspects of nature protection with economic activity, respecting the rules of rational use of resources, was expressed. It was suggested to create biosphere reserves as objects, where such undertakings would take place. Each biosphere reserve, according to these assumptions, should contain:

typical examples of natural biomes of the area,

unique (rare) communities of plants and animals or areas particularly valuable due to their nature values,

examples of harmonic landscape created through traditional methods of land use, or

examples of modified or degraded ecosystems which can be reclaimed and restored to the state close to natural.

Each reserve should be large enough to be an independent unit, to secure the possibility of carrying out research and training. It is believed that they will have a special value as a datum or standards for long-term changes of the whole biosphere. It has also been stated that particular countries will delimitate within their borders biosphere reserves containing ecosystems or important for these countries for

other reasons. Valuable areas achieve the status of a biosphere reserve through certificates issued by UNESCO.

In 1995 in Sevilla the Statute of Biosphere Reserves was presented and accepted, aiming to increase the effectiveness of performance of each reserve and to make understanding of their idea easier. According to this document the biosphere reserves and their networks have been assigned the following functions:

**protective function** – contributing to protection of landscapes, ecosystems, diversity of species and genic diversity;

**development function** – propitious to forms of economic development and human development which can be assumed sustainable;

**functions of logistic support** – supporting demonstration projects, ecological education, training, research and monitoring in relation to local, regional, state and global tasks connected with protection and sustainable development.

The criteria of selection of the area for recognising the area as a biosphere reserve according to the Statute are:

it should contain a mosaic of ecological systems typical for bigger biogeographic regions, including different levels of human intervention,

it should be of significant importance for protection of biodiversity,

it should create a possibility of searching for and demonstrating of solutions in the field of sustainable development on a regional scale,

it should be large enough to perform the three functions mentioned above,

it should merge these functions as an effect of reasonable division into zones, accepting:

existence of a core zone or legally protected zones large enough to achieve these goals,

existence of a buffer zone or zones, where only activities which can be reconciled with protective goals can be carried out,

existence of a transition zone (an external buffer zone) where practices for the benefit of sustainable resource management are promoted and developed.

The conclusion of this Statute is indication of the necessity of:

creating of mechanisms for management of human activity and use of buffer zones;

development of strategies or management plans for the area;

designation of an organ of authority or a mechanism for implementation of the strategy or plan, programmes for the benefit of research, monitoring, education and training.

In Poland, although formally a few biosphere reserves exist and some other reserves are being established at present, their performance has not been related with the conception of rational spatial management of cultural objects yet. It concerns mainly such issues as co-existence of the biosphere reserve and economic development of particular regions, communes and resorts or utilisation of water reservoirs, arable areas and forests. One of the factors influencing this state of matters is the fact, that nearly all biosphere reserves created in Poland are located within the borders of national parks or nature reserves, where economic activity usually contradicts the function of protected area.

In consequence, the areas of supraregional nature values neighbouring with towns and other anthropogenic areas usually are not included in the biosphere reserves, though they fulfil the requirements of the definition. The consequences of such way of organising and using such areas require a new view on these issues and verifying the concept of establishing biosphere reserves in Poland. It should be added here that a biosphere reserve in Polish legislation has not achieved the status of a protected area yet, as it has e.g. in Germany.

### **5.1. “Landscape of the Year 1993/94” as a step forward in establishing the Biosphere Reserve**

Culture monuments, nature values and landscape values of the Estuary of the Oder River, the islands Uznam and Wolin, the Goleniowska Forest, the Wkrzanska Forest (*Uckermünde Heide*) located on both sides of the state border were the base for proclaiming the Mouth of the Oder River “*the Landscape of the Year 1993/94*”. This particular distinction from Nature Friends International (*Natur-*

*freunde Internationale*) remarkably emphasised the importance of these areas in the European nature protection system. This international organisation with headquarters in Vienna through recognising the Mouth of the Oder River as a comprehensively interesting and valuable area, decided to promote its development on the European forum. Therefore the main goal was promotion of:

- protection of nature, landscape and cultural values of the Mouth of the Oder River,
- sustainable development of the region,
- creating and carrying out of an integrated conception and model of tourism respecting natural and social conditions of the region (so-called soft tourism), including among other things creating of a network of hiking trails, cycling paths and kayaking routes around the Szczecinski Lagoon,
- development of railway transport as an alternative means of transport in this region
- recognising this region as an atom-free and demilitarised zone,
- protection of the natural environment of the estuary, with particular regards to the waters of the Szczecinski Lagoon, through giving up construction and exploitation of facilities contributing to its degradation,
- introducing of pro-ecological farming,
- co-operation of both sides aiming to work out a joint conception of development of the region of the Estuary of the Oder River,
- the need of establishing in this region a transboundary Biosphere Reserve “the Mouth of the Oder River”.

The activities carried out a year long within the framework of the celebration of the “*Landscape of the Year*” abounded in events (conferences, fairs, cultural happenings, international meetings, rallies, parties, publications, press conferences etc.) in which representatives of Polish and German Parliaments, ministers, voivodes, mayors, chief officers of groups of villages, scientists, members of ecological organisations and above all inhabitants of the boundary communes participated. It can be assumed that the rapprochement of the both nations and mutual recognising of the problems and achievements was one of the main successes of the celebration of “*Landscape of the Year 1993/94 – the Mouth of the Oder River*”.

When we add the whole information on nature and economic values of the area of the Lagoon and its surroundings to the facts mentioned above, we can state that the area of the Lagoon fulfils the requirements for establishing a biosphere reserve.

This area is characterised by a wealth of valuable ecosystems with rare plant and animal species, in the estuarial system of a big river in the temperate zone of broad-leaved forests. In the area of the reserve the Wolinski National park would be included and a few hundred of established or planned forms of nature protection, including nature reserves which are listed in the Ramsar Convention and also many archaeological sites, architectural monuments and monuments of material culture.

## **6. Integrated environmental monitoring system**

Integrated environmental monitoring is a subsystem of the State Environmental Monitoring. Its goal is to register and analyse the changes taking place in ecological systems, which are a result of pollution loads, and to integrate the information gained in particular subsystems of monitoring. The basic element of monitoring are core stations, which carry out their monitoring programmes on selected experimental areas – so-called model ecological systems. A core station works as a research area with the whole scientific and technical base necessary for carrying out the research. The area designated for monitoring is a river or lake basin with a defined buffer zone. From the methodological point of view the most important issue is detailed definition of the conditions of functioning of the geosystem and of its internal structure. The conditions mentioned above include among other things geographic location, geology, sculpture, climate, water cycle, fauna and flora, human activity. The basic organisational task within integrated monitoring is securing the continuity of performance of core stations aiming to achieve a many years’ series of observations. The stability of functioning of the core stations, apart from the financial matters, depends on concentration of the research carried out by scientific teams of an interdisciplinary character.

In Poland six core stations of integrated monitoring work at the moment. In Grodno in the area of the Wolinski National Park an Environmental Monitoring Station of the Adam Mickiewicz University in Poznan has been put into service.

The profile of the research carried out by the station will support one of the most important functions of national parks, which is active protection of their biotic and abiotic resources.

Activities for the benefit of nature protection involving establishment of forms of nature protection, protection of particular species and their habitats, have to be connected with the procedures of monitoring of environmental resources. These tasks have to be performed using a unified methodology by teams of adequate specialists.

In the 90s in the area of the Szczecinski Lagoon activities were undertaken for the benefit of establishing of an institution carrying out nature monitoring according to the standards of state monitoring. This establishment was located in the Wolinski National Park. It seems that a need exists of establishing another nature monitoring station on the other side of the Lagoon, i.e. in the area of the Wkrzanska Forest. The best site for this kind of activities is without doubt the nature reserve "Świdwie", which is listed among the objects of the Ramsar Convention. At the same time a network of sites should be selected, which should remain under many years' observation. When selecting these points, the following issues should be taken into consideration:

the sites must be typical for the ecosystem (biome),

for each point the range and methodology of acquired data should be indicated.

The actions describes above should be carried out in direct co-operation with the German side.

#### **Conclusions.**

1. The area of the Szczecinski Lagoon is a unique natural area. It plays a special natural, social and economic role.
2. After the analysis of international regulations it should be stated that most of the areas located in the area of the Szczecinski Lagoon fulfil the requirements of at least one convention and also the regulations of the European Union in the field of environmental protection.
3. In the area of the Szczecinski Lagoon many collisions of interests and threats for environment exist.
4. On the list of objects of the Ramsar Convention in the area of the Lagoon the nature reserve "Świdwie" exists. In ornithological publications a list of water and mud areas is recalled which fulfil the requirements of the Convention and are located within the borders of ICZM. Among them we can find the whole Szczecinski Lagoon and some of the areas on its border. The Kamien-ski Lagoon and Miedzyodrze fulfil these requirements as well.
5. For protection of nature resources working out of a complex programme is necessary.
6. Protection of this area requires strong co-operation of Poland and Germany, public administration (governmental and non-governmental), scientists, practicians and non-governmental structures.
7. For effective protection of nature resources of the Szczecinski Lagoon, the society must be convinced about it and it should be aware of the particular role of this area.
8. ICZM of the Szczecinski Lagoon needs implementation of a number of activities, among other things in the field of legal regulations, spatial planning, state of the environment, conservation activities, activities in the field of social acceptation, finance, organisation of area management and infrastructure, education of the society. It can be an integral part of the management plan for the Biosphere Reserve "the Mouth of the Oder River".
9. A number of advantages for economy and nature can result from realisation of this programme.

*The assessment of the condition of the environment in the area included in the Management Plan was carried out basing on the information and data of the Voivodeship Inspectorate of Environmental Protection in Szczecin.\* \*\**

## **1. Waters**

### **1.1. Sources of water pollution**

The assessment of the pollutants discharged in the area of the estuary of the Oder River was made possible by the data of the balance of pollutants discharged into the Oder River, the Szczecinski Lagoon and the Pomeranian Bay, carried out in 1995 within the framework of the PCL-3 programme of HELCOM. Aiming to estimate the loads, the Voivodeship Inspectorate of Environmental Protection carried out a series of annual measurements. The programme will be repeated in 2000, including area pollution (superficial pollution run-off – PLC-4).

Among the treatment plants included in the inventory only three possess a biological treatment plant with phosphorus elimination (municipal treatment plants in Swinoujście, Miedzyzdroje and Wolin). Gryfino possesses this kind of treatment plant as well.

The contribution of Szczecin, which possesses one municipal mechanical treatment plant is (tons per year):

- 7317.1 BOD<sub>5</sub> (82.7%),
- 10,657 COD (65%),
- 202.8 total phosphorus (61.2%),
- 1395.6 total nitrogen (65.5%),
- 3962.35 suspended matter (49.2%),
- 68,981.9 heavy metals (mercury, cadmium, zinc, copper, lead, nickel, chromium) (85%).

Superficial run-off is a significant source of water pollution. However, no calculations of the pollutant loads getting into the water in this way have been carried out so far.

The arduousness of the pollution discharged from the described area has decreased in comparison to 1995. The crucial reasons of this change are:

- the central municipal treatment plant built in Swinoujście in 1997,
- ceasing sewage discharges from the municipal mechanical treatment plant in Police in May 1998 and taking them over by the highly efficient treatment plant of the “Police” Chemical Plant,
- bringing into operation of a mechanical and biological treatment plant in Nowe Warpno in June 1998.

The reasons for the reduction of the loads of pollutants discharged to surface waters in Szczecin are:

- the mechanical and biological treatment plant built on Ostrow Grabowski in the Szczecin Harbour, treating the sewage from the harbour area and from the industrial plants located in Miedzyzdroje,
- closing oversedimental water cycle in the “Pomorzany” thermal-electric power station which allowed to reduce the amount of sewage by 99.9%, with reduction of the BOD<sub>5</sub> load by 99.4%, COD by 99.8% and suspended matter in 99.7%,
- bringing to an end the building of the “H” collector in Szczecin Dabie allowed to direct part of the sewage from this district to the mechanical treatment plant (with the support of phosphorus compounds elimination in a chemical way) in Zdroje district.

---

\* *The many years' work on establishment of a coherent system of conducting measurements of environmental condition and carrying out assessments and predictions has led to the establishment of the State Environmental Monitoring system. The legal basis of the system is the State Inspection of Environmental Protection Act (the State Inspection of Environmental Protection is nowadays called Inspection of Environmental Protection) in which basic entries and information about the State Environmental Monitoring are included.*

\*\* *Report on the condition of the environment in the Szczecin Voivodeship 1997-1998, Voivodeship Inspectorate of Environmental Protection, Szczecin 1999*

Some other tasks being carried out at the moment will have an influence on the improvement of the condition of the Baltic Sea waters:

- expanding of the treatment plant in Miedzywodzie, which will be the central treatment plant for the northern part of the Wolin commune and for the whole Dziwnow commune (except for Lukecin),
- bringing the modernisation of the treatment plants in Wolin, Kamien Pomorski, Wapnica and Stepnica to an end,
- simultaneous continuation of the building of the sewage system and the intermediate pumping station, which will allow of sending the sewage to these treatment plants. The combined sewage system is being modernised as well. Owing to that the household sewage will be separated from the storm-water sewage. This is a matter of a special importance due to the more efficient performance of the treatment plant and reduction of the discharge of pollutants into the surface waters and groundwater. All works mentioned above are carried out by stages and they aim to enfold the highest possible number of sewage producers, eliminating uncontrolled soil and groundwater contamination.

## 1.2. Quality of river waters

The quality of the waters of the Oder River and the outlet stretches of the rivers: Swina, Dziwna, Ina and Plonia is controlled annually. The quality of the waters of the rivers: Gowienica, Wolczenica and Swiniec is controlled cyclically every several years (**Map 9**). Periodical examination of the quality of the waters in the rivers Gunica and Krepa has not been carried out yet. Unfortunately the regional monitoring network does not include these watercourses.

The location of the measurement points of the regional monitoring in the area of the communes in the described terrain is shown on **Map 9**. The examinations that have been carried out allow of the following statements:

- All rivers flowing into the area included in the Management Plan reveal excessive contamination with biogenic compounds, faecal coliforms and organic compounds. The contamination comes mainly from the municipal and agricultural sector of the economy in this area.
- The quality of the waters of the lower stretch of the Oder River is highly dependent on the quality of the waters flowing into this area. At present they are well-oxygenated waters of the 3<sup>rd</sup> class of purity\* in sanitary respect. The eutrophication processes stimulated by high concentration of phosphor and nitrogen compounds have a vital influence on the quality of these waters. Intensive algae bloom has become typical for this stretch of the river.
- The analysis of the many years' changes of the quality of the Oder River waters indicates a systematic improvement in the boundary area. The value of some indicators such as the concentration of organic compounds, suspended matter, phenols and chlorides is approximating to the desired value. In the last few years an improvement in the sanitary condition of the waters and a slight decrease in the contents of biogenic compounds can be seen as well. The improvement in the quality of the waters of the lower Oder River is a good prognosis for this stretch. It indicates that with further regulation of the water and sewage management in the river basin of the upper and middle stretches of the Oder River, a further improvement of water quality in the lower stretch of the Oder River can be expected as well.
- Unfavourable oxygen conditions in the whole area of the estuary of the Oder River need special emphasis. They occur during longer freezing periods and permanently in the summer when the temperature is high and the flows are low. In these periods the deficit reaches the tolerance limit for biological life. Lack of municipal treatment plants for Szczecin and its neighbourhood cause that a real threat of an ecological disaster in the estuary of the Oder River due to water deoxidisation still

\* 1<sup>st</sup> class – waters suitable for: supplying drinking water to people, supplying the industrial plants that require water of drinking-water quality, existing of salmonid fish in natural conditions;

2<sup>nd</sup> class – waters suitable for: existing of fish other than salmonid in natural conditions, animal breeding, recreation, water sports and organising of swimming places;

3<sup>rd</sup> class – waters suitable for: supplying industrial plants other than these that require water of drinking-water quality, irrigating of agricultural areas used for horticultural cultivation, glasshouse cultivation and cultivation under shields made of other materials. The waters whose parameters are higher than admissible for the 3<sup>rd</sup> class of purity are defined as out-of-class waters, not complying with any standards.

exists.

- ♦ The waters of the Oder River are the main source of pollution in the Szczecinski Lagoon. The Oder River carries the contamination flowing from the upper stretch of the river, from the Szczecin agglomeration (lack of sewage treatment plants) and from the “Police” Chemical Plant, located in the outlet into the Roztoka Odrzanska. The contribution of other river waters is not significant, it is about 2% of the contamination inflowing from the Polish part.
- ♦ The examination of the rivers Swina and Dziwna carried out annually indicates an improvement in the purity of the waters of both straits. At present the sanitary condition of the waters of the Swina River fulfils the standards of the 1<sup>st</sup> class of purity and the contents of organic and biogenic compounds allows to classify these waters in the 2<sup>nd</sup> class.
- ♦ The assessment of the sanitary condition of the Dziwna River is similar. The number of the faecal coliforms allows to classify these waters in the 2<sup>nd</sup> class of purity. The standards of this class of purity are also met by the concentration of organic compounds and phosphates and the concentration of suspended matter meets the standards of the 1<sup>st</sup> class.
- ♦ Excessive concentration of chlorophyll “a” reflecting the development of algae has occurred in these waters periodically.

- ♦ **The most important tasks regarding improving the quality of the waters of the estuary of the Oder River are:**
  - **building of a treatment plant for Szczecin**
  - **modernisation of municipal treatment plants (concerning elimination of biogenic compounds)**
  - **regulation of sewage management in the “Skolwin” Papermill, the “Parnica” Repair Shipyard, the Phosphor Fertilisers Plant in Szczecin, the Szczecin Power Plant and Chemitex-Wiskord S.A. Szczecin,**
  - **building sewage facilities in the resorts located in the Szczecin area**
  - **building communal and intercommunal sewage systems basing on the sewage treatment plants in Miedzynowice, Kamien Pomorski, Wolin, Stepnica, Redlica (the Dobra Szczecinska commune), “Police” Chemical Plant, Nowe Warpno.**

### *Quality of river sediments*

The sewage carried off from the towns (industrial and household sewage), refluxes from waste storage yards and the superficial run-off from the areas located in the influence zone of the dusts’ emission from industrial plants to the atmosphere get into the surface waters, among other pollutants, large amounts of heavy metals and toxic organic compounds. As a result of the progressive environmental pollution, river and lacustrine sediments contain trace elements, including heavy metals in amounts that are considerably higher than the geochemical background. The contaminated sediments can become a threat for the soil environment, e.g. during the treatment and regulation of the contaminated water-courses or during floods.

In the area of the Management Plan three observation sites are located: the Oder River in Police and Kolbaskowo and the Ina River in Goleniow. Only in the alluvia of the Oder River (Kolbaskowo) increased contents of mercury and lead have been found. The sources of lead are: storm-water sewage and the superficial run-off from the areas located in the zone of influence of the power plants and metalworks, the mining industry and emission of exhaust gas.

### **1.3. Quality of the waters of the Szczecinski Lagoon and of the Pomeranian Bay**

The examination of the Szczecinski Lagoon and the Pomeranian Bay have been carried out within the framework of the Polish and German co-operation: for the Szczecinski Lagoon since 1960, for the Pomeranian Bay since 1970. The localisation of sampling points is shown on **Map 9**.

The results of the examination of the waters of the Polish part of the Szczecinski Lagoon allow to draw the following conclusions:

- The quality of the waters of the Szczecinski Lagoon remains under influence of fresh inland water

and saltwater of the Pomeranian Bay. Average salinity of these waters is 1-2‰. After a strong inflow of saltwater from the Baltic Sea into the Szczecinski Lagoon which took place in 1990, the waters of the Lagoon have been slowly becoming less and less salty. In the surface and bottom waters the concentration of chlorides has decreased.

- The negative influence of the Oder River on the purity of the Szczecinski Lagoon appears in the far-gone eutrophy/fertilisation of this water reservoir (an excessive amount of biogenic compounds in the water), algae blooms are typical and they are accompanied by: supersaturation of surface waters in oxygen with oxygen deficit in bottom waters at the same time, increased pH reaction of the water and its large span and decreased water transparency. Algae blooms occur from April to October inclusive. In the summer months for many years a mass expansion of blue-green algae *Microcystis aeruginosa* has been taking place. More and more information is revealed about the production of phytotoxines by these algae.
- The wealth in phosphor compounds has decreased considerably. The concentration of mineral phosphor compounds is a limiting factor for the eutrophisation and algae expansion.
- In the waters of the Szczecinski Lagoon no significant industrial pollution has been discovered lately.
- The consequence of the eutrophisation of the waters of the Lagoon is a change in the species composition of game-fish. The quantity of such fish as: eel, pike and whitefish is decreasing while the quantity of roach, perch and pike perch is increasing.

The many years' examination of the waters of the Pomeranian Bay allows of the following statements:

- The salinity of the waters in the bay is influenced by the saltwater of the Baltic Sea and the salty waters of the Szczecinski Lagoon. The average salinity of the waters is 5.5-8.0‰.
- The examined area covering the coastal part of the Pomeranian Bay is characterised by an increased (in comparison to the waters in the central basin of the Baltic Sea) contents of biogenic compounds: nitrates and phosphates – symptoms of water eutrophisation. It is caused mainly by the inflow of fertile waters from the Szczecinski Lagoon. Average concentrations of orthophosphates and chlorophyll are much lower than the values observed in the waters of the Lagoon. However, an intensive expansion of algae in spring and autumn takes place here as well.
- Unfavourable changes in the species composition of game-fish are a result of the progressive eutrophisation of the Pomeranian Bay waters.

#### 1.4. Quality of lake waters

The assessment of the lake water quality in the area included in the Management Plan of the ICZM of the Szczecinski Lagoon is shown on **Map 10**.<sup>\*</sup> The factors that have an influence on the performance of lacustrine ecosystems are: climatic conditions, hydrological regime, morphometrical characteristics of the lake basin and the pollution inflowing from the river basin (point source pollution and surface pollution).

♦ The majority of lakes undergo eutrophisation processes, at a different rate for particular lakes. The eutrophisation rate depends on many factors. The most important factors are: the load of phosphor and nitrogen compounds finding their way into the waters and the susceptibility of the lake to degradation.

- Not always favourable morphometrical and river basin conditions are the main factors deciding about the purity class of the lake waters.
- The eutrophisation processes are followed by other undesirable consequences such as disorders in fishery and limitations in the usability of the lakes for recreation.
- The lakes in the river basin of the Lewinska Struga River and the Grzybica River are shallow water reservoirs, susceptible to degradation. Moreover, the disturbances in the outlet into Dziwna cause high fluctuation of the water level in these lakes. Management of these river basins must be

<sup>\*</sup> The classes of purity of lake waters according to standing criteria of the Lake Waters Assessment System:

1<sup>st</sup> class – bodies of high quality water

2<sup>nd</sup> class – polluted waters

3<sup>rd</sup> class – strongly polluted waters

out-of-class – degradation of waters.

Susceptibility of the water reservoir to degradation is calculated basing on morphometrical and river basin indicators and classified in the following way: I – susceptible water reservoir, II – relative susceptibility, III – low susceptibility and out-of-class – no susceptibility.

subordinated to particular protection of these water reservoirs.

- The quality of the waters of Lake Piaski should undergo periodical examination due to bringing into operation the treatment plant in Piaski Wielkie.
- Lake Koprowo is a degraded water basin. The quality of its waters has a negative influence on the condition of the Kamienski Lagoon. The reclamation of this water reservoir should be considered necessary. The preliminary stage should involve a study concerning possible effects which can be a result of the sanitation which will be carried out.
- The lakes under a strong touristic pressure should have detailed recreational management plans. They are lakes: Kolczewo, Zolwinski, Wiselka and Glebokie.
- In accordance with the state monitoring programme of bottom sediments, examinations of bottom sediments have been carried out in two lakes – Piaski and Ostrowo – located in the area included in the Management Plan. In the sediments of Lake Ostrowo increased contents of zinc, cadmium and vanadium have been found, and in the sediments of Lake Piaski– high concentration of lead, which can be connected with transport pollution.

### 1.5. Quality of groundwater

In the area of the voivodeship no monitoring network for the needs of the region exists. Only in the area of the Wolin Island local monitoring is performed.

In the area of the Management Plan four groundwater measurement points of the state network are located: 2 in Swinoujscie (3<sup>rd</sup> and 2<sup>nd</sup> class)\*\*, in Przybiernow (1<sup>st</sup> class) and Brzozki (1<sup>st</sup> class) – the Nowe Warpno commune. Their location is shown on **Map 11**.

#### *Results of the environmental inventory*

The area of the Management Plan has undergone a system environmental assessment whose results can be found in the “*Geochemical atlas of the Szczecin agglomeration*” (PIG Warsaw 1998). The atlas reflects the potential influence of the local pollution sources on the condition of the environment but it does not identify the source of contamination and the influence of geogenic factors. Nevertheless, a clear view on the influence of the local sources of pollution, including concentration of many metals such as copper, mercury, lead, zinc and other elements in soils and bottom sediments was obtained.

Despite the thick testing grid (1 testing per 4 km<sup>2</sup>) the explanation of the reasons for large variability of groundwater quality has not been found. The cause is thought to be the large quantity of pollution sources, although there is not enough detailed information about the problem (a threat posed by illegal dumping grounds has been identified). The system assessment of groundwater quality is a significant achievement. The recognised pollution in many cases is difficult to identify indicating its reason or source. The regionalisation of groundwater pollution connected with agricultural pollution is apparent. The recognised pollution of the first water-bearing level and some deeper levels in the Szczecin, Kamien Pomorski and Swinoujscie agglomerations warn that wide-spread activities should be undertaken in the area of regulating water and sewage management as well as solid waste management aiming to protect the utilised groundwater levels, being the basic source of drinking water.

## 2. Air

### 2.1. Sources of pollution

The amount of pollution emitted into air from particular communes located in the area around the Szczecinski Lagoon is defined basing on the data gathered by the Voivodeship Bank of Data - SOZAT. The data refer to 1998 – see **Map 12**.

---

\*\* The range of classes for normal groundwater: **class I<sub>a</sub>** – waters of highest quality, **class I<sub>b</sub>** – waters of high quality, **2<sup>nd</sup> class** – waters of medium quality and **3<sup>rd</sup> class** – waters of low quality. No such definition as out-of-class waters is used. In spite of the fact that a higher concentration of a particular indicator than defined for the 3<sup>rd</sup> class of purity was found in the examined water, the water was classified in the 3<sup>rd</sup> class.

- Among the 12 communes included in the area of the Management Plan, the highest emission of pollutants into the air takes place in the Szczecin and Police communes. It is about 10 times higher than in the succeeding communes (Swinoujście and Goleniów).

- The sources of high emission of pollutants in the Szczecin and Police communes are the industrial plants that are located there. Within the borders of Szczecin there are: the Szczecin Power Plant, the “Pomorzany” Power Plant, the Szczecin Shipyard S.A., Wiskord S.A., the “Zalom” cable factory and in Police – “Police” Chemical Plant.
- Most of the pollutants emitted into the air are power engineering pollutants (sulphur dioxide, nitric oxides, carbon monoxide and dust).
- The emission from the remaining communes does not pose a threat to the air quality in the area around the Szczeciński Lagoon. The pollution comes mainly from heating processes. In Swinoujście 50 percent of the emission comes from the heating plant in Daszyńskiego Street.
- A separate problem is so-called “low” emission from uneconomical household furnaces with permanent fire grates, combusting low-quality fuel. They are a source of particular arduousness for the inhabitants, as they emit large amounts of dust and black.
- Unorganised emission from traffic sources poses a serious threat as well. It is particularly intensive in big agglomerations (which can be proved by the results of the automatic and manual measurements carried out in Szczecin), and on the traffic routes of high motor traffic intensity.

## 2.2. Air quality\*

In the area of the Management Plan the Wolinski National Park is located. For the park other (more strict than in other areas) admissible concentration values exist.

Permanent measurements of air pollution carried out by the Voivodeship Inspectorate of Environmental Protection in Szczecin, the Sanitary Inspection – Voivodeship Sanitary and Epidemiological Services in Szczecin and the environmental protection services of the “Police” Chemical Plant include: Szczecin, the Police area, Goleniów, Kamień Pomorski and Swinoujście.

The conclusions drawn from the presented studies (**Map 13**):

- Average annual concentration of sulphur dioxide varies from 1.4  $\mu\text{g}/\text{m}^3$  to 10  $\mu\text{g}/\text{m}^3$ , which is from 4% to 25% of the admissible value,
- Higher concentrations occur in the Szczecin area.
- The concentrations of sulphur dioxide do not exceed the admissible value for the areas of health-resort protection (Swinoujście, Kamień Pomorski).

- A visible influence of the motor traffic intensity on the concentration of nitrogen dioxide in the air can be seen. In Szczecin, in the area of Brama Portowa, the average annual concentration of nitrogen dioxide varies from 77.5% to 182.5%. The admissible values have been exceeded in three other measurement posts in Szczecin. In Swinoujście (area of health-resort protection) the average annual concentration of nitrogen dioxide is 84% of the admissible value and has had a tendency to rise in the last few years.

- In no measurement post the admissible concentration of suspended dust has been exceeded.
- In the area of influence of the “Police” Chemical Plant the concentration of air pollution (fluorine, ammonia) is: 7.5% of the admissible value for fluorine and around 80% for ammonia.

## 3. Acoustic climate

Most inhabitants of cities agree that noise is one of the most significant and importunate types of environmental pollution. The unit of noise assessment is decibel (dB). Zero dB is the hearing threshold, 130 dB is the threshold of pain.

The most arduous sources of noise are any facilities connected with motor traffic, such as motorways and expressways posing a threat to the inhabitants of the adjacent buildings; main streets of the cities, arterial roads etc., road crossings, railways and tramways, depots and transport bases.

---

\* The admissible concentration of the pollutants in the air is defined in the decree of the Minister of Environmental Protection, Nature resources and Forestry, 28.04.1998.

The terrains that are acoustically protected in a particular way are A zones of health-resort protection, hospital areas and nursing homes\*. In the area of the Management Plan two health-resorts are located: Swinoujscie and Kamien Pomorski and some other resorts over which some regulations of the health-resorts act were extended. They are: Dziwnowek, Lukecin, Miedzywodzie, Miedzyzdroje, Mrzezyno and Pogorzelica. For the A zones of health-resort protection admissible levels of noise in the environment are accepted as for the terrains of the 1<sup>st</sup> group. For the terrains on which health-care facilities are located (in the resorts over which some of the regulations of the health-resort act were extended) the admissible noise levels are classified as for the 2<sup>nd</sup> group of acoustically protected areas.

Basing on the research that has been carried out, it can be stated that:

- The main source of noise crucial for the acoustic climate of the areas located in the Szczecinski Lagoon zone is the motor traffic. The range of traffic noise penetration is around 300 m for expressways and motorways and around 50 m for local roads. The intensity of motor traffic on the roads of all communes mentioned above is diversified and strictly connected with the intensity of the holiday season. The suggested traffic noise monitoring on these routes ought to be performed separately for the holiday season and off-peak season, with accordance to the standing methodologies.
- The emission of noise to the environment arising from industrial activity of the plants located in the area of the communes of the Management Plan should not be allowed to get outside the borders of these plants. Inspections of the plants and enforcement of the admissible standards of noise levels in the environment are carried out systematically by suitable environmental protection forces. No monitoring activities have been suggested in this area.
- The emission of railway noise and arising from the water-route traffic is not identified in the area of the mentioned communes. The suggested monitoring of the water-route traffic noise should be carried out separately for the holiday season and off-peak season, with accordance to the standing methodologies.
- The admissible noise levels in the A zones of health-resorts are exceeded:
  - in the Swinoujscie sanatorium by 13 dB(A) during the day
  - in the Kamien Pomorski sanatorium by 16 dB(A) during the day. The main source of noise is road traffic.
- The admissible noise levels in the resorts over which some regulations of the health-resorts act are exceeded:
  - in Dziwnowek by 11 dB(A) during the day
  - in Lukecin by 1 dB(A) during the day
  - in Miedzywodzie by 4 dB(A) during the day
  - in Pogorzelica by 12 dB(A) during the day

The main source of noise is road traffic.

---

\* The admissible noise levels in the environment have been defined in the decree of the Minister of Environmental Protection, Nature resources and Forestry, 13.05.1998.

**Table 3.1.**

No.	Resort	Acoustically protected areas	Main sources of noise forming the acoustic climate	Selected results of measurements of noise level in the environment
1	Swinoujscie	<ul style="list-style-type: none"> <li>group „1” – area of health-resort protection „A” of the Swinoujscie health-resort,</li> <li>group „2” – hospitals, nursing homes (sanatoria and health-care homes)</li> <li>group „3” – other areas.</li> </ul>	<p>A/ SWINOUJSCIE WARSZOW</p> <ul style="list-style-type: none"> <li>road traffic: road no 3 – Swinoujscie-Warszow</li> <li>waterway traffic: traffic and manoeuvres of motor vessels (ferries, passenger ships, fishing crafts etc.),</li> <li>industry connected with maritime economy: the Swinoujscie Harbour, the Sea Ferries Base, the Sea Shipyard etc.,</li> <li>noise of the railway Swinoujscie-Szczecin</li> </ul> <p>B/ SWINOUJSCIE</p> <ul style="list-style-type: none"> <li>waterway traffic: traffic and manoeuvres of motor vessels (ferries, passenger ships, fishing crafts etc.)</li> </ul>	<ul style="list-style-type: none"> <li>noise level in the A zone of the Swinoujscie health-resort: 63 dB(A),</li> <li>road no 3 (the Swinoujscie commune); noise level: 73-75 dB(A),</li> <li>the centre of Swinoujscie; noise level: 63-70 dB(A).</li> </ul>
2	Miedzyzdroje	<ul style="list-style-type: none"> <li>group „2” – area of the Wolinski National Park, hospitals, nursing homes (sanatoria and health-care homes).</li> <li>group „3” – other areas.</li> </ul>	<ul style="list-style-type: none"> <li>road traffic, road no 102: Miedzyzdroje-Wiselka,</li> <li>road traffic in the area of sanatoria and health-resorts</li> </ul>	<ul style="list-style-type: none"> <li>noise level in the area of the physiotherapeutic facility and sanatoria: 58-60 dB(A),</li> <li>road Miedzyzdroje-Wiselka; noise level: 71 dB(A).</li> </ul>
3	Dziwnow	<ul style="list-style-type: none"> <li>group „2” – areas of sanatoria and health-care facilities of the resorts:</li> <li>Dziwnowek, Lukecin, Miedzywodzie, Pogorzelica,</li> <li>group „2” – area of the Wolinski National Park, hospitals, nursing homes,</li> <li>group „3” – other areas.</li> </ul>	<ul style="list-style-type: none"> <li>road traffic, road no 102: Wiselka-Dziwnowek</li> </ul>	<p>Noise level in the area of sanatoria and health-care facilities:</p> <ul style="list-style-type: none"> <li>Dziwnowek: 66 dB(A),</li> <li>Lukecin: 56 dB(A),</li> <li>Miedzywodzie: 54-59dB(A),</li> <li>Pogorzelica: 62 dB(A).</li> </ul>
4	Wolin	<ul style="list-style-type: none"> <li>group „2” – area of the Wolinski National Park, hospitals, nursing homes (sanatoria and health-care homes)</li> <li>group „3” – other areas.</li> </ul>	<ul style="list-style-type: none"> <li>road traffic, road no 3: Przybiernow-Swinoujscie,</li> <li>road traffic, road no 107: Parlowko-Kamien Pomorski,</li> </ul>	<ul style="list-style-type: none"> <li>road traffic in the area of the Wolinski National Park: 53-59 dB(A),</li> <li>road traffic on the main roads (Wolin , Dargobadz): 70-73 dB(A).</li> </ul>
5	Kamien Pomorski	<ul style="list-style-type: none"> <li>group „1” – area of health-resort protection A – the health-resort Kamien Pomorski,</li> <li>group „2” – hospitals and nursing homes,</li> <li>group „3” – other areas</li> </ul>	<ul style="list-style-type: none"> <li>road traffic, road no 102 and 107: Kamien Pomorski-Parlowko, Kamien Pomorski-Golczewo, Kamien Pomorski-Swierzno,</li> </ul>	<ul style="list-style-type: none"> <li>noise level in the A zone of the Kamien Pomorski health-resort: 66 dB(A).</li> </ul>
6	Stepnica	<ul style="list-style-type: none"> <li>group „3” – other areas</li> </ul>	<ul style="list-style-type: none"> <li>road traffic, road no 112: Goleniow-Stepnica,</li> <li>road traffic, road: Stepnica-Zarnowo-Wolin,</li> <li>road traffic, road no 113: Goleniow-Swieta,</li> <li>noise of the wood processing industry.</li> </ul>	<ul style="list-style-type: none"> <li>Krzywoustego Street in Stepnica: 69 dB(A).</li> </ul>
7	Goleniow	<ul style="list-style-type: none"> <li>group „2” – areas of hospitals and nursing homes,</li> <li>group „3” – other areas</li> </ul>	<ul style="list-style-type: none"> <li>road traffic, the highway: Goleniow-the state border,</li> <li>road traffic, road no 3: Goleniow-Wolin,</li> <li>road traffic, road no 6: Goleniow-Nowogard,</li> <li>waterway traffic on Lake Dabie,</li> <li>industry connected with wood industry and sawmills.</li> </ul>	<ul style="list-style-type: none"> <li>highway in Kliniska: 75 dB(A),</li> <li>Goleniow, Maszewska Street: 71 dB(A).</li> </ul>

8	Nowe Warpno	<ul style="list-style-type: none"> <li>group „2” – area of hospitals and nursing homes,</li> <li>group „3” – other areas.</li> </ul>	<ul style="list-style-type: none"> <li>road traffic, the road Trzebiez-Nowe Warpno,</li> </ul>	<ul style="list-style-type: none"> <li>road traffic in Brzozki: 66 dB(A),</li> <li>road traffic in Warnoleka: 61 dB(A),</li> <li>road traffic in Nowe Warpno: 62-66 dB(A).</li> </ul>
9	Police	<ul style="list-style-type: none"> <li>group „2” – the nature reserve „Swidwie”, area of hospitals and nursing homes.</li> </ul>	<ul style="list-style-type: none"> <li>road traffic, road no 114: Police-Tanowo,</li> <li>road traffic, road no 115: Police-Dobieszczyn,</li> <li>industrial noise of the “Police” Chemical Plant</li> </ul>	<ul style="list-style-type: none"> <li>road traffic in Dobieszczyn: 53 dB(A),</li> <li>road traffic in Uniemysl: 66 dB(A),</li> <li>road traffic in Trzebiez: 64 dB(A).</li> </ul>
10	Dobra Szczecinska	<ul style="list-style-type: none"> <li>group „2” – nature reserve, area of hospitals and nursing homes,</li> <li>group „3” – other areas.</li> </ul>	<ul style="list-style-type: none"> <li>road traffic, road no 116: Szczecin-Lubieszyn (the border crossing),</li> </ul>	<ul style="list-style-type: none"> <li>road traffic in Wolczkowo: 66 dB(A),</li> <li>road traffic in Dobra Szczecinska: 61 dB(A),</li> <li>road traffic in Buk: 55 dB(A),</li> <li>road traffic in Lubieszyn: 71 dB(A),</li> <li>road traffic in Doluje: 72 dB(A).</li> </ul>
11	Kolbaskowo	<ul style="list-style-type: none"> <li>group „2” – nature reserve, area of hospitals and nursing homes,</li> <li>group „3” – other areas.</li> </ul>	<ul style="list-style-type: none"> <li>road traffic, road A-6: centre of Poland-Kolbaskowo (border crossing),</li> <li>road traffic, road no 117: Przeclaw-Rosowko (border crossing)</li> </ul>	<ul style="list-style-type: none"> <li>road traffic in Przeclaw: 78 dB(A),</li> <li>road traffic on road A-6 (motorway): 74 dB(A).</li> </ul>
12	Szczecin	<ul style="list-style-type: none"> <li>group „2” – nature reserve, area of hospitals and nursing homes,</li> <li>group „4” – the city centre zone</li> <li>group „3” – other areas</li> </ul>	<ul style="list-style-type: none"> <li>road traffic in Szczecin and of the network of approach roads,</li> <li>industrial noise,</li> <li>railway noise,</li> <li>traffic on waterways of the Oder River, the Regalica River and Lake Dabie.</li> </ul>	<ul style="list-style-type: none"> <li>road traffic in Szczecin (on average): 70 dB(A),</li> <li>railway traffic in Szczecin (the area of the Szczecin-Gumience Station): 55 dB(A) (night)</li> </ul>

#### 4. Soil pollution

Basing on many years’ research, carried out by the Chemical and Agricultural Station in Szczecin, it has been stated that the soil in the area of the 12 communes located around the Szczecinski Lagoon is not contaminated with heavy metals.

**Table 3.2. List of the sites in the area of the Szczecinski Lagoon, where pollution with heavy metals: Pb, Cd, Cr, Zn and Ni occurred at 2<sup>nd</sup> and 3<sup>rd</sup> level\*:**

Element	Commune	Resort	Level of pollution
	Szczecin	Krzekowo	2
	Police	Msciecino	2
Zinc	Goleniow	Goleniow Helenow	2
	Stepnica	Czarnocin	2
	Szczecin	Krzekowo	2
	Police	Trzeszczyn	2
	Wolin	Wolin	2
Copper	Wolin	Gogolice	2
Nickel	Stepnica	Racimierz	2
Chrome	Wolin	Plocino	3
	Dobra Szczecinska	Wolczkowo	3

\* level 2 – the soil is slightly polluted. The plants cultivated in these areas might contain excessive quantities of heavy metals. Cultivation of such plants as lettuce, spinach, cauliflower and carrots should not take place in these areas.

level 3 – medium pollution. All crops on these soils might be contaminated with heavy metals. Cultivation of cereal crops, root crops and fodder crops is admissible on condition of a periodical control of the level of heavy metals in consumable parts of the plants. Industrial crops are recommended here.

Element	Commune	Resort	Level of pollution
	Kolbaskowo	Karwowo	2
Zinc	Stepnica	Piaski Male	3
	Wolin	Wiejkowo	2
Copper	Stepnica	Piaski Male	2
Cadmium	Stepnica	Piaski Male	3
Lead	Stepnica	Piaski Male	3
Chrome	Stepnica	Piaski Male	3
	Kolbaskowo	Siadlo Gorne	2
Nickel	Kolbaskowo	Smolecin	2

## 5. Waste management

### 5.1. Industrial waste

The amount of waste in the 12 communes located around the Szczecin Bay is very diversified, as 99.4% of the produced waste and 99.6% of the stored waste is the waste coming from the industrial plants located within the administrative borders of two communes: Police and Szczecin.

**Table 3.3.**

Commune	The amount of waste in 1997 [tons]			
	produced	utilised	neutralised	stored
Police	2,239,293.370	82,851.930	14,900.490	2,141,540.950
Szczecin	287,374.726	159,333.952	917.816	127,122.958
other communes	14,596.200	4,891.264	1,730.340	7,975.595

The producer of the biggest part of industrial waste in the described area is the "Police" Chemical Plant (phosphate gypsum, ferrous sulphate, sediments from the chemical sewage treatment plant, boiler-room ashes), the "Szczecin" Power Plant and the "Pomorzany" Power Plant (ashes and slags). The specific type of waste for this region is phosphate gypsum (about 2 mln tons are produced yearly) and ashes and slags produced by the power plants (over 210,000 tons).

The industrial wastes produced in the voivodeship are mainly stored at the waste storage yards of their producers or at municipal waste storage yards. An insignificant amount of the waste is utilised or neutralised.

The industrial waste storage yards of the described area are located in three communes: Szczecin, Police and Stepnica (**Map 14**). A number of industrial plants possess rotational waste storage sites (shipyards, sewage treatment plants etc.). The wastes are stored for some time and then recycled or neutralised or they are disposed of at municipal storage yards.

In the area around the Szczecinski Lagoon there are some specific toxic waste storage sites called *mogilniki* which pose a solemn threat. They are concrete containers in which mostly overdue pesticides and empty packagings are stored. Three of them are located in the described area, located in the communes: Dobra (resort: Wawolnica), Goleniow (Marszewo) and Kamien Pomorski (Chrzastowo). The quality of the waste disposed of there is unknown. The governmental programme of elimination of these storage sites assumes that they will be removed by the year 2000 but the realisation of this undertaking is strictly dependent on financial abilities.

### 5.2. Municipal waste

The condition of municipal waste management in the area included in the Management Plan is not satisfactory. Most of the waste is disposed of at dumping grounds, a great part is disposed of without permission in agricultural areas and forests. This state of matters is a consequence of lack of ecological awareness in the society.

It should be emphasised that in the area of the communes around the Szczecinski Lagoon the waste collection is usually well-organised.

Selective waste collection at the place of its production is performed in the Police commune and partly in Szczecin. Waste selection is carried out on the Sierakowo dumping ground (the Police commune) and in Swinoujscie on the Przytor-Ognica dumping ground. In the other communes no selective collection of municipal waste is carried out.

At present 19 organised dumping grounds utilised by municipal enterprises are located in the Management Plan area. The inspections reveal many defects in the exploitation of dumping grounds: incoherent disposal, unsystematic clean-up activities, lack of piezometers for groundwater quality examination, lack of degassing facilities, etc.

In the 90s 3 modern dumping grounds were brought into operation in the Management Plan area, possessing legal regulations (resolutions or decisions on utilisation, resolutions or decisions defining the conditions of exploitation). These dumping grounds are under permanent surveillance, the basement soil is leak-proofed and some of them possess degassing facilities.

It ought to be emphasised that industrial waste is also disposed of at municipal dumping grounds and therefore most of the municipal dumping grounds should be classified as municipal and industrial dumping grounds.

Aiming to decrease the unfavourable consequences caused by waste in the area around the Szczecinski Lagoon we should strain after:

- decreasing the amount of produced municipal waste through common implementation of the selective collection system and increasing waste reuse in economy,
- widening of the ecological awareness in the society
- implementation of low-waste and non-waste-producing technologies in industrial plants,
- building modern storage yards for municipal and industrial waste, reclamation of the old storage yards, elimination of illegal dumping grounds,
- building modern municipal and industrial waste utilisation plants,
- closing down of toxic waste storage sites in Chrzastowo, Marszewo and Wawolnica and reclamation of the area occupied by these storage sites

## **6. Damages caused by the forces of the Russian Federation stationed in Poland – Swinoujscie**

In 1991 the State Inspection of Environmental Protection started carrying out research aiming to identify and price the ecological damage caused by the army of the Russian Federation. At the beginning of 1991 the Military Technical Academy joined the research as a main executor and other professional companies joined as well. The research was finished in 1993 and in June 1994 the Main Inspector of Environmental Protection published *“Identification and pricing of ecological damage caused by stationed forces of the Russian Federation in Poland – the final report”*.

21 objects were included in the studies in which the biggest pollution and damage was expected, basing on the inventory of all objects carried out by the State Inspection of Environmental Protection. the range of the studies included: pollution of soil and groundwater with oil-derivative substances and other chemical substances, surface waters pollution, area pollution and damage, contamination with chemical warfare agents, radioactive contamination and damages in forests.

The object in Swinoujscie, with the area of about 135.5 ha, was a German military complex taken over by the forces of the Russian Federation in 1945. In the area of the objects the following elements are contaminated or damaged:

- soil and waters contaminated with oil-derivative products, volume: 810,100 m<sup>3</sup>, area: 20.9 ha,
- groundwater of the 1<sup>st</sup> water-bearing layer on the area of about 114 ha and volume of about 1.8 mln m<sup>3</sup>, which must be considered as not suitable for drinking and industrial purposes (identified pollution: lead, aluminium, nitrate nitrogen, ammonium nitrogen, chrome, mercury, nickel, zinc, copper and hydrocarbons),

- waste storage sites covering the area of about 1.28 ha,
- the soil and plant layer covering the area of about 23.2 ha,
- forests covering the area of about 60.8 ha.

The global pricing of ecological damage for this object has been fixed at 116.3 mln PLN.

The securing and reclamation works considered urgent are:

- drawing oil-derivatives from the ground on the area of about 1.8 ha,
- elimination and reclamation of waste storage sites on the area of about 1.28 ha.

The costs of urgent securing and reclamation works have been estimated at 2.5 million PLN.

On the area of other objects of the Russian Federation forces in the West-Pomeranian Voivodeship no detailed research was carried out in the years 1992-1993, which does not mean that no pollution exists there (however, the existing pollution is probably of a smaller range). The pollution is usually discovered when the objects are managed, e.g. the garage and workshop base in Szczecin in Wernyhory Street – oil-derivative pollution or the Mulnik Harbour Basin in Swinoujscie – polluted with unexploded shells and varied chemical substances stored in barrels in scuttled wrecks of barges.

**When developing management plans for the areas, where the Russian army was stationed, the existing pollution and possibility of finding unexploded shells and other dangerous items (such as containers with unknown substances or left-overs of such substances) should be taken into consideration.**

## 7. Anthropogenic alluvial soils in the outlet area of the Oder River \*

In the outlet area of the Oder River, as opposed to the other regions of the country, anthropogenic alluvial soils can be found, formed of bottom sediments coming from the systematic dredging of 68 kilometres of the waterway Swinoujscie-Szczecin. The extracted sediments are stored with a hydraulic transport on specially prepared silting fields, where they sometimes are 300 centimetres thick and they have a layer structure typical for muds. In this way, in the estuarial area of the Oder River 11 silting fields have been created with a total area of over 1000 ha.

The locations and characteristics of the silting fields, managed by the Maritime Office in Szczecin, was described in detail in the study by Sagalski and Stolarz (1986). The study says that a silting field is a delimited area (usually wet, difficult to irrigate and of a low agricultural usefulness), embanked and equipped in facilities allowing of receiving the water and ground mixture from dump barges or holds. Each silting field is equipped with a system of drainage dikes which drain off the water soaking through the dike and with monks and culverts for draining off the silting waters from the area of the field through the dikes.

Up to present the sediments from dredging of the waterway Swinoujscie-Szczecin and from dredging of harbour basins and channels of the total volume of about 1 million m<sup>3</sup> yearly have been stored on 11 silting fields: Karsibor B, Karsibor A, Karsibor C, Karsibor D, Chelminek, Mankow, Ostrow Kielpinski, Police, Swieta (1,2), Huta and Ostrow Grabowski. Their locations are shown on Figure 1. At present the following fields are used: Karsibor D, Chelminek, Mankow, Ostrow Grabowski and lately efforts are being made for preparation and utilisation of the silting field Przesmyk Orli.

Artificially formed sediment deposits on the silting fields are usually characterised by layer structure of the stored material and diversity of the material. The diversity depends on the kind and thickness of the layer of sediment replaced from the bottom of the reservoir, the type and power of used dredgers, technical facilities allowing of storage of a defined quantity of sediments on the field and the failure frequency of these machines, the dike systems and the methods of their packing stopping the solid phase of the sediment and at the same time making draining off of silting water possible, frequency of storage of the excavated material and the method of utilisation of the field, e.g. storing bottom sediments and washings from ship holds on the same field. The mentioned factors and the hydraulic transportation system form the microsculpture of the silting field, allocation of particular groups of sediments within one field and

---

\* E. Niedzwiecki, M. Protasowicki, *The Agricultural Academy in Szczecin*

they determine the homogeneity or heterogeneity of the material. As a result of their influence sandy sediments are accumulated mainly in the sites of outflow of the excavation material and smaller mineral fractions and organic matter flow to lower parts of the field forming in the neighbourhood of the dikes surrounding the silting field a sandy and silty or silty material, which according to the Polish Pedological Society is called organic and mineral material (with 10-20% loss at annealing) or organic material (more than 20% loss at annealing).

Usually mineral (sandy) sediments contain large quantities of shells. Moreover, most of these sediments (72.8%) do not have any skeleton fractions ( $> 1$  mm) and the dominating fraction is fine sand. In respect of mechanical contents they are usually loose sands with mass density of  $1.48 \text{ g/cm}^3$  on average, contents of organic matter 0-5%, contents of hygroscopic water 0.41% on average, and low capillary water content (25.4% of weight on average) and maximum water content (28.4% of weight). They are characterised by a usually neutral reaction (pH 6.3-7.5) and low affluence in assimilable and total forms of potassium and phosphor. In consideration of contents of heavy metals and chloroorganic substances they do not pose any threat to the environment (Niedzwiedzki, Tran Van Chinh, 1991; Protasowicki, Niedzwiedzki 1991; Protasowicki and others, 1992). Among the organic and mineral as well as mineral sediments formed on the silting field the dominating sediments contain 10-15% of organic matter. Their mass density is  $0.59 \text{ g/cm}^3$  on average and they are characterised by immense contractility, which after a longer period of drought causes forming of a system of slits with average width 2.5-7.5 cm and depth to 13 cm. However, during drought periods on the "Swieta" silting field slits of 18 cm of width and 40 cm of depth have been found. Experiments in laboratories have shown that "fresh" organic sediments (silty sediments) after bringing them to air-dry state in Kopecky's cylinders have decreased their volume by 50% and often they have become cracked across and as a result small elements of varied shape and thickness have been formed.

Analysis of the results which have been obtained during the research proves that organic and mineral and mineral sediments stored on silting fields indicate a large content of macroelements and microelements: e.g. in 100 grams of these sediments 594.4-682.0 mg of phosphor have been found and 440.9-548.6 mg of magnesium. However, the affluence in the mentioned elements is accompanied by high concentration of heavy metals.

The unfavourable influence on the environment is connected mainly with the organic and mineral and organic sediments stored on the fields. Solution of HCl (concentration:  $1 \text{ mol/dm}^3$ ) usually released:  $5.5\text{-}6.1 \text{ mg}\cdot\text{kg}^{-1}$  of cadmium (65-78% of its total amount),  $127\text{-}151 \text{ mg}\cdot\text{kg}^{-1}$  of lead (65-78% of its total amount),  $851\text{-}1154 \text{ mg}\cdot\text{kg}^{-1}$  of zinc (76-86% of its total amount),  $50\text{-}56 \text{ mg}\cdot\text{kg}^{-1}$  of copper (64-66% of its total amount),  $15\text{-}20 \text{ mg}\cdot\text{kg}^{-1}$  of cobalt (33-42% of its total amount) and  $21\text{-}29 \text{ mg}\cdot\text{kg}^{-1}$  of nickel (36-40% of its total amount). The salinity in these sediment did not exceed  $4.5 \text{ g NaCl}\cdot\text{dm}^{-3}$  and in the vicinity of Swinoujscie it rose to  $10.3 \text{ g NaCl}\cdot\text{dm}^{-3}$ . Among the studied silting fields the highest concentration of the mentioned metals was found in the sediments coming from dredging of the Oder River and of the harbour channels and basins in Szczecin, stored on the Ostrow Grabowski island. On this field the maximum concentration of elements was found at 30-40% of organic matter, their total amount usually counted: for cadmium  $10.0 \text{ mg}\cdot\text{kg}^{-1}$ , lead  $167\text{-}366 \text{ mg}\cdot\text{kg}^{-1}$ , zinc  $1329\text{-}1695 \text{ mg}\cdot\text{kg}^{-1}$ , copper  $154\text{-}322 \text{ mg}\cdot\text{kg}^{-1}$ , nickel  $51\text{-}98 \text{ mg}\cdot\text{kg}^{-1}$ . It should be emphasised that a similarly high concentration of lead and a higher concentration of cadmium, copper, zinc and nickel was found by Herms and Tent (1982) and Kuntze and others (1984) in the bottom sediments (silts) of the harbour in Hamburg.

## Conclusions

- Anthropogenic alluvial soils, existing within silting fields, formed by bottom sediments coming from dredging of the waterway Swinoujscie-Szczecin, access routes to small harbours and numerous channels and basins of the Szczecin harbour, are a specificity of the estuarial area of the Oder River. Generally the dominating material on silting fields is sandy material in the form of fine loose sand. This material, with concentration level of heavy metals comparable to the level in arable sandy soils, is applicable in many uses, among other things for strengthening of quays, for furnishing of recreational areas, for hardening of wet areas, e.g. for road construction, drainage of coastal soils and their reclamation.
- A high concentration of heavy metals in organic and mineral sediments (containing 10-20% of or-

ganic matter) and in organic sediments (more than 20% of organic matter) makes them useless in agriculture. Numerous studies prove that these metals accumulate in plants cultivated on such soil. However, they might be used for cultivation of willow brake, decorative plants and for furnishing of recreational areas. They can also be afforested, with a positive example of the Chelminek Island formed of sediments on the border of Róztoka Odrzanska and the Szczeciński Lagoon.

- The bottom sediments stored on silting fields as a product of water erosion are a specific soil material, on which a humus layer and a soil profile form relatively fast depending on the quality of the material and the character of the site, including the type of plants. A soil-forming process takes place in these sediments which proceeds similarly to the process of forming muds in river valleys.
- At present the anthropogenic alluvial soils within silting fields are covered mainly with meadows, more seldom with forests and sporadically even with allotments and for many years they are a permanent element of the landscape of the estuary of the Oder River and of the Szczeciński Lagoon.

One of the foundations of implementation of sustainable development is solving the issues of threats posed to surface waters and groundwater resources. The main goal of hydrosphere protection is establishing of rules of rational water resources management, counteracting or preventing from unbalancing of the nature and any changes in the water environment which will result in limitation of its usefulness for people, biocenosis and economy.

The strategy of hydrosphere protection must result from identification of water resources and take into consideration activities in the field of:

- improvement of groundwater and surface waters quality,
- natural and technical aspects of increasing water retention,
- modernisation of water resources management through basin management and water management plans of communes and districts,

legal and economic regulations in the system of water resources identification.

The strategy of hydrosphere protection should take into account the technical instruments of water protection together with the water environment monitoring.

Reassuring, the hydrosphere protection must take into account implementation of two directions of activities:

- activities of a regional character in the field of water balancing, identification of resources, protection, setting up the conditions of water utilisation in the estuary co-ordinated by the Ministry of Environment and the Regional Water Management Board in Szczecin,
- local activities at commune and district level connected with detailed works on the issues of water resources consumption, water resources protection within the framework of water management plans of communes and programmes of sustainable development of districts.

## **1. Water management plans of communes and districts**

The basic determinant of groundwater resources management for consumption and industrial purposes should be the Water management plan of the Commune (district) developed basing on the records of the water-economy balance and the conditions of water resources utilisation. The water management plan of the district should be an integral part of the sustainable development plan of the district.

A significant goal of the water management plan of the commune is pointing out to the local community the area of activity necessary for ensuring high-quality drinking water and setting limits for acquiring this resource in the context of the future development of the commune. The hitherto practice shows that a number of partial undertakings is carried out, some of them even complying with the requirements of the water management plan, but not of a thorough character which would allow of a conscious selection of the water supply variant with full regard to the cost of its acquiring and to the water resources protection and environmental protection.

The water management plan of the commune should cover the assessment of all aspects of water management, which is performed and planned in relation with:

- the conditions of the river basin water utilisation,
  - the requirements of quality and quantity protection,
- the formal and legal limitations.

The plan should cover existing and prospective water intakes and the areas of their water supply. The plan should also indicate activities related with water resources management and water resources protection from degradation, taking into account the needs of all water consumers in the commune.

## **2. The state of identification of water resources**

Since 1991, i.e. the year when Regional Water Management Boards were established (here – with headquarters in Szczecin), water management balances and conditions of the river basin water utilisation have been carried out aiming to balance the water resources in water basin configurations.

The examination of groundwater has been carried out for:

- the left-bank side of Szczecin (the river basin of Gunica),
- the river basin of Dziwna (except for the Wolin Island),
- the Wolin Island (the main groundwater reservoir No 102) – the works are being finalised at the moment,

the Uznam Island (where the main groundwater reservoir No 101 has been closed down due to water pollution and lack of perspectives of supplying Swinoujście with the water from this reservoir).

The surface waters balance with the elements of small retention and flood hazard has been worked out only for the left-bank side of the Oder River (the river basin of Gunica). The records of the water-economy balance and of the conditions of water utilisation is being worked out at the moment for the left-bank side of the Oder River (the river basin of Gunica).

With accordance to the facts above, the priorities of the methodical water resources identification of the Szczecinski Lagoon area and of specifying the detailed conditions of water utilisation become easily visible. They are:

**Table 4.1.**

The balance area	Groundwater resources	Surface waters resources	Water-economy balance	Conditions of water utilisation
The river basin of the Gunica River – 5105	developed and accepted	developed	development in progress	development in progress
The river basin of the Ina River	–	–	–	–
The islands Wolin and Uznam – 5107	developed (final stage)	– (urgent)	–	–
The river basin of the Dziwna River – 5108	developed, the acceptance process in progress	– (urgent)	–	–
The river basin of the Gowienica River – 5108	– (urgent)	– (urgent)	–	–

The data in the table above indicate that:

- the full process of identification of the water circulation system and of the economic and natural conditions of water resources utilisation is being finalised in the river basin of Gunica (the left-bank side of the Oder River),
- the documentation process of underground waters of the Wolin Island which is being brought to an end at the moment predisposes this region to the elaboration of water-economy balance and the water utilisation conditions first of all (in the year 2000) taking into account the following issues:
  - protection of the water geoecosystems of the Wolinski National Park and of the Reverse Delta of the Swina River
  - reorientation of polder drainage of the central and eastern part of the Wolin Island together with the recovery of wetlands (Wielkie Pla),
  - supplying Swinoujście and the resorts on the Wolin Island with consumption water (taking into account water transit from the areas outside the island).

Taking into consideration thermal waters in the future heating balance of the islands Wolin and Uznam is an issue worth mentioning (difficult due to the high salinity of these waters).

Simultaneous beginning of the work on water-economy balance and on the conditions of utilisation of the waters of the Dziwna river basin (right-bank side) together with the Gowienica river basin is advisable. The process is more complex due to lack of any works in this area in the river basin of Gowienica. The procedure should begin with the development and approving of the geologic works project for the documentation of discretionary groundwater resources, together with the identification of the main groundwater reservoir No 123.

The presented state of works on balancing of water resources in the Szczecinski Lagoon area, particularly groundwater resources, is connected with the method of groundwater documentation and rendering groundwater accessible, which, although it has been accepted for many years, has the following disadvantages:

- lack of regional water resources identification (except for the islands Wolin and Uznam),
  - lack of regional large intake water resources identification (except for Kodrabek, Wiejkowo and large water intakes of Szczecin),
- building water intakes for individual consumers with water resources approval in respect of the yield of the well and not of the needs of the consumer.

The consequence of the above is over-exploitation, overlapping of depression craters of many intakes and causing decreases in regional groundwater levels (regional depression crater). This was followed by accelerated migration of anthropogenic pollution from the surface, migration towards the saltwater or salty water surface from the Jurassic and Cretaceous layer, lateral inflow of saltwater from the Baltic Sea. These processes have been noticed in the areas of: Swinoujście, the Przytórski Peninsula, Międzywodzie-Swiewin and the coastal area except the Wolin Island.

Regional studies of water economy balance and of the conditions of water utilisation must contain suggestions of limiting water exploitation and covering water shortages and in this way they will contribute to the protection of wetlands (e.g. the area of the “Karsiborkie Paprocie” nature reserve under influence of the Wydrzany intake in Swinoujście, the lakes of the Uznam Island under influence of the Granica intake in Swinoujście, the swampy areas of the coastal gully under influence of the Strzeżewo intake).

Indication of the methods of increasing surface waters and groundwater retention mainly on wetlands will be an important element of water utilisation, together with the prognosis of increasing of the exploitable groundwater resources taking into account the reclamation of degraded wetlands.

The strategy of supplying water to the inhabitants of agglomerations (such as the Szczecin agglomeration) is connected with correct identification of groundwater resources. It is a difficult task, for many years related with reorientation of the consumption of water from groundwater to the surface water. A change in the mentality of engineering staff will be necessary as well. The main and local groundwater reservoirs that exist but have not been examined yet can become the basic source of supplying water to municipal agglomerations (Szczecin), municipal and industrial agglomerations (Swinoujście) as well as touristic and recreational zones (the coastal zone). The basic area where such groundwater reservoirs are located is the river basin of Gowienica and Dziwna between Goleniów and Kamień Pomorski, the river basin of Ina between Stargard and Goleniów and the Wolin Island.

### **3. The small retention restoration and water protection programme exemplified by the Wolin Island**

Wetlands are areas of a particular sensitivity to water condition changes. The systems of ponds, lakes and peatbogs influence water circulation in a hydrogeologic basin and settlement conditions of adjacent areas in a positive way.

Particular role of forests in water resources formation should be appreciated and therefore irrigation of forest foreland should be minimised.

After the analysis of the consequences of the small retention system degradation on the Wolin Island implementation of a watercourse and wet habitats restoration system has been recommended. A significant condition of the restoration system implementation is:

- a wide and penetrating identification of the environmental condition,
  - a forecast of consequences of the performed activities,
- assessment of the influence of engineering undertakings on the environment

The goal of restoration is:

- restraining the process of deepening of watercourse beds and the increasing water outflow,
- restraining the development of the regional depression crater,
- improvement of water conditions,
- renewal of small surface waters, transitional and groundwater retention,
- improvement of the topoclimate (reduction of vaporisation),
- enriching the flora and fauna,

- improving the qualities of the landscape,
  - introducing qualified recreation,
- ceasing the peatbogs' degradation processes and turning them back into marsh.

**The basic task of water retention renewal is protection of peatbogs, which must be of an active character.**

The basic part of the peatbogs protection plan should be the plan of restoration activities. Practical activities aiming to cease the degradation and to begin a process of turning peatbogs back into marsh should be the first stage of reclamation. The nature protection act obliges to carry out such tasks.

In the area of peatbogs protection the following tasks should be carried out:

- purposeful water management,
- restoration activities,

monitoring of the changes that are taking place and the obtained ecological effect .

The small retention renewal programme for the Wolin Island has been divided into stages taking into consideration:

- carrying out the delimitation of wetlands
  - development of the active protection programme
- planning technological activities

The programme must take into account proprietary issues, land purchase, observations of water outflow and water level fluctuations. The gathered documentation and observation material is the base for the entering corrections in the small retention programme.

The first stage of the programme involves:

- filling up the deepest irrigation ditches, crossing the peat layer (even blocking the water outflow leads to filling up with peatmoss),
- liquidation of deep drainage under the peat layer,
- implementation of improvements in the draining network and its reconstruction,

designing and reconstruction of ditches aiming to minimise their negative influence on peatbog areas.

The idea of small retention renewal on the Wolin Island has been put into practice in an undertaking carried out by the Union of Communes of the Wolin Island "Building of sewage treatment plants, sewage systems, water intakes and water pipes together with the investments for the protection of the main groundwater reservoir No 102 The Wolin Island".

5 areas requiring implementation of the small retention programme and 2 hydrotechnical objects needing changes in their functions have been selected basing on many years' observations and measurements.

The areas where the implementation of the small retention programme is needed have been arranged in accordance with the urgency of the task realisation:

- The Area of Szmanc Meadows,
- The basin of the lakes of the Wolinski National Park (the Lewinska Struga River to Zolwino),
- The area of meadows between Warnowo and Ladzin,
- Wielkie Pla,
- The Old Chalk Quarry in the area of the Wolinski National Park,
- The weir regulating the water outflow from Lake Koprowo (and water inflow from the Dziwna River),

The intermediate pumping station in Darzowice.

#### **4. Classification of the tasks and pro-ecological areas within the framework of water management**

The classification of the tasks and areas within the framework of water management has been carried out using the spatial delimitation method basing on the evaluation taking into account:

- identification of the problem
- identification of the consequences
- defining the influence on the environment
- suggestions of technical undertakings

predicted ecological effect

The classification has been divided into sections concerning:

- utilisation of the groundwater resources,
- identification of the main wetland areas of the Szczecinski Lagoon zone together with their evaluation and identification of the ecological effect,
- water resources management taking into account the degradation processes and their sources, the water resources protection strategy including the issues of water quality improvement and increasing its retention and resources.

In the specification main groundwater intakes localised in the zones of the largest deficit (at the same time being the zones of largest conflicts) have been listed, including their impact on the environment.

Generally, two zones of groundwater exploitation can be identified around the Szczecinski Lagoon:

- the coastal stretch from Swinoujscie to Strzezewo, the Szczecin region (the Warszawskie Hills).

A common attribute of groundwater utilisation in both zones is localisation of the large intakes in upland areas, being the areas of precipitation water alimentation and groundwater retention. The consequence of the above is:

- limited groundwater inflow to the basin of the river Gunica (marshy grounds in the area of Lake Swidwie),
- negative impact on the water geosystems of the Uznam Island (on the German side), negative impact on the water geosystems of the Wolin Island and on groundwater resources (regional depression crater).

In Table 4.2. main wetlands connected with valley depressions, coastal areas or the Reverse Delta of the Swina River have been listed, including their function and value in the groundwater circulation and retention system and specifying the essential pro-ecological undertakings in the area of water protection.

**Table 4.2. Identification of the influence of main water intakes on the environment with suggestions of undertakings minimising the negative impact of external factors.**

No	Source of water supply	Pressure	Influence on the environment	Suggested undertakings	Ecological effect
1	<b>Swinoujscie</b>				
1a	The "Granica" intake	Excessive water intake.	Development of a depression crater in the direction of the upland part of the Uznam Island. Decreasing water level on the German side, including the lakes of the park.	Limitation of the intake exploitation, supplying water from an intake out of the Wolin Island.	Elimination of the regional depression crater, limiting of migration of pollutants from the surface. Restoration of groundwater and surface water retention on the Polish and German side.
1b	The "Wydrzany" intake	Excessive water intake.	Development of a depression crater, a change in the water quality. Decrease of the water level in the area of Wydrzany, including the area of the nature reserve "Karsiborskie Paprocie".	Limitation of exploitation, supplying water from external sources.	Limiting of forced water inflow from the coastal zone and wet areas.
2	<b>Miedzzydroje</b>	Excessive water intake.	Development of a regional depression crater in the area of the Wolinski National Park.	Limitation of exploitation, building of a supporting intake basing on the wells in Kodrabek.	Reduction of the regional depression crater in the Wolinski National Park and supplying the villages of the western border of the park (Warnowo, Domyslow, Zolwino) in water.
3	<b>Strzezewo</b>	Excessive exploitation of the waters of the valley structure.	Development of a depression crater, forced inflow of polluted waters (potentially toxically contaminated – toxic waste storage sites).	Carrying out regional examinations of hydrogeologic tunnel-valley structures and of the proglacial stream valley bearing on mind building of water intakes.	Restoration of water retention in the eastern part of the sea proglacial stream valley, elimination of the negative influence on wetlands.
4	<b>Wolin</b>	Large intake of surface waters from the Dziwna River.	Unfavourable parameters of quality of the water supplied to the inhabitants.	Improvement of the unfavourable hydrochemical parameters of the drinking water.	Improvement of the unfavourable hydrochemical parameters of drinking water.
5	<b>Wiejkowo</b>	The groundwater intake not utilised.	None	Increasing the retention of groundwater and surface waters, increasing the retention in the wetlands in the valley of the Grzybnica River, supplying Swinoujscie in drinking water.	Increasing of groundwater and surface waters retention, increasing of retention of wetlands in the valley of the Grzybnica River, supplying Swinoujscie in drinking water.
6	<b>Kodrabek</b>	The groundwater intake not utilised.	None	Groundwater and surface waters retention renewal including the strict nature reserve Luniewo. Supplying Miedzzydroje in drinking water. Decreasing of the depression crater in Wolinski National Park.	Restoration of groundwater and surface waters retention including the strict nature reserve Luniewo. Supplying Miedzzydroje in drinking water. Reduction of the depression crater under the Wolinski National Park.

**Table 4.3. Identification of wetlands significant in the groundwater resources protection and groundwater quality protection processes with specification of essential pro-ecological tasks**

No	Localisation of wetlands	Leading function	Recommended pro-ecological undertakings	Effect
1	The Reverse Delta of the Swina River	Water protection. Peat-forming and island-forming processes. A main habitat area for birds.	Building of a sewage treatment plan and of a sewage system (carried out at the moment). Closing down the waste dumping grounds in Miedzzydroje and Ognica (Swinoujscie), on the eastern border of the national park.	Improvement of the quality of the waters in the Wolinski National Park area.
2	The Kodrabskie Depression	Peatbogs retaining water and blocking the groundwater outflow from the upland area. A bird habitat. The ecosystem is degraded to a high degree.	Limiting the amount of water pumped out in Darzowice. Reducing the depth of drainage. Recovery of the gates damming water outflow. Building sewage systems for the resorts of the central and eastern part of the island.	Groundwater retention renewal on the Wolin Island including the upland part with the Wolinski National Park. Surface waters retention renewal including water retention in the lakes of the Wolinski National Park.
3	The sea proglacial stream valley (the valley of the Swiniec River near Kamien Pomorski)	Water retention. Relations between surface waters and groundwater. Stimulation of groundwater supply of the sea proglacial stream valleys. Might become a water supply area.	Hydrological and hydrogeologic examinations are essential. Regulating of the sewage management and solid waste management. A detailed inventory of water management engineering objects is necessary.	Surface waters and groundwater protection. Increasing the retention and groundwater resources in the sea proglacial stream valley.
4	The valley depression of the lower stretch of the Grzybnica River and of the Wolczenica River	A wide swampy and peaty area blocking the water outflow from the river basin.	Regulating of the water and sewage management in the river basin. Closing down of the dumping grounds. Detailed hydrological and hydrogeologic examinations and an inventory of the technological infrastructure of water management are essential.	A buffer zone for protection of the waters of the Dziwna River. A bird habitat. Protection of mineral waters and curative waters mining area.
5	The lakes Ostrowo and Piaski with the valley of the Grzybnica River	Groundwater and surface waters retention. Water intakes' supply. Objective - building of a water intake to supply Swinoujscie and the sea coastal zone.	Regulating of the water and sewage management in the river basin. Regulating of the solid waste management. Development of eco-tourism.	Surface waters and groundwater protection. Lake protection.
6	The eastern coast of the Szczecinski Lagoon (the area of Stepnica and Skoszewo) and the Row Peninsula	Buffer zone of the Szczecinski Lagoon. Water retention (including flood retention). Bird habitat.	Restoration of the wetland ecosystems (detailed identification necessary). Regulating of solid and liquid waste management.	Protection of surface waters and peatbogs.
7	The valley of the Oder River in the Szczecin area	Flood water retention. Decreasing the level of pollution. Buffer zone - the most utilised and anthropogenically transformed areas.	Reduction of the technological infrastructure, The least transformed zone between the Ina River and the Gowienica River requires particular protection. The function of the area is hardly recognised. Hydrological examinations are necessary.	Protection of surface waters and water and mud areas.
8	The basin of the Gunica River	A zone of groundwater outflow from the area of the Warszawskie Hills. Water retention in the depression of the Gunica River. Bird habitat. Application of the sustainable groundwater intake programme.	Regulating and restitution of water management stimulating the retention, regulating of sewage and solid waste treatment.	Protection of valuable water geoecosystems and bird habitats.

## 1. Management in the area of the Maritime Office

Performance of maritime economy is strongly dependent on a number of factors, such as geographic, social, economic and legal factors. At present this branch of national economy, apart from many advantages, causes many problems and poses threats, mainly to the natural environment. As the usefulness and necessity of carrying out and development of varied domains of maritime economy (trade, ship building and repairing, yachting, fishery etc.) is a matter which does not need to be discussed, within the framework of the present study we should concentrate mainly on its negative impact on the environment. Besides, according to the concept of "Agenda 21" the directions of these activities should be indicated and promoted.

Location of the area included in the ICZM of the Szczecinski Lagoon near internal sea waters is connected with the necessity of delimitation (in compliance with the Act on sea areas of the Republic of Poland and maritime administration of 1991) of the technical zone along the seashore being an area of mutual, direct influence of the sea and the land, destined for maintaining the shore in the state compliant to requirements of safety and environmental protection and of a protection zone covering the area, on which human activity exerts a direct influence on the state of the technical zone (**Map 15**).

**In consequence, all plans and investment projects related with management of the technical zone, internal sea waters and the territorial sea are accepted or co-ordinated by the organs of maritime administration – the Maritime Office in Szczecin. Due to these reasons the role of this organ in realisation of the assumptions of the ICZM of the Szczecinski Lagoon is very important. Effective co-operation with self-governmental administration, especially at commune level, is necessary in the stages of planning and realisation of investments .**

### *The sphere of activities of the Maritime Office in Szczecin*

The sphere of activities of maritime offices is defined in the Act on sea areas of the Republic of Poland and maritime administration of March 21, 1991 (Government Gazette No 91, item No 131 with further changes).

The following issues belong in particular to the organs of maritime administration:

- safety of sea navigation,
- using of seaways, harbours and havens,
- safety connected with exploration, identification and exploitation of mineral resources of the sea bottom,
- **protection of the sea environment against pollution caused by the usage of the sea waters and by the dumping of waste and other substances within the scope which is not regulated by geologic and mining law,**
- life-saving, underwater works and extraction of property from the sea,
- professional technical supervision,
- fire protection in Polish sea areas, harbours and havens,
- co-ordination of decisions in the realm of issuing water licences, building licences in the area of the technical zone, sea harbours and havens, internal sea waters, the territorial sea and any other decisions concerning management in this zone, if a detailed rule does not claim otherwise,
- **building maintenance and conservation of shore protections, dunes and protective forestation in the technical zone,**
- delimitation of seaways, anchorages and examination of the navigation conditions,
- marking of navigation signs of seaways and anchorages in sea harbours and havens and on the coast.

The other tasks of the organs of maritime administration are: tasks connected with international co-operation in the field of safety of sea navigation and use of seaways, sea harbours and havens.

### *Forest management of the Maritime Office in Szczecin*

The Minister of Environmental Protection, Nature Resources and Forestry handed over forest management in the coastal technical zone and in the area of the Piastowski Channel to the Maritime Office in

Szczecin for the needs of coastal protection with the decision No DL-onl-40-52/93 of October 27, 1993. In the area included in the present study the forests are located on the stretch from the state border with Germany to the Lukecin resort (in the east).

The total area described above consists of:

<b>forest area</b>	<b>590.96 ha</b>
area connected with forest management	36.20 ha
unforested area	668.98 ha
<b>total</b>	<b>1296.40 ha</b>

out of which the following area is located in the Piastowski Channel:

<b>forest area</b>	<b>104.44 ha</b>
area connected with forest management	24.84 ha
unforested area	362.68 ha
<b>total</b>	<b>491.96 ha</b>

The described data is contained in the “*Valuation description of the forest as for December 31, 1991*” elaborated for the Maritime Office for the period of 10 years.

In the area of the technical zone of internal sea waters directly adjacent to the waters of the Szczecin-ski Lagoon no forest areas included in planned management exist. The activities on the area included in the study are carried out by three Coast Protection Districts: Miedzzydroje, Nowe Warpno, Wolin.

The tasks of the Coast Protection Districts include:

- administration and maintenance of the consigned part of the technical zone,
- tasks in the field of forestry concerning:
  - carrying out of the plan of forest management in protective forest areas,
  - nursery production,
  - management and biotechnical protection of dunes and cliffs,
  - drawing of economic conclusions in the field of forestry,
- emergency development after heavy storms and other interventions connected with the elimination of consequences of disasters,
- managing the work of subordinate districts,
- supervision over obeying of the rules concerning behaviour in the technical zone and on coastal waters up to 0.1 sea miles from the shore,
- securing of the property thrown out by the sea,
- participation in storm and flood operations,
- co-operation with self-governmental organs and flood committees.

The **technical zone and the protective zone** (coastal zone) are defined in the 8<sup>th</sup> chapter of the Act on sea areas of the Republic of Poland and maritime administration of March 21, 1991 (Government Gazette No 91, item No 131 with further changes).

#### **Article No 36**

1. *The coastal zone is the land area adjacent to the sea shore.*
2. *The coastal zone consists of:*
  - 1) *the technical zone – being the area of mutual direct influence of the sea and the land; it is an area which serves to maintain the shore in the state compliant with the requirements of safety and environmental protection;*
  - 2) *the protective zone – covering the area, where human activity exerts a direct influence on the state of the technical zone.*
3. *The coastal zone runs along the sea coast.*
4. *The Cabinet delimitates the borders and width of the technical zone and of the protective zone with a decree.*

### **Article No 37**

1. *The technical zone may be used for other purposes than listed in article No 37, passage 2, item 1 with the permission of the adequate organ of maritime administration, which at the same time defines the conditions of such usage.*
2. *Delimitation of hunting districts in the technical stripe is forbidden.*
3. *Water licenses and decisions in the field of building, changes in forestation, delimitation of hunting districts as well as development and realisation of spatial management plans in the protective zone need co-ordination with the director of the adequate maritime office.*
4. *All plans and projects concerning management of the technical stripe, internal sea waters and the territorial sea are validated by organs of maritime administration in co-ordination with adequate coastal communes.*

### **Existing restrictions resulting from locating an immobility or investment on the area of activity of the Maritime Office in Szczecin**

- An immobility located on the area of the coastal stripe, belonging to the Treasury or to a self-governmental unit in case of its sale, letting in hereditary tenure, utilisation, renting or tenancy in accordance with the article No 19, item 1 of the Act on immobility management of August 21, 1997 (Government Gazette No 115, item No 741 with further changes) needs co-ordination with the governmental administration organ adequate in maritime affairs, i.e. within the scope of the present study with the Director of the Maritime Office in Szczecin.
- Decisions on conditions of development and spatial management for investments located on internal sea waters and the territorial sea are issued by the director of the adequate maritime office – in accordance with article No 40 passage 3a of the Act on spatial management of July 7, 1994 (Government Gazette No 89, item No 415 with further changes).
- Decisions on conditions of development and spatial management for investments located on the area of the technical zone, protective zone, sea harbours and havens are issued by the chief officer of a group of villages, mayor or lord mayor after co-ordination with the director of the adequate maritime office – in accordance with article No 40 passage 4 item 5 of the Act on spatial management of July 7, 1994 (Government Gazette No 89, item No 415 with further changes).
- The Voivode is the organ of architecture and building administration of the first level in cases of objects and building works situated in the technical zone, sea harbours and havens, internal sea waters and the territorial sea, as well as on other areas serving sea traffic and transportation - in accordance with article No 82 passage 3 item 1 of the Act on building law of July 7, 1994 (Government Gazette No 89, item No 414 with further changes).

### **Preparation and equipping of silting fields and their allocation in the estuarial area of the Oder River**

Allocation and characteristics of the silting fields, maintained by the Maritime Office in Szczecin, is described in detail in the study by Sagalski and Stolarz (1986).

The study says that a silting field is a delimited area (usually wet, difficult to irrigate and of a low agricultural usefulness), embanked and equipped in facilities allowing of receiving the water and ground mixture from dump barges or holds. Each silting field is equipped with a system of drainage dikes which drain off the water soaking through the dike and with monks and culverts for draining off the silting waters from the area of the field through the dikes.

Up to present the sediments from dredging of the waterway Swinoujście-Szczecin and from dredging of harbour basins and channels of the total volume of about 1 million m<sup>3</sup> yearly have been stored on 11 silting fields: Karsibor B, Karsibor A, Karsibor C, Karsibor D, Chelminek, Mankow, Ostrow Kielpinski, Police, Swieta (1,2), Huta and Ostrow Grabowski. Their locations are shown on Figure 1. At present the following fields are used: Karsibor D, Chelminek, Mankow, Ostrow Grabowski and lately efforts are being made for preparation and utilisation of the silting field Przesmyk Orli.

## **2. Transportation**

The infrastructure base for the transportation branch plays a key role in the process of integration of regions. Popularisation of economical and effective means of transportation – both private and public – is

a priority task for modern policy. In this sector many collisions between the concept of environmental protection, economic and social aspects of the issue exist in the light of the principles of sustainable development.

The threats posed by the transportation branch are visible on the local and global scale, causing deterioration of health and life standard of the people. The most important issues in this realm are high grade of fuel consumption, causing emission of pollutants into the atmosphere, emission of noise, dynamic development of the network of roads and motorways causes protuberant use of space and devastation of the natural landscape.

Infrastructure investments should take into account such issues, as road, railway and sea communication routes, harbours, miscellaneous transport, systems of municipal transportation, international transport, telecommunication etc.

The point of approach should be creation or development of a transportation system, ensuring equal access to the means of transportation and mobility of all inhabitants of the region, taking into account the carrying capacity of the ecosystem on local, regional and global scale.

Working out of effective activities limiting the negative influence of transportation on environmental conditions needs a multifarious, interdisciplinary, multidimensional and long-term approach to the problem.

Sustainable development of transportation is the main goal of the activities undertaken at present within the framework of the *Baltic 21* process. To reach this goal three main conditions must be fulfilled with the help of the means and instruments listed below:

***necessary conditions:***

- avoiding increasing vehicle traffic,
- change of proportions in utilisation of varied means of transportation (for the benefit of public transportation),
- improvement of the traffic conditions.

***means and instruments***

- influence on the costs of transportation,
- influence on the quality of transportation,
- organisation and management,
- behaviour of the participants of the traffic

***authoritative actions***

- fiscal and market instruments,
- regulating factors,
- means of investments and planning,
- social awareness,
- information.

The issues causing most conflicts on the area of the ICZM of the Szczecinski Lagoon (**Map 16**) are:

- **road border crossings between the Republic of Poland and the Federal Republic of Germany:**
  - Swinoujscie-Garz, for passenger traffic, whose start-up will take place in the near future. the problem which will occur is lack of possibility of estimation of the scale of motor traffic in the western part of Swinoujscie and probable transit to the Polish sea coastal zone.
  - It is supposed that building of a permanent road link under the Swina River will cause intensification of traffic between the islands Wolin and Uznam. Also membership of Poland in the European Union will allow of another view on this issue.
  - Swinoujscie-Albeck, for pedestrian and bicycle traffic without motor vehicles,
  - Dobieszyn-Hintersee, allowing after the preliminary estimation of its influence on the environment starting up clearances for passenger, pedestrian and bicycle traffic (no goods traffic). This border crossing will cause natural tendency of increasing traffic in Szczecin from the north-western direction (mainly from Ueckermünde). The most important issue is the influence of such step on the nature reserve “Swidwie” and the Wkrzanska Forest. Therefore one of the remedial meas-

ures is limiting of the rank of this crossing and application of adequate organisational and technical solutions limiting the negative impact of vehicles on natural environment.

- **Admissible motor traffic on the Uznam Island.** Admissible motor traffic on the Uznam Island has already been the subject of research:
  - on the German side such analysis was carried out in relation with the project of including the Uznam Island in the group of areas “of special natural conditions for development of tourism and recreation” of Mecklenburg-West Pomerania and in relation with the campaign of the “Green” movement whose aim was to limit motor traffic in favour of railway transportation,
  - on the Polish side the analysis concerned only the methods of protection of the health-care district in Swinoujście against the increasing level of motor traffic as more and more vehicles use the municipal ferry crossing.
- **Crossing of the expressway S-3 through the Wolinski National Park** in the thoroughfare of the present corridor of the state motorway No 3 and necessary corrections of the road between Dargobadz and the entryway to Miedzyzdroje. This stretch is the priority in modernisation activities of the administrator of the road. Realisation and reaching the parameters of the expressway is an effect of many years’ negotiations with the Wolinski National Park. At present this stretch is the bottleneck for the passenger cars and trucks driving to and from Swinoujście and the Sea Ferries Base which has been extended in the last few years.
- **Expansion of the harbour base in the western part of Swinoujście (on the Uznam Island).** The thorough modernisation of the former German and later Russian fuel base raises controversies although it has been modernised in compliance with the EU standards. Another area causing conflicts are the terrains south from the fuel base and in the area of Basen Polnocny (the North Basin). They have a potential chance of being spatially managed after the works on cleaning of the Mulnik Channel are finished and the transportation conditions on the island are regulated. The evidence of possibility of positive solving of the controversies is building and exploitation of a joint Polish and German treatment plant located near the fuel base and serving the Uznam Island on both sides of the border. A similar solution is taken into consideration, involving the eastern part of Swinoujście located on the Wolin Island (together with main harbour areas).
- **Functions of the chemical harbour in Police.** All editions of spatial management plans of the Police commune and of the resort Police up to present have sanctioned the existence and development of the chemical sea and inland harbour in Police. At present it is an institutional harbour of the “Police” Chemical Plant but it should become a regional harbour of a public character for varied chemical freights and liquid fuels.

#### **Suggested tasks for realisation in the field of transportation:**

- ♦ Settlement of the question of opening or change of the status of planned and existing road border crossings between the Republic of Poland and the Republic of Germany.
- ♦ Finalising of the road investment through the area of the Wolinski National Park in the thoroughfare of the state motorway No 3.
- ♦ Building of an underwater tunnel in Swinoujście.
- ♦ Building of a ferry crossing on the waterway in Police.
- ♦ Reactivation of the railway connection between Swinoujście and the German part of the Uznam Island.
- ♦ Building of a passage across the Szczecinski Lagoon between Nowe Warpno and Swinoujście.
- ♦ Building of a ring road for Szczecin.

### **3. Tourism**

The issues of development of tourism activities except for passenger conveyance which are included in the transportation sector have been considered here. The most important elements of tourism activities are: the hotel and supply base, services of travel agents and tourist organisations, research and educational programmes, attractive areas of high landscape values, event and celebrations connected with local tradition and culture, promotion of local products typical for the region (artistic handicraft, healthy food etc.).

Sustainable development of tourism means increasing quality of the offered services and limiting of energy consumption and also decreasing of the level of environment contamination. The main assumptions concern the three major elements of sustainable development: environment, economy and social situation:

- maintaining of a good condition of the natural environment and taking into consideration the regenerative abilities of the natural and anthropogenic landscape with simultaneous integration of natural, cultural and social factors,
- promotion and maintaining of high quality of services of the tourist sector,
- creating of favourable social conditions for development of local tourism.

Aiming to realise the assumptions mentioned above and to perform the monitoring of development processes, the following activities can be undertaken:

- forming of the rural and urban landscape with respect to biodiversity of the environment,
- pro-ecological spatial management in the areas destined for recreation and tourism,
- securing of constant development of the tourist industry,
- effective management of the structures and resources for tourist purposes,
- increasing of the life standard of local communities,
- creating of tourist services of high quality.

The activities necessary for achieving the goals mentioned above involve the following domains:

- planning in the field of state and regional tourism,
- regional spatial planning,
- educational programmes and trainings on ecological awareness,
- co-operation in the Baltic Sea region and in the European Union,
- management systems favouring environmental protection,
- support for pro-ecological practices of tourism activities in rural and urban areas.

Each form of tourism activity should respect the regenerative abilities of the environment, long-term protection of nature resources and protection of cultural scenery, and also possess full acceptance of local social and economic environments.

Tourism to a large extent depends on the conditions, which are strongly influenced by the performance of other sectors, such as industry, transport and agriculture. Development of tourism and activities in this realm determine the condition of the natural environment, cultural scenery and social situation in the region. It concerns the future directions of development as well as corrections of the activities undertaken at present.

Due to the fact that social and economic conditions for development of tourism in particular communes of the area of Integrated Management are diverse, we should assume that also the set up goals will differ. Nevertheless, the process for the benefit of sustainable development should be a joint action of the interested parties – communes. To reach this goal, the following questions should be solved and adequate actions undertaken:

- adequate legal regulations are necessary for securing minimum standards,
- an educational cycle should be organised and education should involve all subjects in the tourism branch, workers in the network of services, local authorities, society and tourists,
- criteria and guidelines should be defined for particular communes and their functions should be specified. The method of environmental influence assessment of human activity should be used (EIA) as well as the regenerative abilities of the natural environment,
- accommodation and supply base should be organised with the use of environmental management systems (including auditing of the natural environment), which will allow of limiting of water and energy consumption and waste production,
- introduced legal codes should regulate the activities of travel agents and their obligations to customers,
- a computer register of projects carried out in the field of tourism should be set up.

As the issues of development of tourism on the described area has been the subject of a number of studies and analysis, in the present ICZM of the Szczecinski Lagoon we concentrated on the issue of the need of promotion and activation of development of cycling paths. Up to present a system of cycling paths has been planned for international traffic (the route around the Szczecinski Lagoon, the Hanseatic route by the sea-side), for regional traffic (the route of palaces and castles) and for local traffic (**Map 17**). The routes of the existing and planned cycling paths are synchronised with the elements of the natural environment of significant nature values, such as the national park, landscape parks, nature reserves, bird habitats, monu-

ments, observation points, lodging places, watering-places, yacht havens etc. Analysing the course of these paths it should be stated that they are tourist routes of high values and they can meet the needs of many people. However, it is believed that the network of existing paths is too weak and it needs further expansion. The basic system of cycling paths listed in the study should be completed with the paths within the communes:

- they should complement the basic system and base on local nature and landscape values,
- within the framework of ecological education activation of didactic paths is advisable, especially for groups of youth interested in concrete issues,
- development of service base and tourist infrastructure with special regards to agrotourism will give a chance of successful implementation of the project of cycling paths,
- preparation of publications presenting cycling routes will create a chance of development of cycling tourism promoted in Agenda 21.

#### **Suggested tasks to be carried out in the field of tourism**

- Development of programmes for promotion of tourism basing on local nature resources.
- Management of attractive terrains and at the same time respecting of the principle of protection of biodiversity. Development of specific objects such as thematic paths, observation point.
- Creating possibilities for spending time in a unique way, such as sea angling, searching for amber, paragliding etc.
- Development of infrastructure serving tourists and marking of the routes will lessen the risk of negative interference in natural environment and will augment the ecological awareness of potential tourists and users.

#### **4. Power industry and industry**

Both the economic activity and industrial production are the major issues in the process of realisation of the principles of sustainable development.

##### ***Power industry***

Power industry is the most important branch for realisation of the concept of sustainable development, being a synthesis of such issues as social problems, environmental protection, economic growth and the safety and health of the society.

As for the nature resources, the situation is rather favourable in spite of the fact that mineral fuels (oil and gas) are commonly used and alternative sources of renewable energy still do not find a common application in most of the countries of the region.

Rationalisation and limiting of electric energy consumption is also an important element of the branch. Some progress has been achieved in the field of housing through promoting of modern devices and energy-saving technologies. The process of transformation of the activities in power industry in the direction of sustainable management of nature resources will proceed gradually but the main goals can be set today, such as environmentally safe supplies of energy and an effective system of distribution basing on tightened regional co-operation.

#### **Suggested activities in the field of power industry**

- Common use of alternative sources of energy, including environmentally safe and renewable sources (water and wind power plants, solar energy, bioenergy) where it is possible and does not generate any new conflicts.
- Limiting of exploitation of non-renewable resources (mineral fuels) due to climatic changes and degradation of the natural environment.
- Increasing of the effectiveness through economical and rational management of electric energy resources, with consideration of adequate market mechanisms and institutional reforms in the field of housing, industry, transport etc.
- More effective use of local electric energy resources.

## **Industry**

The area of ICZM of the Szczecinski Lagoon is diversified considering allocation of industry. In Szczecin, Swinoujscie, Police and Gryfino the biggest industrial plants of the voivodeship which are strategic for the economy of the country are located. It is a circumstance for dynamic economic growth and prosperity of the inhabitants. The condition for stimulating of the economic growth are investments for the benefit of modern, environmental-friendly technologies, modernisation of the infrastructure for industrial production and reorganisation of the management systems of production processes. Unfortunately, places defined by HELCOM as posing particular threat to the environment of the Baltic Sea, so-called *hot-spots*, are also located in this area. Virtually the whole municipal economy and industry of the Szczecin agglomeration is counted among them.

### **Actions undertaken of the users of the environment**

Basing on the activities of companies which have been observed for many years, three basic methods of their treatment of the issues connected with environmental protection can be distinguished:

- passive; the companies do not notice the chances or hazards connected with the environment until it is too late,
- reacting; before taking any remedial measures the management wait for the events and problems to be solved without their involvement. A company with such attempt can gain profits for a short period of time but they will never be sure if they do not drift towards bigger ecological problems. In case such problems occur, the company is not ready to face them,
- pro-active; i.e. such company, which carries out monitoring of ecological issues within the framework of its everyday activities and prepares remedial measures before the situation becomes critical. This policy does not mean that the company escapes from difficulties and problems but that it is better prepared to act in critical situations.

The industry has undertaken many activities aiming to introduce so-called *environmental management systems*, whose base is decreasing of negative influence on the environment and informing the society about such actions is a very important element. Introducing of uniform environmental standards, such as Environmental Management and Auditing System, being a voluntary system for the companies acting systematically for the benefit of improvement of their influence on the environment through working out and carrying out environmental protection policies and informing the public about their activities for the benefit of environment and the results of these activities (*EMAS – Environmental Management Analysis System*, directive No 1836/93 of June 29, 1993). **The priority goal is adjusting of the activities carried out by companies to the requirements included in legal acts and rules concerning environmental protection.**

Implementation of ISO 14000 standards is becoming more and more popular (these standards have also been introduced in Poland), in which the most important fact is that they must be inserted into the whole mechanism of taking strategic decisions concerning the future of the company and not only the everyday's management. In the long-term it may allow of financial savings (avoiding or reduction of costs) and consequently lowering of the prices of products. Development and implementation of such systems in the company improves its "image" as well. Its meaning is more and more important on European markets and the companies which want to present there in the 21<sup>st</sup> century have to think about it now.

Introducing of more effective market mechanisms of "unprofitableness" of polluting would accelerate this process.

**Only the users of the environment who want to gain maximum profits in a short period of time will not apprehend the necessity of implementation of management systems with an environmental protection repair programme.** In this case, self-governmental authorities may again play an important role working out adequate, long-range environmental management programmes on their areas and in this way forcing the "insubordinate" users to fulfil the requirements. The issue of educational programmes is then resumed again, both for users of the environment and for self-governmental authorities.

**A chance exists of taking advantage of the changes introduced by the administration reform – the self-government of a commune, district or voivodeship becomes the real host of the areas which are managed by it.**

### ***Possibilities of enforcement of the ecological requirements regarding environmental users***

According to the Polish legislation, without doubt the institution of the greatest importance for controlling and enforcement of the environmental protection law is the Inspection of Environmental Protection.

The administration reform has introduced significant changes in the functioning of the State Inspection of Environmental Protection.

Since January 1, 1999 the services of control and assessment of the state of environment perform their activities under the name of Inspection of Environmental Protection which still remains self-governmental administration working on the central and voivodeship level. The activities of the inspection are carried out by the Main Inspectorate of Environmental Protection and by the Voivodes who carry out the tasks with the help of Voivodeship Inspectorates of Environmental Protection. These inspectorates are part of the joint voivodeship administration.

The basic tasks of the Inspection of Environmental Protection are: inspection of complying with the legal rules on environmental protection and rational use of nature resources, assessment of the state of environment within the framework of the State Environmental Monitoring, acting in the field of prevention against accidental pollution and prevention against illegal importation, exportation and transit of waste.

During the inspection not only the type and range of infringing of the environmental requirements but also the reasons for these abnormalities and the possibilities of their permanent elimination. In inspection activities all capacities of the Inspection regarding enforcement of the requirements of environmental protection are used. Therefore strict co-operation with other inspection institutions, limbs of the Law and public administration organs is performed.

The inspection activities are destined to achieve concrete ecological effects. The most important goals according to the Main Inspector of Environmental Protection are among other things limiting of the arduousness of the biggest sources of pollution on the scale of the country (co-called list of 80), elimination of the companies which are particularly arduous for the voivodeship (so-called voivodeship list). On the area of ICZM two plants from the state list ("Police" and "Wiskord") are located and a few plant from the voivodeship list.

The plants which are included in the state and voivodeship list are nearly constantly inspected, not only regarding the improvement of pollution emission parameters but also complex repair programmes. Inspection activities and measurement tasks concentrate in these plants mainly on the ecological problems which are selected in each of them.

Analysis of the achieved ecological effects allows of taking decisions on excluding of the plant from the list or keeping the plant on it.

Despite the criticism stirred up by the "list of 80" and the voivodeship lists, particularly among the users of the environment, it is still the most effective method of enforcement of the activities for the benefit of the improvement of the state of environment.

The policy of postponement and even remission of the fines has been practised for a long time in the cases when a repair programme is carried out. The fines administered to economic units serve mainly enforcing of fulfilling the environmental requirements, including undertaking ecological activities by these units, mainly investments. The act on environmental protection and forming of the environment leaves a possibility of postponing for a few years the deadline for paying the fine on condition that the company will carry out investments which will eliminate the reason for administering the fine. If the investment is carried out on time, the fine is decreased by the amount of own financial means used to realise this investment. The companies which have not met their obligations have been penalised by increasing the fine by 50%. The effectiveness of realisation of the obligations by economic units is very high (80%).

Insufficient number of staff and low wages of inspection services in Voivodeship Inspectorates of Environmental Protection is without doubt a significant obstacle in the programme of the inspection of plants. The situation may be improved not only through increasing the financial means for the Inspec-

tion but also through extending inspection and executive competences on different levels of self-governmental administration.

Access to information on quality and quantity of the pollution emitted into the environment, being the base for assessment of negative influence caused by economic units, is a very important factor for well-performed environmental management.

The new Constitution of the Republic of Poland guarantees in article No 74 access to information on the state and protection of the environment to everybody and obliges the authorities to support the activities of the citizens for the benefit of environmental protection and improvement of the state of environment. The access to information is to some extent regulated by the Act on environmental protection and forming of the environment (together with the amendment of 1997).

Monitoring of emission into the environment is not regulated well enough by the Polish legislation. Although the obligation of reporting on pollution discharged into the environment to bureaux for statistics exists and it forms the base for administering the fees for economic use of the environment, no adequate decrees regarding the issue of reliability of the data supplied by the users of the environment exist and there are no explicit guidelines saying which institution should collect the data.

**Awakening of ecological awareness of the society is becoming more and more important as the society demands from the users of the environment that they produce evidence of compliance of their actions with the law. Many times the activities undertaken by local societies have led to pro-ecological actions undertaken by economic units, sometimes more firm than required by law.**

**We should consider how to accelerate the process of augmenting of the participation of the society in environmental controlling and management. For this issue well-prepared educational programmes and conveying of information on the environment through a wide and adjusted to the receiver form of reporting on its quality are essential.**

Co-operation with self-governmental administration is necessary, new legislation states that the Inspection of Environmental Protection and especially Voivodeship Inspectorates have to carry out the co-operation with the self-governmental units. It means that their initiative of control and monitoring activities should be (considering the financial abilities and staff) taken into account when planning the activities of the Voivodeship Inspectorates.

## **5. Agriculture**

Agriculture is an important aspect of the economy but also the main source of pollution, having a negative influence especially on the state of waters. Agriculture has been undergoing vital transformations in the field of organisation of management, ownership of arable grounds, motivation, market situation (both in the country and concerning exportation) and in the field of environmental protection.

**In the light of the *Baltic 21* process we should endeavour for achieving the following goals:**

- agricultural production of high quality, safe for the health of consumers,
- elimination of the phenomenon of eutrophisation of water reservoirs and contamination of drinking water sources with nitrogen compounds as a result of using artificial fertilisers,
- elimination of the influence of air pollution on agriculture,
- regeneration and protection of the nature diversity of the agricultural landscape,
- improvement of health condition of farm workers,
- protection of high quality of soils and cattle herds of high production potential.

## 6. Fishery

The main goal of well-performed management in this realm is securing of reproduction of fish resources. Activities should be undertaken leading to achieving the following goals:

- ♦ modernisation of the methods of fishing,
- ♦ taking into account the changeable hydrographic conditions,
- ♦ decreasing of the emission of phosphor and nitrogen compounds into the waters of the Lagoon and the Bay aiming to eliminate the phenomenon of eutrophisation, having a negative influence on the reproduction of resources.

**The species which should draw particular attention is pike. After giving up stocking with fry, despite undertaking many administrative protection interventions, a continuous decrease of the numerical force of the shoals has been noticed. The decrease is caused by many factors, the main factor is cutting off the access to natural spawning-grounds, i.e. periodically flooded coastal meadows, through building dikes on the shores and malfunctioning of the locks from the ecological point of view.**

Fishing of salmonid fish in the waters of the Lagoon is held thanks to stocking actions (carried out in the coastal areas of the Baltic Sea and in the littoral waters) and a tendency to increase has been noticed in the last few years.

Since the beginning of the 70s twaite shad has become extinct completely, not only in the waters of the Lagoon but in the whole Baltic region. The shoals of cyprynides have become extinct as well. At the same time, as a result of stocking actions, hybrids of sturgeon have reappeared, whose single, young individuals can be found occasionally in the catch.

During the development of fishery more and more rational methods of protection have been applied, adjusted to the state of shoals of particular fish species. The following elements should be listed here:

- protection of spawning-grounds, fry and immature fish,
- partial protection of spawners (concerning pike-perch),
- stocking with fry,
- aiming for well-performed exploitation of the shoals of particular species.

These tendencies should be preserved.

**Directions of scientific research and administrative activities should aim above all to:**

- develop the rules of limiting of fishing of particular fish species not only in the waters of the Lagoon but in the whole estuary together with the waters of the Pomeranian Bay,
- carrying out of systematic stocking actions concerning the species, whose existence in the reservoir is essential due to ecological reasons. These species are e.g. pike and lavaret,
- preventing from damage of biocenosis, as damaged biocenosis does not return automatically to its natural state.

Detailed tasks are listed in the part concerning nature protection.

## 7. Accidental pollution

According to the legal definition, accidental pollution is a threat caused by a sudden incident, excluding natural calamities, which may cause large damage to the environment or worsening of its state posing a threat to the people and environment. Accidental pollution may have a significant influence on management of the coastal zones of the Szczecinski Lagoon. Therefore this problem should be taken into account in the ICZM of the Szczecinski Lagoon.

The potential sources of accidental pollution are harmful substances which are used or stored on the area of the management plan and transported through this area (**Map 18**). These substances are ammonia and other compounds indicated in adequate regulations. Moreover, exploitation of oil, which is carried out in some parts of the area of the ICZM of the Szczecinski Lagoon, is also counted among the sources of accidental pollution. Especially dangerous sites where substances being potential sources of accidental pollution are used or stored have been indicated on the map, as well as the routes

of their transportation, the sites which in case of disasters will pose a particular threat to the waters and sites where oil is exploited.

**Bearing on mind the facts stated above, the tasks that ought to be carried out are:**

- long-term and medium-term tasks: creation of rescue centres at the State Fire Brigade in Swinoujście and Szczecin and developing of plans for preventing from accidental pollution on different levels of administration and also by economic units.

**Table 6.1. Identification of the basic tasks to be realised in the commune programmes, basing on the inventory carried out by the Marshalship (data compiled by the communes).\***

<b>The Dobra Szczecinska commune</b>	
Supplying the commune with water	<ul style="list-style-type: none"> <li>• Installing water-works in new-built houses.</li> </ul>
Sewage management	<ul style="list-style-type: none"> <li>• The sewage system in the commune is being built at the moment.</li> </ul>
Waste management	<ul style="list-style-type: none"> <li>• Building of a municipal waste processing plant in Redlice.</li> </ul>
Investments improving the condition of the environment – planned and carried out	<ul style="list-style-type: none"> <li>• Supplying the commune with gas and building of a complex system of water-works.</li> </ul>
Threats posed to the environment concerning other communes	–
Necessary activities concerning environment on a scale larger than local which eliminate the threats	–

<b>The Dziwnow commune</b>	
Supplying the commune with water	<ul style="list-style-type: none"> <li>• Continuation of building of the strategic water-works Strzezewo-Miedzywodzie.</li> <li>• Modernisation and development of the intercommunal water intake in Strzezewo.</li> <li>• New bore-holes of water wells and other alternative outlets, e.g. the Kamienski Lagoon.</li> </ul>
Sewage management	<ul style="list-style-type: none"> <li>• Finishing of the development of the treatment plant in Miedzywodzie.</li> <li>• Connecting of the resorts Dziwnówek and Dziwnow to the treatment plant in Miedzywodzie.</li> <li>• Completing of the network of sanitary sewage system in the resorts.</li> <li>• The old sanitary sewage system should be replaced with a new one made of PVC and the old one should be used for storm-water sewage.</li> </ul>
Waste management	<ul style="list-style-type: none"> <li>• Intercommunal solid waste storage site beyond the commune borders.</li> <li>• Including the commune in the selective waste collection programme, purchase of containers, preparing of storage sites.</li> </ul>
Investments improving the condition of the environment – planned and carried out	<ul style="list-style-type: none"> <li>• Melioration in Miedzywodzie.</li> <li>• Forestation of dunes.</li> </ul>
Threats posed to the environment concerning other communes	<ul style="list-style-type: none"> <li>• Threats posed to the water intake in Strzezewo by toxic waste storage sites in the Kamien Pomorski commune.</li> </ul>
Necessary activities concerning environment on a scale larger than local which eliminate the threats	<ul style="list-style-type: none"> <li>• Programme of securing the beaches against ecological disasters (oil-derivative pollution).</li> <li>• Necessity of building of n intercommunal solid waste storage site.</li> </ul>

<b>The Goleniow commune</b>	
Supplying the commune with water	<ul style="list-style-type: none"> <li>• Aiming to secure the whole population and economy of the commune with water-works, the following resorts must be connected: Burkowo, Glewice, Katy, Kliniska, Krepsko, Miekowo, Imno, Laniewo, Modrzewie, Niewiadowo, Rurzyca, Wierzchoslaw, Zabrod, Zdzary, Zolwia Bloc, Zolwia, Swieta, Komarowo, Lubczyna.</li> </ul>
Sewage management	<ul style="list-style-type: none"> <li>• Komarowo – building of a sewage treatment plant with a sewage system.</li> <li>• Zalom-Pucice-Kliniska-Rurzyca-Czarna Laka, Dobroszyn – building of a sewage treatment plant with a sewage system.</li> <li>• Goleniow – building of a sanitary sewage system and development of the treatment plant.</li> <li>• The village complex: Krepsko, Modrzewie, Katy, Swieta-Laniewo – sewage system.</li> <li>• Area of so-called Goleniowski Technological Park.</li> <li>• Solution for sediment management.</li> </ul>

\* The Marshalship – the results of the surveys carried out in the communes for the Strategy of Development of West-Pomeranian Voivodeship.

<b>The Goleniow commune – continued</b>	
Waste management	<ul style="list-style-type: none"> <li>As the Goleniow commune receives the waste from neighbouring communes, there is a need for: <ul style="list-style-type: none"> <li>1<sup>st</sup> stage – Podansko – building of the 2<sup>nd</sup> section of the storage site of municipal solid waste and solid waste similar to municipal,</li> <li>2<sup>nd</sup> stage – new location for the storage site of municipal solid waste and solid waste similar to municipal.</li> </ul> </li> <li>Analyse the possibility of using the drift in Mosty with the option of implementation of the selective waste collection programme. Building of a composting facility for organic waste.</li> </ul>
Investments improving the condition of the environment - planned and carried out	<ul style="list-style-type: none"> <li>Sewage system: <ul style="list-style-type: none"> <li>being currently built – Lubczyna, Borzyslawiec, Komarowo,</li> <li>planned – Kliniska, Pucice (modernisation), Czarna Laka, Zalom, Rurzyca (new).</li> </ul> </li> <li>Supplying gas: <ul style="list-style-type: none"> <li>being currently built – Goleniów (at present), Mosty, Imno-Glewice,</li> <li>planned – Kliniska, Pucice in newly delimited areas.</li> </ul> </li> <li>Environmental protection programme against waste in the Goleniow commune: <ul style="list-style-type: none"> <li>a composting facility for organic waste,</li> <li>solid waste storage site, 2<sup>nd</sup> stage.</li> </ul> </li> </ul>
Threats posed to the environment concerning other communes	<ul style="list-style-type: none"> <li>Police – the Chemical Plant.</li> <li>Sewage sediments.</li> <li>Road, water and railway transport.</li> <li>Transport of harmful substances, roads No 3 and 6.</li> <li>The water way.</li> <li>Lack of a treatment plant in Dabie.</li> </ul>
Necessary activities concerning environment on a scale larger than local which eliminate the threats	–

<b>The Kamien Pomorski commune</b>	
Supplying the commune with water	<ul style="list-style-type: none"> <li>Finishing of the building of the pipeline Rawino-Kamien Pom.</li> <li>Finishing of the building of the pipeline Swiniec-Trzebieszewo.</li> <li>Building water intakes and networks for 19 villages.</li> </ul>
Sewage management	<ul style="list-style-type: none"> <li>A sewage system for 37 villages must be built and collective treatment plants must be prepared. These tasks are of equal significance.</li> </ul>
Waste management	<ul style="list-style-type: none"> <li>A change in the Spatial Management Plan of the Commune concerning the location of the solid waste storage site.</li> <li>Elaboration of technical documentation.</li> </ul>
Investments improving the condition of the environment - planned and carried out	<ul style="list-style-type: none"> <li>The commune has carried out a gas system on the area of Kamien Pomorski. When the pipeline from Reclaw is prepared by the Gasworks, houses and companies will be connected aiming to change the method of heating</li> <li>Conveying gas to the whole commune is planned. The programme has already been prepared.</li> </ul>
Threats posed to the environment concerning other communes	–
Necessary activities concerning environment on a scale larger than local which eliminate the threats	<ul style="list-style-type: none"> <li>Closing down of the exploited oil bore-holes.</li> <li>Closing down of the toxic waste storage site in Chrzastowo.</li> </ul>

<b>The Kolbaskowo commune</b>	
Supplying the commune with water	<ul style="list-style-type: none"> <li>Building of a well in Stobno.</li> <li>Repairs of water-works.</li> </ul>
Sewage management	<ul style="list-style-type: none"> <li>Building of a sewage system of the commune with a sewage treatment plant (3-5 years).</li> </ul>
Waste management	<ul style="list-style-type: none"> <li>Building of the 2<sup>nd</sup> stage, i.e. shifting of the slopes and extending of the capacity of the storage site.</li> <li>Necessity of preliminary segregation.</li> </ul>
Investments improving the condition of the environment – planned and carried out	<ul style="list-style-type: none"> <li>Building of a sewage system in the commune together with a sewage treatment plant, building of a gas conveying system.</li> </ul>

<b>The Kolbaskowo commune – continued</b>	
Threats posed to the environment concerning other communes	<ul style="list-style-type: none"> <li>• Road and railway transport of harmful substances.</li> <li>• Water pollution.</li> </ul>
Necessary activities concerning environment on a scale larger than local which eliminate the threats	–

<b>The Miedzdroje commune</b>	
Supplying the commune with water	<ul style="list-style-type: none"> <li>• Supplying Miedzdroje with water from the vicinity of Kodrebek acquiring a new water intake, to eliminate the shortages in the summer season.</li> <li>• Modernisation of the water-works network in Wicko for sanitary reasons.</li> </ul>
Sewage management	<ul style="list-style-type: none"> <li>• Modernisation of the mechanical part of the sewage treatment plant.</li> <li>• Building of a biomechanical sewage treatment plant for three resorts (Wicko, Lubin, Wapnica – 600m<sup>3</sup>/day), started in 1999.</li> <li>• Building of a sanitary sewage system for three resorts (Wicko, Lubin, Wapnica), started in 1999.</li> <li>• Building of a storm sewage system – completion of the existing system.</li> <li>• Building of a sanitary sewage system in Miedzdroje- completion of the existing system.</li> </ul>
Waste management	<ul style="list-style-type: none"> <li>• Reclamation of the municipal solid waste storage site in Miedzdroje – the technical project has been developed. Realisation: 1999-2001.</li> <li>• Building of a composting plant for organic waste together with the communes of the Union of Communes of the Wolin Island.</li> <li>• Building of a waste storage site together with the communes mentioned above.</li> <li>• Selective waste collection since 1999.</li> </ul>
Investments improving the condition of the environment - planned and carried out	<ul style="list-style-type: none"> <li>• The biological sewage treatment plant in Miedzdroje has been working since 1995.</li> <li>• Supplying Miedzdroje in gas has been finished.</li> <li>• Building of a biological sewage treatment plant in Wapnica has been started together with a sanitary sewage system in all resorts of the commune.</li> <li>• A technical project of reclamation of the municipal waste storage site has been developed.</li> <li>• For implementation: selective waste collection and building of a new storage site.</li> </ul>
Threats posed to the environment concerning other communes	<ul style="list-style-type: none"> <li>• Building of fuel terminals in the outlet of the Swina River.</li> <li>• Water (sea and lagoon) and railway transport of harmful substances.</li> </ul>
Necessary activities concerning environment on a scale larger than local which eliminate the threats	<ul style="list-style-type: none"> <li>• Improvement of the cleanliness of the Szczecinski Lagoon through building of sewage treatment plants in the estuary of the Oder River, especially in Szczecin.</li> <li>• Building of breakwaters arresting water pollution inflowing from Swinoujscie as a result of western winds is necessary.</li> </ul>

<b>The Nowe Warpno commune</b>	
Supplying the commune with water	<ul style="list-style-type: none"> <li>• Building of a new well in Nowe Warpno.</li> <li>• Modernisation of the pump stations in Nowe Warpno and Brzozki.</li> <li>• Development of the water-works network in the commune.</li> <li>• Modernisation of the water-works network in Nowe Warpno.</li> </ul>
Sewage management	<ul style="list-style-type: none"> <li>• Development of the network of sanitary sewage system in the commune.</li> <li>• Management of the sediments from sewage treatment plants.</li> </ul>
Waste management	<ul style="list-style-type: none"> <li>• Development of the municipal waste storage site in Nowe Warpno (preparation of technical documentation and building of the 2<sup>nd</sup> and 3<sup>rd</sup> working section).</li> <li>• Reclamation of the 2<sup>nd</sup> working section of the municipal waste storage site in Nowe Warpno.</li> <li>• Implementation of the selective waste collection programme.</li> </ul>
Investments improving the condition of the environment - planned and carried out	<ul style="list-style-type: none"> <li>• Development of the municipal waste storage site.</li> <li>• Building of sanitary sewage system.</li> <li>• Building of gas grid.</li> <li>• Implementation of the selective waste collection programme</li> </ul>
Threats posed to the environment concerning other communes	<ul style="list-style-type: none"> <li>• Pollution of the Szczecinski Lagoon caused by the waters of the Oder River.</li> </ul>

Necessary activities concerning environment on a scale larger than local which eliminate the threats	–
<b>The Police commune</b>	
Supplying the commune with water	<ul style="list-style-type: none"> <li>• Water-works from Tanowo to Pilchowo.</li> <li>• Building of the water-works network in Trzeszczyn.</li> <li>• Modernisation of the water intake in Police in Grzybowa Street.</li> <li>• Modernisation of the water purification plant in Trzebiez.</li> <li>• Finishing of the building of the water purification plant in Tanowo.</li> </ul>
Sewage management	<ul style="list-style-type: none"> <li>• Building of sanitary sewage system in the resorts: Trzebiez, Tanowo, Przesocin, Debostrow, Nieklonczyca, Uniemysl, Wienkowo, Tatynia, Siedlice and Trzeszczyn.</li> <li>• Modernisation of the sewage system in old Police – 48 km, network – 17 km, connection points– 65 km.</li> </ul>
Waste management	<ul style="list-style-type: none"> <li>• Due to the fact that the municipal waste deposit site in Sierakowo is nearly full, building of a new waste utilisation plant is necessary. The plant will be built in Lesno Gorne. On its area the following objects are planned: a sorting line, a composting plant and two sections.</li> </ul>
Investments improving the condition of the environment - planned and carried out	<ul style="list-style-type: none"> <li>• Building of a waste utilisation plant in Lesno Gorne.</li> <li>• Development of the sewage system in the commune – towards Trzebiez.</li> <li>• Planting trees and shrubs in urbanised areas.</li> <li>• Thermal isolation of buildings and heating systems (reduction of air pollution).</li> </ul>
Threats posed to the environment concerning other communes	<ul style="list-style-type: none"> <li>• Concentration in the area of the “Police” Chemical Plant of a large quantity of chemical compounds (including ammonia) in unfavourable conditions can become a threat to the environment which can be more than of a local scale.</li> </ul>
Necessary activities concerning environment on a scale larger than local which eliminate the threats	–

<b>The Stepnica commune</b>	
Supplying the commune with water	<ul style="list-style-type: none"> <li>• Development and modernisation of existing intakes.</li> <li>• Replacement of the existing water-works made of asbestos cement with water-works made of PVC or PE.</li> </ul>
Sewage management	<ul style="list-style-type: none"> <li>• Connection of the built sanitary sewage system in the whole commune.</li> </ul>
Waste management	<ul style="list-style-type: none"> <li>• Building of a communal waste deposit site (mainly municipal waste).</li> <li>• Segregation of waste at the district level.</li> </ul>
Investments improving the condition of the environment - planned and carried out	<ul style="list-style-type: none"> <li>• The developed complex sewage system.</li> <li>• Planned building of a waste storage site and successive supplying with gas.</li> </ul>
Threats posed to the environment concerning other communes	<ul style="list-style-type: none"> <li>• The biggest threat is the peat mine in Swietowice, which might cause lowering of groundwater level, degradation of the environment, of the voivodeship road and of flood banks.</li> <li>• Other threats: the “Police” Chemical Plant.</li> </ul>
Necessary activities concerning environment on a scale larger than local which eliminate the threats	–

<b>Szczecin</b>	
Supplying the commune with water	<ul style="list-style-type: none"> <li>• Aiming to improve water supply in the northern areas of the city realisation of a main line of water-works Warszewo-Msciecino is planned together with a water purification plant in Msciecino. Modernisation of water purification methods is also planned in the water purification plants “Pomorzany” and “Miedwie”, and also modernisation of the existing well water purification stations. Replacement of the old, exploited water-works system and building of a second line of the water main line Miedwie-Kijewo are also advisable.</li> </ul>

Sewage management	<ul style="list-style-type: none"> <li>• The “Pomorzany” sewage treatment plant for the left-bank part of Szczecin.</li> <li>• the “Drzetowo” sewage treatment plant.</li> <li>• Building of a fragment of the biological treatment plant “Zdroje”.</li> <li>• About 250 km of sewage collectors.</li> </ul> <p>At present the “<i>Master Plan of Water and Sewage Management for Szczecin</i>” is being elaborated. The plan will indicate the directions of activities of the Szczecin City Commune and it will become a guide for the activities of the Management Board of Waterworks and Sewage Systems, the need for the spatial management plan, supplying water, discharging of sewage and precipitation water and existing property conditions of the municipal plants.</p>
-------------------	--

<b>Szczecin – continued</b>	
Waste management	<ul style="list-style-type: none"> <li>• Development of the existing dumping sites or building of new ones.</li> <li>• Building of a Municipal Waste Recycling Plant with a composting plant, sorting plant and a storage site.</li> </ul> <p>Szczecin has begun negotiations with the representatives of the neighbouring communes aiming to solve the problem of waste management together. The Szczecin City Commune possesses a “<i>Long-Term Programme of Municipal Waste Management in Szczecin</i>”.</p>
Investments improving the condition of the environment - planned and carried out	<ul style="list-style-type: none"> <li>• Investments for replacement of heating systems from coal or charcoal heating to gas, oil or the municipal heating system (schools, kindergartens, nurseries, health-care centres) are carried out systematically.</li> <li>• A project of a local wind power plant with the power of 3-5 MW is being studied at the moment. The investment can be used for supplying local objects in electricity.</li> </ul>
Threats posed to the environment concerning other communes	<ul style="list-style-type: none"> <li>• Possible pollution and contamination of the rivers outside the city, whose consequences may influence the inhabitants.</li> <li>• Consequences of air pollution and especially of increased radioactive radiation (e.g. as a result of a malfunction of the nuclear plant located in the area of Greifswald).</li> </ul>
Necessary activities concerning environment on a scale larger than local which eliminate the threats	<ul style="list-style-type: none"> <li>• Aiming to prevent from accidental pollution development of a “<i>Rescue plan for the City</i>” is advisable, as well as organisation and putting into service of a Municipal Centre for Crisis Management. Moreover, investments suggested by Municipal Town Planning Office should be taken into consideration.</li> <li>• Apart from that a significant need exists for development of a local system of early warning (in which the city would participate as well) in case of any threats, among other things contamination of varied character (of water and atmosphere), flood alarms, dangerous loads etc. The terminals of the system should be placed in the Crisis Management Department of the Voivodeship Office and district services responsible for safety, working non-stop.</li> <li>• Aiming to prevent from danger preparation of plans and procedures in case of emergency and threats to the health and lives of the inhabitants, basing on existing structures, is advisable.</li> <li>• Establishment of a Municipal Centre for Crisis Management is necessary as it is required by legal acts. The centre will eliminate the hazards in the city in co-operation with the Office of the Technician On Duty of the City (in near future with the Municipal Alarming Centre).</li> <li>• Carrying out of joint trainings of the services responsible for safety is also necessary.</li> <li>• Establishment of a joint system of communication for the needs of widely meant safety is essential. Szczecin has completed the concept works on establishment of the Municipal Communication Network. The concept assumes that the communication network based on the TETRA digital communication standard which ensures perfect quality of voice transmission, unlimited possibility of expansion, extra services such as data transmission will be reliable and accessible for the services responsible for safety and it will be used among other things for the needs of municipal engineering, in the vehicles of municipal transit, in traffic management etc. The TETRA digital communication is officially accepted by NATO and it has been given the frequency by them. TETRA is a more and more popular communication system in Western Europe. Development of such system in Szczecin and in the region would even give a possibility of transboundary co-operation in elimination of hazards.</li> </ul>

<b>The Swinoujscie commune</b>	
Supplying the commune with water	<ul style="list-style-type: none"> <li>• External sources of water supply should be found out of the town (on the Wolin Island) or complex technologies of water purification ought to be developed. There is a possibility of supplying the water from Kodrabek.</li> </ul>

Sewage management	<ul style="list-style-type: none"> <li>• Building of a sewage system for Karsibor, Przytor, Lunowo, Ognica, Warszaw (the right-bank side).</li> <li>• Building of a sewage system for the left-bank side of Swinoujscie (part of the streets, e.g. Rycerska St, Mazowiecka St, Wielkopolska St) – as it has not been built yet.</li> <li>• On the right-bank side – implementation and use in the future of household sewage treatment facilities.</li> </ul>
Waste management	<ul style="list-style-type: none"> <li>• Swinoujscie – building of two sections for waste complying with modern standards (sorting, recycling, production of bio-gas, toxic waste storage sites) and with the requirements of environmental protection is necessary.</li> </ul>

<b>The Swinoujscie commune – continued</b>	
Investments improving the condition of the environment - planned and carried out	<ul style="list-style-type: none"> <li>• The strategic goal for the city is closing down of the old coal-fuelled heat-generating plant in the centre and building of a gas and oil heat-generating plant beyond the centre using: <ul style="list-style-type: none"> <li>– supplied gas,</li> <li>– oil from the containers of “Paria-Petrol”.</li> </ul> </li> <li>• Supplying of gas to the right-bank side – reclamation of the areas left by the Russian army</li> </ul>
Threats posed to the environment concerning other communes	<ul style="list-style-type: none"> <li>• Hazards from tankers and fuel terminals.</li> <li>• Threats posed by the temporary waste deposit site in Germany and the nuclear plant in Greifswald.</li> <li>• Threats posed by hazardous loads carried by ships.</li> </ul>
Necessary activities concerning environment on a scale larger than local which eliminate the threats	–

<b>The Wolin commune</b>	
Supplying the commune with water	<ul style="list-style-type: none"> <li>• Building of water-works in: Wiselka, Laska, Rzeczyn, Dramin, Lojszyn, Darzowice, Zolwin, Domyslow, Warnowo, Jarzebowo, Korzecin, Plocin, Rabiaz, Wartowo, Sulomino, Karnocice, Siniechow.</li> <li>• Building of water intake stations: Rzeczyn, Mokrzyca.</li> </ul>
Sewage management	<ul style="list-style-type: none"> <li>• Building of sanitary collectors of total length 176 km.</li> <li>• Building of a sewage treatment plant in Miedzywodzie.</li> <li>• Building of modern treatment plants for small village agglomerations – 8 plants.</li> </ul>
Waste management	<ul style="list-style-type: none"> <li>• Legalisation of the present solid waste storage site in Reclaw, enlarging of its area and carrying out reclamation works in the sections which are already full. The forecasted short exploitation period – 3 to 5 years – enforces the necessity of developing the storage site or building of a new one after finding a proper location. The most proper location that has been found is the drift left after the former gravel-pit in Ostromice; there is a study on this location.</li> </ul>
Investments improving the condition of the environment – planned and carried out	<ul style="list-style-type: none"> <li>• Building of a treatment plant in Miedzywodzie, building of a network of collectors for the treatment plant in Wolin, building of sewage terminals for the treatment plant in Piaski.</li> <li>• Supplying gas to Wolin, building of gas reduction stations in Reclaw and Dargobadz.</li> <li>• Finishing of the sewage system and storm sewage system in Wolin.</li> </ul>
Threats posed to the environment concerning other communes	<ul style="list-style-type: none"> <li>• Irresponsible solid waste management in the Kamien Pomorski district, including the Wolin Island.</li> </ul>
Necessary activities concerning environment on a scale larger than local which eliminate the threats	–

Identifying the problems, tasks and undertakings to be carried out within the framework of the Management Plan, suggestions of a selection of protection undertakings have been made, after a discussion with the representatives of the self-governmental administration and with regard to the terrain management, the water demands, the degree of water degradation etc.

The suggested undertakings have been divided into two basic tasks in the area of:

- active protection – work on the water circulation system identification, the condition of hydrosphere resources, identification and suppression of the environmental pollution sources,
- passive protection – legal aspects of protection (protection zones, the areas of water supply protection of the main groundwater reservoirs, limiting the changes in water conditions, water licences, acts confirming the discretionary and exploitable resources).

**Table 7.1. Short-term tasks – period of realisation less than 5 years**

Name of the task	Description of the realisation method	Identification of the body carrying out/financing the tasks
1. Balancing surface water resources and groundwater resources and the conditions of water utilisation for the area of: <ul style="list-style-type: none"> <li>• the Wolin Island,</li> <li>• the river basin of the Dziwna River</li> <li>• the river basin of the Gowienica River, the river basin of the Ina River and the Gowienica River.</li> </ul>	1.1. Development of the project of geological works for determining the discretionary groundwater resources in the river basins.	The Geology Department of the Ministry of Environmental Protection, Natural Resources and Forestry and the National Environmental Protection and Water Management Fund.
	1.2. Development of the documentation of hydrogeological water resources in the river basins.	The Geology Department of the Ministry of Environmental Protection, Natural Resources and Forestry and the National Environmental Protection and Water Management Fund.
	1.3. Development of the documentation of the surface waters balance in the river basins.	The Regional Water Management Board in Szczecin, The National Environmental Protection and Water Management Fund, The Voivodeship Environmental Protection Fund
	1.4. Development of the water management balance of the river basins.	The Regional Water Management Board in Szczecin, The National Environmental Protection and Water Management Fund, The Voivodeship Environmental Protection Fund, The Marshalship
	1.5. Development of the conditions of water utilisation in the river basins.	The Regional Water Management Board in Szczecin, The National Environmental Protection and Water Management Fund, The Voivodeship Environmental Protection Fund, The Marshalship, taken into account in: <ul style="list-style-type: none"> <li>• regional plans,</li> <li>• studies of directions and conditions,</li> <li>• local spatial management plans.</li> </ul>
2. Completion of the elaboration and edition of cartographic materials necessary for regional synthesis of hydrological, hydrogeological, geo-environmental and economic conditions of the Management Plan.	2.1. Completion of the hydrogeological maps edition 1:50 000	State Institute of Geology (the Szczecin branch)
	2.2. Acceleration of the geological and economic map edition 1 : 50 000	State Institute of Geology (the Szczecin branch)
	2.3. Completion of the lithodynamic maps edition of the sea coast	State Institute of Geology in Warsaw
	2.4. Acceleration of the hydrographical map edition 1:50 000 (sheets from the area of the Management Plan).	The Main Geodesist of the State
	2.5. Acceleration of the environmental map edition 1 : 50 000 (sheets from the area of the Management Plan).	The Main Geodesist of the State

3. Implementation of the documentation, organisational, legal and institutional procedure of establishment of protected river basins (multitask functions).	3.1. Establishment of the protective river basin of the Gunica River.	The Regional Water Management Board in Szczecin in consultation with the self-governments, The Marshalship, The Voivodeship Environmental Protection Fund
	3.2. Establishment of the protective river basin of the Grzybnica River with water retention in the lake system Ostrowo-Piaski.	The Regional Water Management Board in Szczecin in consultation with the self-governments, The Marshalship, The Voivodeship Environmental Protection Fund
	3.3. Establishment of the protective river basin of the Gowienica River.	The Regional Water Management Board in Szczecin in consultation with the self-governments, The Marshalship, The Voivodeship Environmental Protection Fund
	3.4. Establishment of the protective basin of the Wolin Island area.	The Regional Water Management Board in Szczecin in consultation with the Wolin Island Communes Association, The Voivodeship Environmental Protection Fund
4. Implementation of the programme of system inventory of contaminated sites in the river basins of the Management Plan carried out in the areas of particular communes.	4.1. Detailed system inventory of: <ul style="list-style-type: none"> <li>• illegal waste dumping grounds</li> <li>• waste dumping grounds</li> <li>• polluted grounds</li> <li>• toxic waste storage sites</li> <li>• industrial waste: <ul style="list-style-type: none"> <li>– highly dangerous (1<sup>st</sup> class)</li> <li>– dangerous (2<sup>nd</sup> class)</li> <li>– harmful (3<sup>rd</sup> class)</li> <li>– arduous (4<sup>th</sup> class)</li> </ul> </li> </ul>	The Voivodeship Inspectorate of Environmental Protection in Szczecin, which carries out the tasks for the whole voivodeship
	4.2. Waste management plan in the Management Plan area	Carried out at present The Voivodeship Office and The Marshalship
	4.3. Implementation of the information processing procedure and development of a report in the GIS format.	Carried out at present The Voivodeship Inspectorate of Environmental Protection in Szczecin
5. Implementation of technical activities aiming to increase the surface waters and groundwater retention on the Wolin Island.	5.1. Limiting of polder draining without causing accelerated water outflow and regional depression	The Wolin Island Communes Association and the Wolinski National Park. The project is partly financed from the means of the European Union.
	5.2. Repair and putting into service the existing gates	
	5.3. Building new damming facilities (earth or wooden)	
	5.4. Renaturalisation of selected mud and peats areas (e.g. liquidation of deep drainage of the Szmanc Meadows, creating ponds and water reservoirs)	
6. Implementation of protection tasks defined in the Protection Plan of the Wolinski National Park.	6.1. Research and documentation tasks	The Wolinski National Park, the Wolin and Miedzdroje communes and Swinoujscie in relation to buffer zone together with the Wolin Island Communes Association  In the stage of identification of the possibilities of financing and raising financial means.
	6.2. Technical protection activities	

**Table 7.2. Medium-term tasks – period of realisation 5-25 years**

Name of the task	Description of the realisation method	Identification of the body carrying out/financing the tasks
1. Regulation of water and sewage management.	1.1. Building of sewage treatment plants and sewage systems for the area of the direct basin of the Management Plan.	Communes, intercommunal task forces and the starosties. Financing: own financial means, The National Environmental Protection and Water Management Fund, The Voivodeship Environmental Protection Fund, the Ecofund, The Marshalship, financial aid from the abroad.
	1.2. Building of sewage treatment plants and sewage systems for all settlement units of the coastal zone according to the hierarchy below: <ul style="list-style-type: none"> <li>• the Wolin Island,</li> <li>• the areas of main groundwater reservoirs,</li> <li>• the river basin of the Gunica River,</li> <li>• the river basin of the Grzybnica River,</li> <li>• the river basin of the Gowienica River.</li> </ul>	
	1.3. Limiting of area pollution in the direct basin of the ICZM of the Szczecinski Lagoon.	Communes, intercommunal task forces and the starosties in consultation with the Management Plan co-ordinator. Financing: own financial means, The National Environmental Protection and Water Management Fund, The Voivodeship Environmental Protection Fund, the Ecofund, The Marshalship, financial aid from the abroad
2. Regulation of solid waste management.	2.1. Implementation of the programme of collection, segregation and recycling of waste	Self-governments of the communes Financing: own financial means, The National Environmental Protection and Water Management Fund, The Voivodeship Environmental Protection Fund, the Ecofund, The Marshalship, financial aid from the abroad
	2.2. Building regional waste storage yards for intercommunal areas	Communes, intercommunal task forces and the starosties Financing: own financial means, The National Environmental Protection and Water Management Fund, The Voivodeship Environmental Protection Fund, the Ecofund, The Marshalship, financial aid from the abroad
	2.3. Liquidation of illegal waste dumping grounds and reclamation of the organised waste dumping grounds	The self-governments of the communes Financing: own financial means, The National Environmental Protection and Water Management Fund, The Voivodeship Environmental Protection Fund, the Ecofund, The Marshalship, financial aid from the abroad
	2.4. Liquidation of polluted sites and treatment of degraded areas	Self-government, economic units, institutions and units carrying out economic activity Financing: own financial means, The National Environmental Protection and Water Management Fund, The Voivodeship Environmental Protection Fund, the Ecofund, The Marshalship, financial aid from the abroad

3. Implementation of a modern consumption water supply system.	3.1. Building waterworks for all resorts of the Wolin Island with a change in the supply system of Miedzzydroje	The Wolin Island Communes Association, Miedzzydroje, the Dziwnów, Wolin and Miedzzydroje communes Financing: own financial means, The National Environmental Protection and Water Management Fund, The Voivodeship Environmental Protection Fund, the Ecofund, The Marshalship, financial aid from the abroad
	3.2. Building new water intakes in the river basin of the Grzybnica River and an access route to Swinoujscie.	The Town Council in Swinoujscie in consultation with the communes of the river basin area of the Grzybnica River Financing: own financial means, The National Environmental Protection and Water Management Fund, The Voivodeship Environmental Protection Fund, the Ecofund, The Marshalship, financial aid from the abroad
	3.3. Building new water intakes in the river basin of the Swiniec River and a supply system for the sea-resorts.	The Kamien Pomorski starosty in consultation with the interested communes Financing: own financial means, The National Environmental Protection and Water Management Fund, The Voivodeship Environmental Protection Fund, the Ecofund, The Marshalship, financial aid from the abroad
	3.4. Managing groundwater of the main groundwater reservoir No 123 and local water reservoirs	The Regional Water Management Board in Szczecin in consultation with the interested communes Financing: own financial means, The National Environmental Protection and Water Management Fund, The Voivodeship Environmental Protection Fund, the Ecofund, The Marshalship, financial aid from the abroad
	3.5. Regulating the technological infrastructure of groundwater collection	
4. Implementation of engineering activities aiming to increase the surface water and groundwater retention outside the Wolin Island (tasks which should be carried out after working out the water-economy balances).	4.1. Adaptation and putting into service the existing damming facilities that do not need reconstruction	The Voivodeship Water Irrigation Board in consultation with the Regional Water Management Board in Szczecin and suitable communes. Financing: own financial means, The National Environmental Protection and Water Management Fund, The Voivodeship Environmental Protection Fund, the Ecofund, The Marshalship, financial aid from the abroad
	4.2. Reconstruction and modernisation of damaged damming facilities	
	4.3. Building artificial water reservoirs in the valleys of the rivers Niemica and Wolcza	
	4.4. Carrying out lake damming in the river basins of the rivers: Gunica, Grzybnica, Wolczenica, Gowienica	
5. Implementation of engineering activities of renaturation of degraded water and mud areas and peat areas	5.1. Reorientation of the hydrographical system to an irrigating system that will slow down the water outflow	The co-ordinator of the Management Plan programme with the support of a team of interdisciplinary experts. Financing: own financial means, The National Environmental Protection and Water Management Fund, The Voivodeship Environmental Protection Fund, the Ecofund, The Marshalship, financial aid from the abroad
	5.2. Building of a system of gates and wooden damming bars	
	5.3. Filling up the ditches crossing the peat layer	
	5.4. Monitoring of the environmental effect	

**Table 7.3. Long-term tasks**

Name of the task	Description of the realisation method	Identification of the body carrying out/financing the tasks
1. Technological and biological undertakings in the field of renaturalisation of the Szczecinski Lagoon (possible to carry out after a significant decrease of the load of pollutants from the river basin of the Oder River and from the direct river basin basing on detailed projects)	1.1. Technical undertakings, e.g. artificial reefs and loosening of the sediments	The co-ordinator of the Management Plan programme, The authorities of governmental and self-governmental administration in co-operation with scientific institutions
	1.2. Biological undertakings – increasing of the population of <i>Dreissena</i> and other molluscs.	

### 1. Priority tasks within the framework of integrated management in the aspect of nature resources protection

Bearing on mind the natural, economic and social conditions, the liabilities resulting from state legal regulations and international regulations ratified by Poland and the conclusions drawn from the regulations of the European Union, it is clear that for sustainable natural resources management in the coastal area of the Szczecinski Lagoon a special management programme must be developed. It must be compatible with the activities in the benefit of the lagoon on the German side.

The natural conditions described above are among other things the determinants of priority tasks within the activities in the field of animated nature resources protection. Among them short-term, medium-term and long-term tasks can be identified. The activities suggested below should be treated as a basis for further discussion.

Implementation of the conception of sustainable development taking into account among other things the necessity of protection of the areas which are particularly valuable from the natural point of view, requires carrying out tasks essential for:

- preserving of the biodiversity of living forms, natural landscape and culture scenery existing in this area, with particular regards to peat areas, water and mud areas, field ponds etc.,
- restoration of lost values, e.g. through restoration of traditional management methods on wetlands and partially flooded areas,
- promotion of these values, aiming to work out a feeling of strong ties with them,
- making these values accessible for the development of tourism,
- development of local ecological organisation which would participate in the activities for the benefit of protection and promotion of nature values of the area.

**Table 7.4. Short-term and medium-term tasks for nature protection**

*Concerns the tasks whose period of realisation ranges from a few to twenty years.*

Suggestions/comments	The bodies which carry out or may carry out the tasks
<b>1. Adjusting the Polish law to the requirements of the European Union.</b> On account of the endeavours of Poland to join the European Union a necessity of adjusting the legal regulations exists, including the regulations in the field of environmental protection.	Executive authority. Legislative authority.
<b>2. Undertaking the activities aiming to include the Szczecinski Lagoon area in the list of areas of the Ramsar Convention and protection of this area in accordance with the guidelines of the Convention.</b> Reporting of this area as a terrain of special value for mud and water birds by the Polish government to the secretariat of the Convention.	Suitable departments of governmental administration. Non-governmental organisations.

<p><b>3. Undertaking the activities aiming to apply and implement the entries of the Convention concerning environmental heritage.</b> It refers in particular to the Helsinki Convention, Bonn Convention, Bern Convention, Washington Convention and Ramsar Convention.</p>	<p>Suitable departments of governmental administration. Self-governmental administration. Non-governmental organisations.</p>
<p><b>4. Development of management structures in the area of the Szczecinski Lagoon, water management structures in particular.</b> The competences in the field of the management of the resources in the area of the Szczecinski Lagoon are very dismembered, and in numerous cases unclear. Therefore these issues need to be regulated by law (legislation).</p>	<p>Self-governmental administration. Suitable departments of governmental administration. Non-governmental organisations. Body or bodies established for this particular reason.</p>
<p><b>5. Undertaking the activities aiming to include the necessity of natural sea resources protection in the state legislation.</b> It refers in particular to the amendment of the nature protection act and other acts from the point of view of the possibilities of natural resources protection of the Baltic Sea.</p>	<p>Legislative authority. Suitable departments of governmental administration. Self-governmental administration. Non-governmental organisations.</p>
<p><b>6. Intensifying the Polish and German co-operation in the field of joint nature resources protection of the Szczecinski Lagoon area.</b> Continuation of the tasks that have been already undertaken. Development and approval of the integrated management plan of the Szczecinski Lagoon area on both sides of the border.</p>	<p>Suitable departments of governmental and self-governmental administration. Non-governmental organisations.</p>
<p><b>7. Implementation of the short-term tasks of the Plan for Protection of the Wolinski National Park.</b> In accordance with the plan developed in 1999 particular tasks will be carried out in the field of protection and management of plant and animal populations and biotopes existing in the Park.</p>	<p>In accordance with the assumptions of the Plan.</p>
<p><b>8. Development of plans for protection of the nature reserves existing at present and their successive implementation.</b> The protection plan is developed in accordance with the legal entries for nature reserves.</p>	<p>In accordance with the directions for development of protection plans. the bodies carrying out the tasks may be: Suitable departments of governmental administration. Suitable departments of self-governmental administration. Land owners or administrators. Non-governmental organisations.</p>
<p><b>9. Establishment of legal protection in the form of nature reserves, landscape parks and ecological grounds etc. for the most valuable areas.</b> Establishment of new forms of nature protection in the Szczecinski Lagoon area for preservation and proper management of natural resources. In the first place the sites where the species and biotopes that are vanishing or in danger of extinction exist should be taken under protection. It refers in particular to the halophilous communes, periodically wet meadows and sedge meadows and the sites of a significant importance for the birds defined as bird refuges (See Map 3).</p>	
<p><b>10. Intensification of the activities aiming to draw up suitable documents required by the spatial management act, i.e.:</b></p> <ul style="list-style-type: none"> <li>• studies of conditions and directions of spatial management in the communes located around the Szczecinski Lagoon,</li> <li>• local spatial management plans,</li> <li>• voivodeship plans,</li> <li>• predictions of the impact of the local plans in the environment.</li> </ul> <p>Suitable spatial management plans are the principal direction of natural resources protection in the area of the communes and the voivodeship. In these plans the environmental conditions and the existence of protected areas and species must be taken into account, as well as the legal consequences of the international legal regulations ratified by Poland. At the same time, as soon as Poland joins the European Union, these plans will have to take into account the requirements resulting from the legal regulations of the European Union, among other things in the field of nature resources protection, e.g. the bird directive and habitat directive. For proper development of studies, plans and prognosis the commune must have suitable up-to-date evaluations of the areas that are the subject of the study at their disposal.</p>	<p>Self-governmental administration.</p>

<p><b>11. Undertaking the activities for the benefit of more effective natural resources protection in the Szczecinski Lagoon area.</b> It refers in particular to carrying out the activities for further limiting of fish-poaching and for:</p> <ul style="list-style-type: none"> <li>• working out the rules of limiting the amount of catches of particular fish species,</li> <li>• carrying on stocking with fry of the most needed species,</li> <li>• carrying on the implementation of the principles of sustainable management in the forests,</li> <li>• working out an optimal model of agriculture and forestry management in the areas surrounding the Szczecinski Lagoon,</li> <li>• ceasing the exploitation of peats (their exploitation should be permitted only in certain cases).</li> </ul>	<p>Suitable public administration departments. Non-governmental organisations.</p>
<p><b>12. Carrying on the activities in the field of air, water and soil quality improvement and waste reuse.</b> The task should be carried out through continuation of the activity programmes accepted so far and gradual adjusting of the scope of the activities to the requirements of international legal regulations, including the regulations of the EU.</p>	<p>Same as above</p>
<p><b>13. Development of a programme concerning the management of dredging material coming from watercourse dredging and its implementation.</b> The solution to this problem should be found as soon as possible since a collision exists between the need of finding an optimal storage site for the dredging material and the natural resources.</p>	<p>Same as above</p>
<p><b>14. Undertaking comprehensive activities in the field of preservation of wetlands where many species and biotopes which are in danger of extinction can be found.</b> Preparation of a programme on preservation of these biotopes. The programme should point out optimal and admissible suggestions of management in these areas, a schedule and the means necessary for carrying out the activities, as well as the units, organisations and bodies which are to carry them out.</p>	<p>Same as above</p>
<p><b>15. Undertaking activities for the benefit of ecological barrier elimination and making the ecological corridors permeable.</b> The activities should be carried out in the stage of spatial planning, the check-up of compliance with regulations (e.g. concerning fishery), elimination of existing barriers, application of modern technology decreasing the negative influence.</p>	<p>Same as above</p>
<p><b>16. Drawing up and implementation of a programme aiming to minimise the scope of draining irrigation in the areas that perform an important function as refuges of rare and vanishing plant and animal species.</b> These areas should be taken under special care. A list of the areas where irrigation can only be made with the supervision of environmental services or non-governmental organisations or where the irrigation should not be made at all ought to be prepared. A programme of compensations or exchange for the land owners or users should be drawn up in case the land productivity decreases.</p>	<p>Same as above</p>
<p><b>17. Elaboration of a monograph on the environment of the area of the Szczecinski Lagoon and of a nature guide.</b> No such elaboration, being a synthesis of knowledge about the lagoon, exists so far. The monograph should point out in detail the most valuable resources of animated and non-animated nature in varied aspects. The role of the guide should be to promote this area as an area of highest environmental values. It should perform an educational function as well, so that it can be used for didactic activities and trips.</p>	<p>Same as above. Scientific and research units.</p>
<p><b>18. Ecological education of the society in the field of animated nature resources protection. Establishment of a modern museum of the Szczecin Bay area basing on the infrastructure of the Wolinski National Park.</b> An educational programme should be drawn up and implemented in the field of natural sciences and comprehensive knowledge in the area of state and EU law. The education should involve the whole public and its range should be adjusted to different age groups. Within the programme a network of areas and sites should be prepared for ecological education. During the elaboration of the programme it is advisable to take advantage of the experience of other countries. At the same time the means for financing the programme in the realisation stage and the units responsible for its implementation should be pointed out. The best possibility for non-governmental organisations, self-governments and environmental services to join should be taken into account when drawing up the programme. This is even more important as in the communes around the lagoon and in the whole voivodeship no proper knowledge about the natural function of the Szczecinski Lagoon area exists. While performing these tasks, the existing project can be implemented.</p>	<p>Same as above</p>

<p><b>19. Promotion of the Szczecinski Lagoon as an area of high natural, landscape and touristic values.</b> Activities aiming to change the awareness of the society regarding the possibilities of recreation in the area of the lagoon should be carried out, among other things basing on the existing project of cycling paths.</p>	Same as above
<p><b>20. Undertaking the activities aiming for the non-governmental organisations to participate or extend their activities in the field of natural resources protection and promotion of the region.</b> In accordance with the model accepted by the other EU countries the role of non-governmental organisations in the natural resources protection of a region can be very important. In a number of cases their participation is necessary. The advantages of co-operation of non-governmental organisations with public administration can be significant.</p>	Same as above
<p><b>21. Undertaking the activities aiming to continued handing over the waste lands around the Szczecinski Lagoon for the benefit of the organisations and other units which have environmental protection activities in their statutes.</b> Continuation of the activities carried out by Agricultural Property Agency of Treasury and the Maritime Office.</p>	Same as above
<p><b>22. Undertaking activities for the benefit of establishing "the Mouth of the Oder River Biosphere Reserve" in the Szczecinski Lagoon area.</b> As the area of the lagoon fulfils the requirements of a biosphere reserve, activities aiming for UNESCO to recognise it can be undertaken.</p>	Same as above

**Table 7.5. Long-term tasks**

*Concerns the tasks whose period of realisation lasts at least 25 years..*

Suggestions/comments	The bodies which carry out or may carry out the tasks
<p><b>1. Continuation of the tasks which are already undertaken in the stage of short-term and medium-term priorities and whose realisation will be necessary or advisable.</b> It refers to most short-term and medium-term tasks.</p>	same as above

## 2. Suggested tasks to be carried out in the area of the Maritime Office in Szczecin

The analysis of conditions and needs involving all the issues resulting from the Act on sea areas of the Republic of Poland and maritime administration has allowed of listing the tasks necessary to be implemented. They are:

**Table 7.6. Short-term tasks in the light of the activities of the Maritime Office**

Suggestions/comments	The bodies which carry out or may carry out the tasks
1. Adjusting of the Polish law to the requirements of the EU regulations.	The Maritime Office, the Marshalship, commune administration.
2. Implementation of a data collecting system on the trans-shipping in the harbour, quantities of trans-shipped hazardous materials, capacity of extracting works, quantities of discharges pollution.	
3. Protection of shores in the sites indicated by the Project No 2078/C.T 12-9/98 named " <i>Strategy of Protection of Sea Shores</i> ".	
4. Reservation of sites in spatial management plans for silting fields and dredging material storage sites for maintaining of the parameters of the waterways or change of these parameters in case of building of a gas terminal in the harbour in Police. It requires: <ul style="list-style-type: none"> <li>• securing of the sites for storage of dredging material in the area of Wicko, the Dziwna River (at least 3), Stepnica and Nowe Warpno,</li> <li>• development of the field "D" on the Piastowski Channel.</li> </ul>	
5. Building of new silting fields in the area of Roztoka Odrzanska, the Orli Inlet, the Szczecin Harbour or the Police Harbour, adapted for utilisation of harmful substances contained in the dredging material.	
6. Securing of access of people to the water in the habitually accepted places.	
7. Elaboration of a monograph of the Lagoon and activation of sea and environmental education.	

**Table 7.7 Medium-term tasks**

Suggestions/comments	The bodies which carry out or may carry out the tasks
1. Improvement of the state of waters, among other things through activation of services and units responsible for detecting, preventing and elimination of the consequences of pollution on sea waters and the coastal zone in case of damage.	Regional Water Management Board, self-governmental administrations, the Voivodeship Office, the Voivodeship Inspectorate of Environmental Protection.
2. Building of new silting fields with particular regards to utilisation of harmful substances.	
3. Activation of sea areas and neighbouring areas determined for tourism.	

**Table 7.8. Long-term tasks**

Suggestions/comments	The bodies which carry out or may carry out the tasks
1. Further improvement of the state of the waters.	same as above

### 3. Tasks within the monitoring on the area included in Integrated Management

#### The monitoring system

The necessity of monitoring concerns:

- the extent of meeting the demands,
- exploitation and condition of the non-renewable resources such as space, human capital and natural environment (water, forests, fish, air, flora and fauna – the issue of biodiversity);
- quality and effectiveness of the policy of sustainable development and/or integrated management of the coastal zone.

Monitoring should be of a double-track character:

- It should use the existing information on quantity, factually indicating the processes and phenomena connected with sustainable development.
- In case of lack of such information it should refer to standardised opinion of experts and other forms of monitoring of a quality character.

**Table 7.9. Tasks within the framework of environmental monitoring**

<b>Tasks within the framework of monitoring</b>	
<b>Rivers</b>	<ol style="list-style-type: none"> <li>1. Including in the research within the framework of local monitoring all rivers in the area of the Management Plan together with their tributaries. The monitoring plan for the rivers should be preceded by an inventory of pollution sources and co-ordinated with the Voivodeship Inspectorate of Environmental Protection. It concerns the rivers: Gunica, Krepa, Gowienica, Swiniec, Wolcza, Grzybnica and Niemica.</li> <li>2. Organisation of monitoring of the waste discharge into the surface waters of the Management Plan area.</li> </ol>
<b>Lakes</b>	<ol style="list-style-type: none"> <li>1. The remaining lakes in the region should be included in the monitoring tasks. They are the lakes located on the Polish-German border: Mysliborskie Wielkie and Mysliborskie Male and the Karpin Lake located in the Wkrzanska Forest. Verifying examination of the water condition should be also conducted in the Racze Lake which is located on a golf course (the Wolin Island).</li> <li>2. Monitoring examination of the lakes should be carried out in a 5 years' cycle.</li> <li>3. A lake should be selected for the examination of bottom sediments basing on the pollution sources inventory.</li> <li>4. Morphometrical examination should be carried out for the lakes for which the data missing or is not updated.</li> </ol>
<b>Groundwater</b>	<ol style="list-style-type: none"> <li>1. Establishing a monitoring system in the area included in the Management Plan (subregional) referring to the existing state monitoring network. Local monitoring systems, monitoring of emission and sources of pollution are a significant element of the groundwater monitoring system.</li> </ol>
<b>The Szczecin-ski Lagoon</b>	<ol style="list-style-type: none"> <li>1. Maintaining the ship traffic into the Szczecin harbour requires permanent dredging of the water-route. The storage sites of dredging material should be inventoried and the sediments disposed there should be examined in respect of quality.</li> <li>2. A thorough examination in the well-pronounced bays of the Szczecinski Lagoon should be carried out. With further decrease in the loads of pollutants carried in by the Oder River the importance of these bodies of water will increase.</li> <li>3. A thorough examination of the lakes Wicko Duze and Wicko Male will allow to identify the present condition of these water reservoirs and will define their capability of natural revitalisation. This region was surcharged for several years with the inflow of badly treated sewage from the Miedzdroje sewage treatment plant (the facility has already been modernised). The bottom sediments of the Wicko Male Lake, their chemical constitution and mineralisation degree should undergo thorough examinations.</li> <li>4. The examination of the Nowowarpienskie Lake waters and its sediments, especially in the southern part, will allow to define the present condition of the reservoir, which is characterised by low water exchange with the central part of the Szczecinski Lagoon. The results of the research will help determine the usefulness of this area for recreation at present and in the future.</li> <li>5. Efforts should be made to include the Roztoka Odrzanska, the Kamienski Lagoon and the Dabie Lake (which is a delta-shaped overflow of the Oder River) in regional monitoring.</li> <li>6. Scientific identification of the blue-green algae of the Microcystis species is recommended, whose existence in the Szczecinski Lagoon is stated.</li> <li>7. A programme of bottom sediments examination should be run and the whole area of the Szczecinski Lagoon should be included in this programme.</li> </ol>
<b>Air</b>	<ol style="list-style-type: none"> <li>1. Development of a thorough air quality monitoring taking into account motor traffic pollution and low emission from municipal areas.</li> </ol>

<b>Noise</b>	<ol style="list-style-type: none"> <li>1. Updating of the measurements of noise during the day and in the night in the A zone of health-resorts and in the resorts to which some regulations of the act on health-resorts have been extended.</li> <li>2. Continuation of the measurements of traffic noise in Szczecin and in the neighbourhood – updating of the acoustic maps.</li> <li>3. Measurements of the traffic noise on the waterway of the Oder River, Lake Dabie (in Lubczyna) and the Szczecinski Lagoon.</li> <li>4. Measurements of the road traffic noise: <ul style="list-style-type: none"> <li>•on the highway – the border crossing in Kolbaskowo,</li> <li>•in Rosowko,</li> <li>•on road No 116 Mierzyn-Lubieszyn (the border crossing),</li> <li>•on the road Police-Trzebiez,</li> <li>•on road No 3 (part of the expressway),</li> <li>•on road No 6 Goleniow-Nowogard,</li> <li>•on road No 113 Goleniow-Swieta,</li> <li>•on road No 112 Goleniow-Stepnica,</li> <li>•on roads No 102 and 107,</li> <li>•on road No 3 in the area of the Wolinski National Park,</li> <li>•on road No 107 Parlowko-Kamien Pomorski,</li> <li>•on road No 3 – the line of housing buildings in the centre of Wolin,</li> <li>•on road No 103 Dziwnowek-Rewal,</li> <li>•on road No 102 Miedzzydroje-Wiselka , in the area of the Wolinski National Park,</li> <li>•on the road Lunowo-the municipal ferry crossing,</li> <li>•on the road Lunowo-the Karsiborz ferry crossing.</li> </ul> </li> <li>5. Measurements of noise on the areas where sanatoria and health-care facilities are located: <ul style="list-style-type: none"> <li>•in Dziwnowek,</li> <li>•in Lukecin,</li> <li>•in Miedzzywodzie,</li> <li>•in Pogorzelica,</li> <li>•in Miedzzydroje,</li> <li>•in the „A” zone of the Świnoujscie health-resort,</li> <li>•in the „A” zone of the Kamien Pomorski health-resort.</li> </ul> </li> <li>6. Measurements of noise on Wladyslaw IV Embankments – along the housing buildings.</li> <li>7. Measurements of railway traffic noise from the railway line Swinoujscie-Szczecin.</li> </ol>
<b>Wastes</b>	<ol style="list-style-type: none"> <li>1. Performing local groundwater quality monitoring in the surroundings of exploited and reclaimed municipal dumping grounds aiming to identify and monitor the influence of the dumping grounds on groundwater quality and to counteract the negative consequences of groundwater pollution.</li> <li>2. Within the full monitoring around the dumping sites the leaks from the dumping sites should be examined as well.</li> </ol>
<b>Soil</b>	<ol style="list-style-type: none"> <li>1. Continuation of the monitoring tasks and extending the monitoring system to the areas where high concentrations of heavy metals are expected.</li> </ol>
<b>Integrated environmental monitoring</b>	<ol style="list-style-type: none"> <li>1. Extending the natural monitoring system in Grodno by equipping in air pollution measurement stations and a water condition and quality measurement system. Bringing into operation a natural monitoring measurement station in the area of the Swidwie nature reserve.</li> </ol>

For the control of the integrated management (sustainable development) process a system of monitoring and assessment of changes in an indicator aspect is necessary.

The possibility of using objective indicators in the assessment of changes taking place in the environment is the condition for making a proper diagnosis and starting carrying out the activities.

However, it has been stated that no single optimum indicator exists, therefore a group of indicators should be found in accordance with the OECD model: pressure-state-reaction or in a similar formulation, divided into direct and indirect indicators. The direct indicators are these indicators, basing on which conclusions can be directly drawn concerning the state of environment and indirect indicators are these indicators, which reflect the changes but it is difficult to indicate the cause of the changes basing on them.

## A set of Sustainable Development Indicators for the areas included in the project of Integrated Coastal Zone Management in Poland

The set does not include all the problems, it is used for the purposes of discussion on the ATT forum. A basic and at the same time significant set of indicators will be selected taking into account access to data and importance of the suggested indicators for the management process.

**Table 8.1. Sustainable development indicators – waters**

Problems	Causes of problems	Pressure indicators - D
1. Threat to surface waters and groundwater resources in the aspect of quality and quantity.	1. Lack of a full system identification of surface waters resources.	1. Amount of surface water resources ( $m^3/s$ ) and quantity of intangible resources ( $m^3/s$ ) or an indicator (mln $m^3/year$ ).
	2. Lack of a full system identification of groundwater resources.	2. Amount of discretionary groundwater resources in $m^3/h$ , $m^3/day$ , $m^3/year$ .
	3. Groundwater intake scattered unevenly.	3. Amount of groundwater use ( $m^3/h$ ) related to the amount of discretionary resources ( $m^3/h$ ), grade of groundwater resources utilisation (% of discretionary resources), state of groundwater reserves ( $m^3/h$ ).
	4. Existence of exogenous threats to groundwater from the Jurassic and Cretaceous layer.	4. Areas where the phenomenon takes place ( $km^2$ ) related to the area of the balancing units of the basin (%).
	5. Existence of anthropogenic threats to groundwater and surface waters.	5. State of liquid waste management (number of resorts with completed sewage system, number of three-stage sewage treatment plants with separation to cities and villages, state of solid waste management (number of waste storage sites, number of resorts included in the selective collection programme).
	6. Groundwater quality.	6. Areas with water meeting the drinking water standards and for economic use (% of the balancing basin), areas with waters not meeting the standards with a list of threats – $Cl > 300 mg/dm^3$ , $Fe > 0.5 mg/dm^3$ , $N-NO_3 > 10 mg/dm^3$ – adopt the EU or WHO standards (need to be co-ordinated with Mecklenburg).
	7. Surface waters quality.	7. State of flowing surface waters quality, lakes, concentration of eutrophic substances and salinity of the Lagoon.
	8. Lack of strategic legal regulations (the Water Law as a basic act and executive decrees).	
	9. Lack of legislative (executive) solutions for transformation of the conditions of use of the basin waters into spatial management plans.	
	10. Accidental pollution – lack of a compact regional plan of preventing from accidental pollution.	
	11. Lack of compliance of the Polish legislation in the field of water management with the legal acts of the European Union.	

1. Threat to surface waters and groundwater resources in the aspect of quality and quantity continued.	12. Decreasing surface waters, groundwater and transitional retention.	12. Decrease of water resources in mln m <sup>3</sup> , lowering of the water level (m).
	13. Melioration and drying of water and mud areas and peatbogs.	13. Drained area, decrease of transitory retention (mln m <sup>3</sup> ).

State	State indicators – S	Activities	Indicators of reaction – R
1. Threat to surface waters resources in quality and quantity.	<ul style="list-style-type: none"> <li>Quality and quantity indicators for surface waters and groundwater.</li> </ul>	<ul style="list-style-type: none"> <li>Documentation of water balance for surface waters, water-economy balance and conditions of use of the waters of the basin.</li> <li>Improvement of quality and quantity of surface water resources.</li> </ul>	<ul style="list-style-type: none"> <li>Expenditure on improvement of water management related to expenditure on environmental protection in the voivodeship.</li> <li>Improvement of water quality in the aspect of eutrophic pollution.</li> </ul>
2. Threat to groundwater resources in quality and quantity.		<ul style="list-style-type: none"> <li>Projects of geological works, documentation of discretionary resources of groundwater, documentation of the water-economy balance and conditions of use of the waters of the basin.</li> <li>Improvement of groundwater quality.</li> <li>Rational groundwater management.</li> </ul>	<ul style="list-style-type: none"> <li>Expenditure on increasing of water resources and improvement of groundwater quality.</li> <li>Improvement of quality and quantity of resources expressed in parameters (indicators) of the state (purity class).</li> </ul>
3. Degradation of quality and quantity of groundwater caused by excessive exploitation of some areas.		<ul style="list-style-type: none"> <li>Study of the balance of water demand (including prognosis) related to water resources of the basin and introducing the principles of basin protection.</li> <li>Decreasing of water intake.</li> <li>Restoration of water retention.</li> <li>Limiting of the range of the regional depression crater.</li> </ul>	<ul style="list-style-type: none"> <li>Expenditure on increasing water resources and improvement of groundwater quality.</li> <li>Improvement of quality and quantity of the resources expressed in parameters (indicators) of the state (purity class).</li> <li>Number of water intakes run alternatively.</li> <li>Expenditure on augmenting of the retention process yearly related to the initial state.</li> </ul>
4. Threat posed by inflow of saline waters from the bedding.	<ul style="list-style-type: none"> <li>Salinity of groundwater.</li> </ul>	<ul style="list-style-type: none"> <li>Indication of the areas threatened with the phenomena with definition of expansion and depth of occurrence.</li> <li>Limiting of water intake in these zones.</li> <li>Restoration of water retention.</li> <li>Ceasing of the process of migration of salt waters to the surface.</li> </ul>	<ul style="list-style-type: none"> <li>Number of water intakes run alternatively.</li> <li>Expenditure on augmenting of the retention process yearly related to the initial state.</li> </ul>
5. Anthropogenic pollution of surface waters and groundwater. Detailed inventory of sources of pollution of the water environment with separation to point and area sources.	<ul style="list-style-type: none"> <li>Amount of treated sewage discharged compared with untreated – industrial and municipal – with separation to villages and cities.</li> <li>Amount of municipal and industrial waste produced: <ul style="list-style-type: none"> <li>– stored,</li> <li>– sorted,</li> <li>– utilised,</li> </ul> with separation to villages and cities.</li> </ul>	<ul style="list-style-type: none"> <li>Regulation of water and sewage management.</li> <li>Regulation of solid waste management.</li> <li>Decrease of the amount of sewage discharged without treatment.</li> <li>Improvement of the quality of surface waters and restoration of biological life.</li> <li>Decreasing of the number of illegal and in orderly dumping sites.</li> <li>Elimination of threats to soils, grounds and groundwater.</li> </ul>	<ul style="list-style-type: none"> <li>Expenditure on building of sewage systems and sewage treatment plants with separation to expenditures in cities and villages.</li> <li>Improvement (e.g. expressed in %) of surface waters quality, especially concerning main pollutants (eutrophication).</li> <li>Expenditure on improvement of water management related to expenditure on environmental protection in the voivodeship.</li> </ul>

6. Bad quality of surface waters.	<ul style="list-style-type: none"> <li>• Surface waters quality indicators.</li> </ul>	<ul style="list-style-type: none"> <li>• Limiting or elimination of the inflow of point and area pollution to surface waters.</li> <li>• Improvement of the quality of flowing surface waters, lakes and the Lagoon concerning concentration of eutrophic substances, chemical sediments and bottom sediments.</li> </ul>	<ul style="list-style-type: none"> <li>• Expenditure on implementation of ecological farming programmes.</li> <li>• Indicators of development of tourism and water recreation.</li> <li>• Indicators of development of agrotourism and qualified tourism.</li> </ul>
7. Unsatisfactory quality of groundwater.	<ul style="list-style-type: none"> <li>• Classification of groundwater quality related to areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Limiting or elimination of the inflow of point and area pollution to groundwater.</li> <li>• Improvement of the quality of groundwater to class Ia, Ib in the areas of water intakes and to class II in degraded areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Expenditure on technologies groundwater purification.</li> </ul>
8. Obsolete “Water law” act and executive decrees.	<ul style="list-style-type: none"> <li>• Entries of the act non-compliant with the concept of implementation of sustainable development.</li> </ul>	<ul style="list-style-type: none"> <li>• Amendments to the Constitution taking into account environmental legal acts.</li> <li>• Amendments and implementation of new executive decrees (the Ministry of Environment) .</li> <li>• Improvement of water management.</li> <li>• Improvement of spatial planning.</li> <li>• Regulating of spatial management in compliance with sustainable development.</li> </ul>	<ul style="list-style-type: none"> <li>• Integrated water management plans in the water basins co-ordinated with the EU legislation.</li> <li>• Taking into account of the sustainable development principle.</li> </ul>
9. Lack of legal basis for implementation of the assumptions of “ <i>Conditions of using the waters of the basin</i> ”. Suspending of the procedure of accepting by the Minister of Environment of “ <i>Conditions of using the waters of the basin and transferring to the spatial management plans</i> ”.		<ul style="list-style-type: none"> <li>• Legislative procedure of an adequate decree of the Ministry of Environment and the Ministry of Spatial Management.</li> <li>• Improvement of water management at all decision levels taking into account the relation between the self-government and the users.</li> </ul>	
10. A not very modern system of warning, information, management and prevention from accidental pollution.		<ul style="list-style-type: none"> <li>• Development of a system regional plan of preventing from accidental pollution.</li> <li>• Explicit definition of the goals, competences and tasks as well as technical methods of prevention.</li> </ul>	
11. Lack of compactness of Polish legislation in the field of environmental protection and water management with the legal acts of the European Union.		<ul style="list-style-type: none"> <li>• Development and legislative procedure of the principal act.</li> <li>• Verification of the “<i>Water law</i>” act and “<i>Geological and mining law</i>” act related to the requirements of the European Union.</li> <li>• Synchronisation of executive decrees for the acts mentioned above.</li> <li>• Improvement of the environmental management procedure with special regards to protection of land surface, air, waters, raw stock resources, spatial planning etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Integrated water management plans in the water basins co-ordinated with the EU legislation.</li> <li>• Taking into account of the sustainable development principle.</li> </ul>

12. Decrease of surface waters and ground-water retention.	<ul style="list-style-type: none"> <li>• Lowering of the water level in lakes.</li> <li>• Lowering of groundwater level.</li> <li>• Increasing outflow and intensifying of chemical changes.</li> <li>• Limiting of exploitable (tangible) water resources.</li> </ul>	<ul style="list-style-type: none"> <li>• Development of small retention programmes and flood safety plans for the basins.</li> <li>• Increasing of lake waters retention and river bed retention.</li> <li>• Increasing of groundwater retention in water-bearing layers with filling of depression craters in the areas of influence of water intakes.</li> </ul>	<ul style="list-style-type: none"> <li>• Investments connected with protection of retention.</li> </ul>
13. Drying of water and mud areas and peat-bogs. Badly directed melioration.	<ul style="list-style-type: none"> <li>• Area of drying terrains.</li> <li>• Amount of decrease of water level.</li> <li>• Volume of decrease in water retention.</li> </ul>	<ul style="list-style-type: none"> <li>• Development of programmes and technical projects for restoration of wetlands.</li> <li>• Restoration of former hydrographic and hydrogeological systems.</li> <li>• Increasing of transitional water retention.</li> <li>• Restoration of biological life typical for water and mud ecosystems.</li> </ul>	<ul style="list-style-type: none"> <li>• Indicators suggested in the part concerning animated nature and landscape.</li> </ul>

**Table 8.2. Sustainable development indicators – land surface**

<b>Problems</b>	<b>Causes of problems</b>	<b>Pressure indicators – D</b>
1. Protection of land surface: <ul style="list-style-type: none"> <li>• waste management,</li> <li>• threats to the natural environment connected with exploitation of mineral raw stock.</li> </ul>	1. Lack of regional identification of mineral raw stock resources.	1. Amount of documented raw stock deposits and of exploited resources.
	2. Lack of a full system programme of mineral resources exploitation taking into account the requirements of environmental protection.	2. Amount of non-conflict deposits (class A), amount of conflict resources (class B), amount of resources causing a great number of conflicts (class C).
	3. Exploitation of oil and gas.	3. Number of exploited and not exploited objects (bore-holes), protective areas (mining areas).
	4. Unregulated exploitation of organogenic raw stock (peat and lacustrine chalk).	4. Area of exploited deposits (ha), level of exploitation (thousands of m <sup>3</sup> /year).
	5. Shallow occurrence of Jurassic salt groundwater.	5. Depth of occurrence (m under the ground surface, m over the sea level) and grade of mineralisation (thousands of mg/dm <sup>3</sup> ).
	6. Unregulated management of municipal and industrial waste: <ul style="list-style-type: none"> <li>• bad state of waste deposit sites,</li> <li>• lack of industrial waste deposit sites,</li> <li>• illegal deposit sites.</li> </ul>	6. Amount of municipal waste stored / sorted on storage sites / processed related to the amount of waste produced. Number of legal storage sites (properly secured, with adequate documentation). Number of reclaimed storage sites with separation on cities and villages.

State	State indicators – S	Activities	Reaction indicators – R
1. Bad state of mineral raw stock management.	<ul style="list-style-type: none"> <li>• Amount of deposits exploited in compliance with the requirements of environmental protection.</li> <li>• Amount of deposits exploited without full formal and legal regulation.</li> </ul>	<ul style="list-style-type: none"> <li>• Working out of a system analysis of mineral resources management basing on geological and economic maps and raw stock inventory.</li> <li>• Elimination or limiting of raw stock exploitation in particularly sensitive areas in terms of nature and of deposits causing collisions.</li> </ul>	<ul style="list-style-type: none"> <li>• Legal regulations regarding elimination of use or suggested limiting.</li> </ul>
2. Economically groundless oil exploitation.	<ul style="list-style-type: none"> <li>• Indicator of the number of bore-holes closed down and destined for closing down.</li> <li>• Number of bore-holes closed down in a wrong way (corrosion, leakages).</li> </ul>	<ul style="list-style-type: none"> <li>• Working out of adequate projects and closing down of bore-holes and exploratory holes with special regards to environmental protection.</li> <li>• Elimination of hazards connected with contamination of water and soil with oil-derivative substances and heavy metals and elimination of migration of oil-derivative substances and salt groundwater to the surface.</li> </ul>	<ul style="list-style-type: none"> <li>• Expenditure on closing down of such sites.</li> <li>• Number of holes closed down related to the total number in ICZM.</li> </ul>
3. Naturally and economically groundless tendency to use geothermal waters and salt groundwater.	<ul style="list-style-type: none"> <li>• Relatively easy access to the deposits of geothermal water deposits and salt groundwater.</li> <li>• High temperature of the waters (up to 70°C).</li> <li>• Very high mineralisation of the waters.</li> </ul>	<ul style="list-style-type: none"> <li>• Performing of detailed geological and economic analysis including natural consequences – assessment of the impact on the environment.</li> <li>• Elimination of making the salt water ascension process permeable, overflows and problems with grouting water to orogens.</li> </ul>	<ul style="list-style-type: none"> <li>• Proper expertise of advantages, degradation of environment, economic losses etc.</li> </ul>
4. Unsatisfactory state of waste management.	<ul style="list-style-type: none"> <li>• Number of polluted sites and sites posing a threat to the environment.</li> <li>• Quality and quantity of municipal and industrial waste.</li> <li>• Lack of a system programme of waste management.</li> <li>• Unsatisfactory number of waste storage sites. A large number of illegal storage sites.</li> <li>• Overflows.</li> <li>• Toxic waste storage sites.</li> </ul>	<ul style="list-style-type: none"> <li>• Carrying out of a detailed inventory of polluted sites and structure of produced and stored waste.</li> <li>• Implementation of programmes of complex pro-ecological undertakings in this area.</li> <li>• Implementation of modern systems of collection, selection, storage and recycling of wastes.</li> <li>• Limiting or elimination of environmental collisions.</li> <li>• Reclamation of waste storage sites and sanitation of degraded areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Expenditure on: <ul style="list-style-type: none"> <li>– waste segregation,</li> <li>– building of storage sites,</li> <li>– utilisation,</li> <li>– recycling,</li> <li>– education.</li> </ul> </li> </ul>
5. Bad state of mineral raw stock exploitation management (landscape scars).	<ul style="list-style-type: none"> <li>• A large number of illegal post-exploitation drifts.</li> <li>• Area and volume of the drifts for reclamation.</li> </ul>	<ul style="list-style-type: none"> <li>• Carrying out of a detailed inventory of post-exploratory sites (organised and illegal) with identification of reclamation methods.</li> <li>• Elimination of landscape scars.</li> <li>• Elimination of illegal waste deposit sites.</li> <li>• Reclamation of polluted sites.</li> </ul>	<ul style="list-style-type: none"> <li>• Expenditure on: <ul style="list-style-type: none"> <li>– elimination of landscape scars,</li> <li>– elimination of illegal storage sites,</li> <li>– reclamation of polluted sites.</li> </ul> </li> </ul>

**Table 8.3. Sustainable development indicators – nature protection**

Problems	Causes of problems	Pressure indicators – D
<p>1. Threats to biodiversity:</p> <ul style="list-style-type: none"> <li>• impoverishment of the species composition of flora and fauna,</li> <li>• weakening of standing timber,</li> <li>• vanishing of protected species.</li> <li>• appearing of new species, bearing down native species.</li> </ul>	<ol style="list-style-type: none"> <li>1. Drying of wetlands caused by: <ul style="list-style-type: none"> <li>• wrong exploitation of groundwater resources,</li> <li>• wrong melioration.</li> </ul> </li> <li>2. Environmental pollution, mainly: <ul style="list-style-type: none"> <li>• surface waters (eutrophisation) and groundwater,</li> <li>• air,</li> <li>• land surface.</li> </ul> </li> <li>3. Change of the traditional method of farming.</li> <li>4. Wrong fishery.</li> <li>5. Lack of legal protection of the most valuable nature areas.</li> <li>6. Uncontrollable development of tourism.</li> <li>7. Lack of accurate knowledge about nature at all levels of management.</li> <li>8. Lack of standardised programmes of nature protection on both sides of the border.</li> <li>9. Lack of acceptance for the limits resulting from nature protection plans.</li> <li>10. Existence of barriers in unconstrained migration of species.</li> <li>11. Intensive forestry.</li> <li>12. Lack of financial means for carrying out programmes, including means for employment of adequate staff.</li> </ol>	<ol style="list-style-type: none"> <li>1. Water consumption per capita.</li> <li>2. Exploitation of groundwater resources.</li> <li>3. Surface waters intake.</li> <li>4. Irrigated areas – agriculturally used areas ratio.</li> <li>5. Drained areas - agriculturally used areas ratio.</li> <li>6. Total amount of treated sewage – water consumption for industrial and municipal purposes ratio.</li> <li>7. Emission of organic substances as BOD.</li> <li>8. Emission of phosphor and nitrogen from sewage treatment plants.</li> <li>9. Emission of heavy metals.</li> <li>10. Use of pesticides and fertilisers in a unit of agriculturally used area.</li> <li>11. Emission of sulphur oxides and nitrogen oxides from households and transport.</li> <li>12. Amount of waste produced / stored and utilised in the industrial and municipal sector.</li> <li>13. Agriculturally used area and area used for cattle pasturage – total area ratio.</li> <li>14. Number of cattle on an area unit.</li> <li>15. Tonnage of fish caught to number of registered fishing boats ratio.</li> <li>16. Number of tourists in the season.</li> <li>17. Number of organised lodging places for tourist compared to the number of tourists in particular seasons.</li> <li>18. Inventory of ecological barriers – natural and artificial.</li> <li>19. Wood gained from particular area in m<sup>3</sup>.</li> <li>20. Expenditure on environmental protection – total expenditures ratio.</li> <li>21. Participation of the staff employed in the environmental protection sector.</li> </ol>

State	State indicators - S	Activities	Reaction indicators - R
<ol style="list-style-type: none"> <li>1. Vanishing of rare species.</li> <li>2. Decreasing of environment quality taking into account the influence on health of the inhabitants, state of the forests, flora and fauna and development of tourism.</li> <li>3. Two effects of land use: <ul style="list-style-type: none"> <li>– positive – creating of areas which become valuable because of their nature values, as a result of ceasing any economic activity, forestation of degraded areas,</li> <li>– negative – loss of nature values of the environment, increasing unemployment.</li> </ul> </li> <li>4. Loss of valuable fish species as an effect of excessive fishing, loss of ecological balance, economic losses in fishery,</li> <li>5. Loss of natural resources.</li> <li>6. Loss of nature values, areas valuable from the point of view of tourism, negative impact on economy.</li> <li>7. Inappropriate management of the area.</li> <li>8. Low ecological awareness of the local administration and society.</li> <li>9. Difficulties in introducing of new forms of nature protection.</li> <li>10. Isolation and vanishing of species, collisions of animals with transport.</li> <li>11. Decreasing biodiversity.</li> <li>12. Low executing of the environmental protection rules.</li> <li>13. Unsatisfactory legal system for environmental protection.</li> </ol>	<ul style="list-style-type: none"> <li>• Area of wetlands to total area ratio.</li> <li>• Number of protected species (threatened with vanishing, key species) to total number of species ratio.</li> <li>• Concentration of total phosphor and nitrogen in surface waters, BOD5, salinity of groundwater, concentration of heavy metals in waters and sediments, concentration of SO<sub>2</sub> i NO<sub>x</sub> in the air, indicators of wholesomeness for flora, fauna and people.</li> <li>• Indicators of land use.</li> <li>• Number of caught fish and their age.</li> <li>• Protected areas to total area ratio.</li> <li>• Age of standing timber, number of trees per area unit.</li> <li>• Percentage of financial means for environmental protection.</li> </ul>	<ul style="list-style-type: none"> <li>• Implementation of legal regulations for the protection of wetlands.</li> <li>• Promotion of positive trends of land use, reclamation and restoration of degraded areas.</li> <li>• Implementation of sustainable principles for fishery together with an effective programme of monitoring and education.</li> <li>• Realisation of passive and active methods of nature protection.</li> <li>• Rational location of the tourism infrastructure from the point of view of the protection of the most valuable areas as a result of spatial planning, education of local communities, working out of tourism development programmes taking into account preservation of biodiversity, promotion of ecotourism.</li> <li>• Development of education programmes (certificates) for self-governmental administration and communities taking into account the principles of sustainable development and increasing of the awareness of the importance of the protection of the area included in the plan.</li> <li>• Working out of operation programmes and publishing of the available information.</li> <li>• Educational programmes showing future profits for local communities, intensifying of the activities of non-governmental organisations, financial compensatory programmes.</li> <li>• Planning of transportation taking into account preserving of ecological corridors.</li> <li>• Implementation of sustainable management of forest resources.</li> <li>• Adjusting of the financial means and staff to proecological management.</li> <li>• Programme of adjusting legal regulations to international standards.</li> </ul>	<ul style="list-style-type: none"> <li>• Protected areas, financial means for environmental protection.</li> <li>• Fees, fines, taxes, legal instruments.</li> <li>• Implementation of the principles of sustainable development in the area included in the ICZM of the Szczecin-ski Lagoon, development of spatial management plans and planning strategies towards this direction.</li> <li>• Effective instruments for inspection of fishery management.</li> <li>• Number of legal acts complying with the EU legislation.</li> <li>• Development of land use management plans.</li> <li>• Number of qualified staff with certificates.</li> <li>• Working out of operating programmes together with neighbouring countries.</li> <li>• Development and implementation of financial, education and management programmes.</li> <li>• Implementation of technical solutions preventing from unconstrained migration of species.</li> <li>• Implementation of forest management plans compliant with the sustainable development.</li> </ul>

**Table 8.4. Sustainable development indicators according to the Maritime Office in Szczecin for the area of ICZM – the Szczecinski Lagoon**

<b>Problems</b>	<b>Causes of problems</b>	<b>Pressure indicators – D</b>
1. Quality of sea waters and internal waters (sediments).	1. Development of sea harbours leads to increasing of traffic and of the size of the units, which causes environmental problems. 2. Development of sea harbours on the ICZM area is connected with carrying out much dredging works. Storage of dredging material causes conflicts with the environment and local communities..	1. Increase of trans-shipping of goods and passenger transport (tons/year). 2. Amount of dredging material stored on silting fields (m <sup>3</sup> /year).
2. Protection of sea shores against damage.	1. Damage caused by: <ul style="list-style-type: none"> <li>• the sea,</li> <li>• development of industry,</li> <li>• uncontrollable development of tourism.</li> </ul>	1. Sea shore and shore of internal sea waters requiring protective activities (km). 2. Area of the technical zone designated for tourism, recreation, industry and urbanisation (ha).
3. Finishing of the works on delimitation of the technical zone (including elaboration of vectorial maps).	1. Lack of acceptance of the communes for additional legal limits on attractive areas located directly by the water.	1. Area of the technical zone of the Maritime Office in Szczecin – legally sanctioned (ha).
4. Lack of adequate database and reacting systems for possible accidental pollution on sea waters.	1. Lack of a data collecting system for accidental pollution and quick-reacting systems.	1. Quantity and quality of data collected by the system and existence of the system together with its assessment.

<b>State</b>	<b>State indicators – S</b>	<b>Activity</b>	<b>Reaction indicator – R</b>
1. lack of complete identification of sea waters pollution and bottom sediments (including the area of sea harbours and other internal sea waters).	<ul style="list-style-type: none"> <li>• Concentration of oil-derivative substances in the water and sediments and other harmful substances being a threat to sustainable development including flora and fauna taking into account state standards and, EU standards.</li> </ul>	<ul style="list-style-type: none"> <li>• Improvement of the existing monitoring system, limiting of emission of pollutants.</li> </ul>	<ul style="list-style-type: none"> <li>• Awarding of financial means and selecting of institutions responsible for carrying out monitoring activities and assessment of water and bottom sediment quality.</li> <li>• Expenditures on monitoring of accidental environmental pollution assessment of security.</li> </ul>
2. Possibility of occurrence of accidental pollution during transport and trans-shipping.	<ul style="list-style-type: none"> <li>• Lack of an adequate database for possible accidental pollution.</li> </ul>	<ul style="list-style-type: none"> <li>• Development of a data collecting system for the data significant in cases of accidental pollution and of a system of protection and reacting taking into account co-operation with Mecklenburg.</li> </ul>	<ul style="list-style-type: none"> <li>• Quality and quantity of the data collected by the system.</li> </ul>
3. Weakness of the existing staff and equipment used in case of accidental pollution and in general inspection and securing activities.	<ul style="list-style-type: none"> <li>• Number of staff trained, quality of the equipment and existence of quick-reacting systems for accidental pollution.</li> </ul>	<ul style="list-style-type: none"> <li>• Augmentation of the range of activities of adequate services.</li> <li>• Financial means for: <ul style="list-style-type: none"> <li>– professional equipment,</li> <li>– alarming systems,</li> <li>– inventory of transport and trans-shipping of hazardous loads.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Expenditure on organisation of the quick-reacting system.</li> <li>• Working out of co-operation with Mecklenburg.</li> <li>• Expenditures on professional equipment.</li> <li>• Expenditures on realisation of the whole quick-reacting system.</li> </ul>

<p>4. Existence of toxic substances in dredging material and bottom sediments.</p>	<ul style="list-style-type: none"> <li>• Concentration of heavy metals, halogen derivatives, organic substances.</li> </ul>	<ul style="list-style-type: none"> <li>• Securing proper sites for storage of dredging material: <ul style="list-style-type: none"> <li>– for dredging material assumed not to be harmful to the environment,</li> <li>– for dredging material containing harmful substances.</li> </ul> </li> <li>• Reclamation of storage sites or utilisation of harmful substances in dredging materials using Best Available Technology.</li> </ul>	<ul style="list-style-type: none"> <li>• General amount of dredging material stored (m<sup>3</sup>/year).</li> <li>• Amount of dredging material with toxic substances (m<sup>3</sup>/year).</li> <li>• Amount of dredging material subject to the process of utilisation of harmful substances (m<sup>3</sup>/year) or reclaimed area (ha/year).</li> </ul>
<p>5. Dust, noise and existence of other factors during trans-shipping in the harbour (trans-shipping of different goods in different parts of the harbour and the problem of ship scrapping).</p>	<ul style="list-style-type: none"> <li>• Concentration of pollutants and state of acoustic climate causing exceeding of state and EU standards.</li> </ul>	<ul style="list-style-type: none"> <li>• Extending of supervision in the sites where standards are exceeded, working out of a monitoring system, use of technologies limiting harmful emissions to the environment.</li> </ul>	<ul style="list-style-type: none"> <li>• Expenditure on new trans-shipping technologies.</li> <li>• Improvement of environment quality measured by concentration of pollution adequate for particular loads.</li> </ul>