

# Coastal Zone Management in Ventspils



(Photo: A. Popeluha, 2006)



## Case study report within the Coastman project

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## **Abstract**

The unique geographical location of Ventspils located on the Latvian eastern shores of the Baltic Sea has shaped its historical role as one of the most important export ports, from Russian Imperial times in the 18th century, through the Soviet Union regime until today. The transshipment of oil products and chemicals is and will be one of the most important aspects for the economy and the development of the port town. Therefore, the largest investments will mainly occur in the field of environmental protection in relation to the above mentioned transshipment.

Environmental problems of Ventspils are described and analysed in the Environmental Policy Plan (EPP) adopted by the municipality. The current Ventspils Environmental Policy Plan is the third one covering the period until 2010. The EPP combines a continuous process of monitoring, implementation and planning of new improvements. The plan contains a process of developing ways and means to improve the environment and diminish negative impacts through the involvement and co-operation of local government, enterprises, the Free Port Authority and citizens. The plan is based on the principle of sustainable development. One of the main goals of this plan is to develop a society with high environmental awareness.

The municipality is responsible for the implementation of local environmental policy and is obliged to devote increasing attention to the developments in the port, to ensure that there are no negative or destructive changes to the environment of the city and its surroundings.

**Keywords:** Latvia, Ventspils, municipality, environmental policy, management, licensing, planning, coastal zone, beach, Blue Flag

# 1. Introduction

Ventspils is the sixth largest city in Latvia situated in the north-western part of Latvia on the Baltic Sea at the outlet of the River Venta. The total area of the city is 55.74 km<sup>2</sup>, with 44.000 inhabitants in 2006. Ventspils is an important transport hub with an ice free deep-water port, which has one of the largest cargo turnovers in the Baltic region. At the same time Ventspils is a green city – almost half of the total area (45%) of Ventspils is covered by natural flora that consists mainly of pine forests (24% of nature area). The River Venta, with a length within the city borders of 3.75 km and a width between 150-300 m, divides the town into two parts. In the northern part of Ventspils Busnieku Lake is located with a total water area of 4.8 km<sup>2</sup>.



*Photo 1: Ventspils from birds' flight (Photo: A. Popeluha, 2006)*

The total length of coastline in Ventspils City is 11.85 km and is characterised by the beach and a dune zone along the shore reaching a maximum height of 15-20 m. The inhabitants of Ventspils have always been proud of their wide sandy, clean and orderly maintained beach. They use several bathing places within the area of the city: the River Venta and Busnieku Lake, as well as several places along the seashore. According to Regulations No. 300 of the Cabinet of Ministers of the Republic of Latvia issued on August 11, 1998 "Regulations of Arranging and Hygiene of Bathing Places" Ventspils City beach has been arranged and is being maintained for recreational needs. The beach used for recreation is a 300m wide and 1.2 km long section of the seashore within the area of Ventspils city, situated to the south of the territory of the Free Port of Ventspils and near to where the River Venta flows into the Baltic Sea.

## **2. Background of the problem**

The uniqueness of the Baltic Sea coast in Latvia and surroundings of Ventspils is determined by its valuable natural resources. The length of the Baltic Sea coast in the administrative territory of Ventspils is approx. 12 km, and almost a fourth of the city's administrative territory is occupied by Ventspils Free Port. When planning city development, the interests of the general public and entrepreneurs should be taken into account, at the same time ensuring the preservation of valuable natural resources and preventing and minimising environmental pollution. The development of economic activities in the Free Port territory together with the implementation of the policy of preserving valuable natural resources is possible only if the sustainable development principle – development that meets the needs of the present generation without compromising the needs of the future (Brundlandt report) - is put into action. It is the only way to successfully plan the development of the Baltic Sea coast and to preserve its valuable natural resources, particularly its coastal dune areas.

## **3. Description of the conflict**

Ventspils historically is located on the coast of the Baltic Sea and on both banks of the River Venta. This case study developed within the scope of the Coastman project relates not only to the narrow part of the seashore referred to in the legislation of Latvia as the Baltic Sea protective belt, but assuming that the term “coast” here refers to the river shores as well, it takes into account the city as a whole. The case study describes methods and planning instruments to be used on the municipal level to fully prevent conflicts and to solve any potential problems before a conflict can arise. Therefore, the essence of the Ventspils case study comprises how to develop a town preserving valuable natural resources while at maximum level satisfying interests of all parties involved (different groups of population and institutions, including developers and environmentalists), as well as ensuring economic growth and meeting of social needs. The methods of conflict resolution were chosen with the aim to encourage elaboration of the integrated strategy for the coastal area in its narrower sense and the sustainable development of the whole town, thereby facilitating the best possible decision making for coastal area management.

## **4. Stakeholders and conflict resolution methods**

### ***4.1. Relevant stakeholders***

- Ventspils local government, Ventspils City Council and its executive institutions:
  - o Development Commission
  - o Environmental Department
  - o Architecture and City Building Department with territory planning office
  - o Economy Department and Investment Department
  - o Center of Tourism Information
- Neighbouring coastal local governments

- State environmental authorities at national and regional level:
  - o State Environment Service and Ventspils Regional Environment Board
  - o Marine and Inland Waters Administration
  - o State EIA Bureau
- Non-governmental organisations – Environmental Protection Club, Latvian Environmental Education Fund and local society "Zaļā nagla" (Green Nail)
- Scientists and consultancies

In the COASTMAN project Ventspils City Council cooperates with neighboring coastal local governments because the environmental policy and management system cover not only the city territory but also all those areas around the city, which are of interest to and impacted by Ventspils and its inhabitants. Ventspils Free Port Authority and companies within its territory are also involved in the implementation of the project. Among the parties involved in the COASTMAN project are also state institutions – the State Environment Service's Ventspils Regional Environment Board and the Marine and Inland Waters Administration who control environmental protection and nature resource use in the land area, the continental shelf and the economic zone of the Baltic Sea in the Republic of Latvia.

- Ventspils Free Port Authority
- Harbor Master's Office and
- Private and public companies within the Free Port Authority territory

The Free Port of Ventspils Authority takes an active role in ensuring environmentally sound practice in the port through the following activities:

- Around the clock monitoring by oil spill collection team aimed at prevention and collection of incidental pollution in port waters. The unit is equipped with 6 oil skimmers and experienced personnel.
- The development of an oil spill contingency plan in cooperation with the port's terminals, where information procedures, risk assessment, response activities, and the application of available technology are outlined.
- The implementation of the Port's Waste Management Plan where information for port users is provided concerning different waste types (oily waste, sewage, solid domestic waste and other), treatment options, the capacity of reception facilities, reporting procedures, the responsibilities of organisations etc.
- The completion of the environmental infrastructure project by constructing an oil spill combating equipment storage facility at the northern breakwaters. The benefits of this project include the efficient deployment of different types of booms to locally confine pollution, and safeguarding against the spreading of oil into the open sea, thus minimising the impact on marine resources.

Navigation safety is also important for the guarantee of a quality environment in the port. These issues are under control of the Harbor Master's Office, which is one of Ventspils Free Port Authority's units. The Harbor Master's Office is working with state-of-the-art vessel traffic control systems, e.g. a modern radar system *STN ATLAS 9730* and radio-locator. 17 professional pilot crews ensure vessel traffic, and *Ostas Flote LTD.* manages 8 tugboats with an average 2500 – 3000 HP capacity.



*Photo 2: Ventspils harbour (Photo: A. Popeluha, 2004)*

Taking into account that the River Venta is the only maritime access to the port of Ventspils it must be regularly dredged. The Free Port of Ventspils Authority guarantees a minimum depth for sea going vessels along the trajectory towards the Port of Ventspils. As there is a constant process of sedimentation, maintenance dredging is required year round. In the Free Port of Ventspils area of the River Venta the dredge spoil consists of fine sand mixed with a varying volume of mud depending on the season. In order to maintain the dynamic equilibrium of the river, the annual volume of dredged material averages 305.000 m<sup>3</sup>. Over the last years the dredged material has been dumped in a special dumping area situated 4 nautical miles from the northern breakwater and 1.7 nautical miles from the shore line. According to Latvian national law regular checks and analyses of dredge spoil samples have been carried out accurately.

Throughout the year in the Free Port of Ventspils, environmental protection is highly valued and organised according to overall environmental protection rules and ethics.

Ventspils Port provides various kinds of environmentally important services including the removal and the utilisation of different types of waste that are polluted with oil and oil products, the removal and the purification of polluted waters from the washing of cargo tanks, and the removal of polluted ballast waters. The treatment of waste collected in the port is organised according to the rules and regulations of HELCOM, MARPOL 73/7 and Directive No.2000/59 issued by the European Commission.

Ventspils port has realised the project “Environmental Protection against Oil and Oil Product Spillage in Ventspils Port”. As part of the scope of this project a boom warehouse was built on the northern breakwater at berth No.36. Additionally, three new types of sea booms were bought: heavy sea booms (3 spools), light booms (6 spools) and absorbent booms (2 spools). The heavy sea boom spools can be operated with a diesel engine. The light boom and absorbent boom spools can be operated manually. In order to be able to use the booms in case of oil or oil product



spillage a slip in the front of the boom warehouse was built. The slip helps to launch the booms into the water or to lift them out of the water. Additionally, to make the booms completely operational a mooring pile for boom strengthening was installed.



*Photo 3: Storehouse for booms (V. Zilnieks, 2006)*

Today, as a result of the project “Environmental Protection against Oil and Oil Product Spillage in Ventspils Port” in the case of oil or oil product spillage it is possible to contain an oil spillage with absorbent booms as fast as in 15 minutes. The containment of the spillage with absorbent booms is particularly important due to the fact that after these preliminary works it is possible to close off the polluted water area with effective light booms or even with sea booms and skim the oil.

#### **4.2. Legal methods: Environmental Protection, Planning, Building Control, Strategic Environmental Impact Assessment and Environmental Impact Assessment**

On May 1, 2004 Latvia introduced the environmental impact assessment of planning projects also called **Strategic Environmental Impact Assessment (SEIA)** in compliance with the requirements of European Parliament and Council Directive 2001/42/EC of June 27, 2001 “On the Assessment of the Effects of Certain Plans and Programmes on the Environment”. Its purpose is to identify and evaluate potential environmental impacts of certain plans and programmes and to involve the general public in discussing planning documents and decision-making, as well as to express proposals to prevent or decrease any potential negative impact. The strategic assessment is carried out during preparation of a planning document, before the document is submitted for approval.

This procedure was applied to Ventspils City Planning Document (2006-2018) in accordance with Decision No. 41 of February 25, 2005 of the national EIA office, although the development of the planning document was already in the development stage (its development was provided



for in Decision No. 94 of February 23, 2003 of Ventspils City Council). After receiving the programme from the office, a consultancy was commissioned to prepare an environmental review. The environmental review should contain:

- goals of the planning document and its relation to other planning documents (Development Strategy)
- procedure of the strategic EIA, institutions taking part, public participation and results of this participation
- description of the current environmental situation and possible changes if the plan or programme will not be realised
- environmental situation in the areas that will be affected by the plan or programme
- environmental problems in protected areas
- relation to national and international environmental protection goals (National EPP, Baltic Agenda – 21, HELCOM recommendations etc.)
- evaluation of the main influences (direct and indirect, common effects, short- and long-term effects, positive and negative)
- solutions for minimisation of negative effects
- trans-boundary effects
- description of methods and principles used

In spring 2006 the consultancy firm finalised the Environmental Review. The main conclusions are:

The planning document determines opportunities, directions and limitations of the development of municipal areas, as well as their current and planned (permitted) use. Its main task is determining the planning of the town's development, taking into account the interests of inhabitants and businessmen ensuring both preservation of valuable natural resources and elimination or reduction of environmental pollution. The planning document of Ventspils City has been developed for the time period up to 2018. It reflects the long-term development trends of the municipality in this period, determining the current and the planned use of the area, as well as prospective research areas (construction of the northern port), for which opportunities of use will be researched in the future. In addition, the planning document defines the protective belts and also envisages development of infrastructure including a centralised water supply and sewerage network, heating supply, streets and bridges.

The planning document establishes the following changes in the current types of use of the territory and their development:

- to update the width of the Baltic Sea coast protective belt in the south-western and northern part of the city;
- to determine the protective belts of Lake Busnieku and the River Venta;
- to change the type of land use from agricultural and forest areas to industrial area in the north-eastern part of Ventspils in the Free Port territory;
- to improve transport infrastructure (reconstruction of the current bridge and of the port access roads, expansion of the airport, optimisation of free port territory etc.);
- to develop Ventspils free port activities by constructing a custom-designed coal terminal, fish uploading and refrigeration terminal, as well as other industrial objects;
- to develop a centralised water supply and household sewerage wastewater collection system;
- to develop a surface water, rainwater and ground water collection system;
- to improve the centralised heating supply system.

As part of Ventspils City's planning document a general description of the territory and environment was prepared featuring the following areas:

- air quality
- water consumption
- waste management
- ground and ground water pollution
- safety and risks
- green fields

#### **4.2.1. Possible environmental impact**

It is envisaged in the planning document to change the width of the Baltic Sea protective belts in the south-western part of Ventspils, as well as the width of the protective belts at Lake Busnieku and the River Venta, and in the territory of Ventspils Free Port to change the type of use of a particular land section from forest and agricultural land to industrial territories in the north-eastern part of Ventspils. These areas were described in the environmental review including potential environmental impacts due to the implementation of these changes. It can be concluded that:

- Transforming valueless and overgrown agricultural land would improve the situation from the view of landscape, architecture and land use.
- Transformation of forest land in separate regions could aggravate air quality or at least keep air pollution at the current level. However, as a result the value of land would increase and possibilities to use and develop the area would improve.
- Changing the boundaries of the Baltic Sea protective belts would ensure structuring of the grey dunes and foredunes and coordination of the visitors flow.
- The planned construction of apartment houses in the area of Vasarnicu Street could adversely affect this area, as the number of people would increase, as well as the anthropogenic load on the forest and dune ecosystem of the seashore.

#### **4.2.2. Activities to soften the impact**

The softening of potential impacts and their evaluation will be provided through an environmental monitoring system including both the regular planning of the environmental policy and actions and evaluation of its efficiency and environmental licensing of economic activities. Currently the third Environmental Policy Plan and its corresponding action programme are in force.

To compensate for a possible reduction of the city's green area on the right bank of the River Venta, any future construction plans are to include large proportions of free areas for green spaces. Of particular significance is the establishment of new green areas (parks and squares) between the planned industrial and residential areas.

When planning the management of the Baltic Sea coastal forests, any excessive trimming should not to be allowed in order to avoid strong wind influence.

When defining the protective belt of the Baltic Sea coast and planning usage and management of this area both recreational and environment protection interests should be taken into consideration.

To preserve the dune ecosystem walkways need to be established to cross grey dunes and foredunes, as well as an access way for service transport. No mode of transport, e.g. pedestrians, horses, bicycles, should be allowed outside the designated footbridges. In the dunes located to the north of the gap opposite Seaside Park, recreation areas (fireplaces, tents, tables etc.), sport fields, sightseeing towers are forbidden, as well as changing the relief, forestation and planting.

To save the dunes, particularly the grey dunes; it is necessary to elaborate the management plan and methodology and to evaluate changes.

To ensure protection of the valuable habitats and protected plants in the Baltic Sea coast protective belt it is necessary to implement the solutions and recommendations as outlined in the section on regulation of the flow of visitors: closing of public roads, building walkways. When planning any development in this area, the use of plants foreign to the flora of Latvia and this specific habitat should be avoided. In no case should dry meadows be forested, since this would degrade a biologically diverse, natural and protected habitat.

#### **4.2.3. Monitoring of implementation of Ventspils City Planning Document (2006-2018)**

Elaboration of the planning document and its implementation are related to the Ventspils City Development Strategy for 2005-2015 and the implementation of Ventspils Environmental Policy Plan and its action programme. Within the Ventspils Environmental Policy Plan and its action programme periodic (every 3 year) evaluation of the implementation of actions of the programme and their efficiency are envisaged, closely linked to the monitoring of Ventspils spatial planning, as it would allow an evaluation of the affect the planned and implemented actions have had on the environment, including the green area in the town. To perform this evaluation data from monitoring, observations and statistics are used, as well as the results of research carried out by various experts, to develop a comprehensive picture of the changes of the environmental condition in the town and the efficiency of the implementation of the Environmental Policy Plan and the action programme.

On 22 May, 2006 Ventspils City Council decided to issue the final draft of the planning document for public consultation. Until 10 July the City Council received conclusions, proposals and recommendations from public institutions, as required by several legislative acts. Until the end of October four meetings were held with residents, who had submitted applications. Other residents or their representative groups were invited to meetings with the Architecture and City Building Department and the Development Commission. In addition, discussions took place in other municipal institutions.

#### **4.2.4. Environmental impact assessment (EIA)**

Environmental Impact Assessment (EIA) is a useful tool for the reduction of impacts on the environment. EIA is a multi-level procedure, which is required prior to the construction of significant facilities that may have a harmful impact on the environment. This procedure includes a set of measures, which envisages the review of the state of the environment at the given site, the review of impacts of the facility on the environment, the preparation of proposals for reduction or prevention of negative impacts, as well as the development of necessary requirements for the monitoring of the remaining impacts. In order to receive permission for commencement of envisaged activities, the Law on Environmental Impact Assessment requires that the applicant

submit a final conclusion to the respective state institution or municipality. In addition, a report on such final conclusion by the authorised institution needs to be submitted, together with any other documentation as required. The municipality then carries out a comprehensive assessment of the final conclusion and the report of the national EIA Bureau taking into account the opinion of state authorities concerned and the general public before finally reaching a decision on acceptance or refusal of the envisaged activities. This decision is then displayed in the local municipality building and in other public places, as well as being published in the local newspaper.

In Ventspils, EIAs have been carried out for a number of reconstructions in the largest oil and product terminals in the port territory, as well as for the construction of a number of new production facilities and a sewage water treatment plant.

In cases where according to the law an EIA is not required, the Ventspils Regional Environmental Board has been carrying out initial EIAs, and only thereafter technical requirements for design and construction works are being issued.

#### **4.2.5. Local municipal legislative methods by laws (including planning and building control) and licenses**

On a local level, relevant legislation includes municipal binding regulations. In case of Ventspils, the Environment Protection Licensing Regulations, Seashore Management Regulations and Building Regulations, which are currently under development, should be mentioned.

A successful instrument for implementing environmental policy in relation to companies is the environmental licensing system that has been in force in Ventspils since the mid 1990s. Ventspils wanted to provide for the realisation of the functions and rights given to the local authority by the state. In the mid 1990s the environmental legislation in Latvia was comparatively disjointed, but in many countries, e.g. the Netherlands, it is more coherent. That is why the principles of environmental licensing as enforced in the Netherlands have been used as the basis for Ventspils' environmental protection licensing regulations. The licensing system means that every enterprise or activity, which may have an impact on the environment (either through emission of pollution or disposal of waste) and/or may create any risk for the environment, must receive an environmental license – a special permit from the municipality. The process of preparation of the license includes the following main stages: application, informing the general public and public hearing, preparation of a draft license, preparation of the license and issuing the license.

Thus, the licensing system provides stricter environmental standards than the national requirements, a possibility to forbid some activities of companies if they are considered to be dangerous or hazardous to environment and population of the town, taking into account the public opinion. Public hearings are the main measure to develop democratic principles in our society. Therefore, Ventspils has already organised its work according to the EU Directive on Integrated Pollution Prevention and Control (IPPC).

The local authority compiles the draft license taking into consideration Latvian environmental legislation norms, the Ventspils Environmental Policy Plan, the Ventspils Territory Development Plan, the conclusions of the national Fire and Emergency Service, the national Public Health

Agency, the national Labour inspectorate and the national environmental inspection, as well as objections expressed during the public hearing.

The license contains environmental protection and safety regulations and requirements, as well as the requirement to carry out measurements in order to trace environmental changes and the level of pollution, and inform the local authority about the results of the measurements.

In certain issues the City of Ventspils, by implementing its environmental policy, has been ahead of the processes taking place on the national level. For example, the requirement to install vapour collection systems in newly built filling stations has been in force in Ventspils since 1994. Similarly, the requirement to carry out a soil and groundwater contamination study before starting construction works was incorporated in all the environmental licenses issued to enterprises.

The control of compliance with the license requirements is performed by the local authority, and when deemed necessary the State authorities that have participated in developing the license can be invited.

### **4.3. *Environmental information collection and research methods***

#### **4.3.1. Research on current geological process of the seashore**

During the COASTMAN project Ventspils municipality is continuing its cooperation with independent consulting companies and scientists, mainly to investigate the value of natural resources and to work out the forecasts of changes in nature that have to be taken into account in the planning and building in new areas.

This includes the current investigation into the **geological processes of the seashore**. Problems with changes in the coastal zone are common to almost all of Latvia's seacoast. Erosion processes are mainly natural, but there is also the influence from the port. The port's long breakwaters and up to 17m deep shipping channels practically cut off alongshore sediment drift and lead to significant changes in the coastal belt on both sides of the port. To the north of the port downdrift erosion is continuing due to the alongshore sediment deficit. This zone is 10-14 km long and includes a belt of land loss with a width of 70- 200m to the south of the harbor structures. Over the past century since these harbour structures were built updrift acceleration has been observed in a 5-10 km stretch, attaining a width of 300-600 m with a maximum of 900m.

Taking into account such processes in the coastal zone, it is vital to have a qualitative forecast of changes in order to make plans for future development, such as building and planning of recreation activities on the seashore.

For planning of the region it was necessary to take into account natural processes such as coastal erosion in the northern part of Ventspils. The municipality was eager to obtain proposals for recommendations and forecasts and therefore requested scientific assistance.



Picture 1: Map of the seacoast in northern part of Ventspils with the height of bluff in meters (Photo: G. Eberhards, 2005)

In order to understand the geological processes in the northern part of the Ventspils region, one particular district can be used as a model. According to the relative elevation, morphology and geological structure three different coastal sections, each approx. 360-380 m long, can be named.



Picture 2: Detail analyzed district of the bluff (Photo: G. Eberhards, 2005)

The first section (the most northern one) is a strongly marked 6-8 m high bluff coast regularly eroded by storms, with an almost fully eroded 2-4 m high narrow coast dune belt, that was formed when the sand from the steep was blown over its upper edge inland.

The second section, a low coastal district, is an indented bluff coast only 4-6 m high, and is also regularly eroded by storms. Here the sea washes off the ancient bed of the old channel of the River Venta.

The third section (closest to the harbour) is also a typical 4-6 m high bluff sea coast occasionally washed off by the storms.



The first and the third coastal sections according to their geological structure and conditions of the formation are similar. The sediments that form the bluff coast belt except for the segment of the old channel of the River Venta are relatively easily eroded. During storms the foot of the steep is usually washed off, the natural stability is lost and the landslip processes begin. According to observations, usually the erosion from the foot of the steep when a vertical wall is formed is followed by the slope retrograding by losing sand, which flows down or may form large masses sliding down.

The sea bluff coast erosion during the previous years, as detailed described below was influenced by several factors:

- The proximity of port waterworks – breakwaters and continued (1953-1993) dumping of dredged material from the waterway channel at the distant sea dump, which created up to 30 million m<sup>3</sup> drift deficit in the alongshore drift flow to the north of the port.
- Increasing destructive impact of strong winds during the last decades especially in 1982-85 until 1993, as well as the storm of November-December 1999.

According to an analysis of map material in the period from 1947 to 1984 (37 years) the width of the eroded coast (measuring from the upper side of the steep, not from the waterline inland) in the first section 2.5 km to the north from the northern mole of the port reached 75-150 m, in the second 30-35 m, and in the third coastal section only 20 m. In the period from 1982 to today, changes were established by performing measurements in 20 measurement lines, and the following results were obtained:

- In the first coastal section the width of the eroded basic coast belt ranges from 47 to 58 m (on average 52-55 m), on average 3-3.5 m annually.
- In the second coastal section that embraces the old channel of the River Venta with clayey and peat sediments the low coast has receded irregularly – by 18-30 m (on average 1-1.6 m annually)
- Conversely, the third section experienced only irrelevant recession of the steep by 3-9 m, (on average 0.5 m annually).

It is expected that in the following decades the dominating wind direction will not change, that the destructive activity of the wind will increase, and that the drift deficit in the shallow waters of the sea to the north of Ventspils port will remain.

Taking as the base the long-term average of erosion and recession speed as main tendencies, we can forecast that in Ventspils' northern coastal part, where for half a century substantial erosion of the terrestrial belt was observed, in the following 50 years (**until 2050**) the width of the actually endangered basic coast belt (actual risk zones) will be as follows: 1st section - 90 to 100 m; 2nd section - 40 to 60 m; 3rd section - 30 to 40 m. However, if in **2020-2030** as forecasted on a global scale an increase in temperature will take place, including an increase in the frequency and strength of storms, especially of those regional south west- westerly winds, then we can assume that the coastal geological activities will increase and the width of the belt that is being eroded as well. In the maximum possible erosion risk zone it may reach 140-150 m. This leads to the following question:

What should be done when as a result of erosion of the main coast a large number of measured land plots intended for individual land owners or tenants will be lost?

Experience from around the world shows that depending on the significance of the endangered coastal segment (e.g. apartment houses and infrastructure of the town, port buildings, unique

coastal landscapes and beaches significant for recreation, or underpopulated or little used, swampy, covered with bushes, areas with degraded environment etc.) on a local or national scale, nowadays there are three approaches (three options) bearing in mind that protection against erosion is very expensive:

- **1st option is not to do anything** if an area is of little significance, scarcely populated, has no significant natural resources or excellent protected nature objects or cultural and historical monuments. People need to adapt to the changes taking place in the coastal belts.
- **2nd option is to retreat further inland.**
- **3rd option is to actively protect it and build nourished beach (replenishing a beach artificially by delivery of materials dredged or excavated elsewhere) or build coastal protection constructions** (booms, breakwaters, walls, rip-raps etc.). At the same time it must be mentioned that over the last decade leading experts around the world have advised against the construction of heavy, massive waterworks (booms, breakwaters, rip-rap, etc.), which are very expensive to design, construct and maintain and not always provide positive results. The other significant reason against construction is that the natural coastal belt, its environment and landscape would be destroyed. Often, so called soft constructions take their place, environmentally friendly technologies and methods that help to preserve the natural look of the coastal belt: regular renewal of eroded beaches, drifting substantial masses of sand, draining of beaches etc.



*Photo 4: The lonely tree on the bluff (Photo: I. Plavina, 2005)*

The main problem is where to source sand with the necessary granulometric content (roughness), as it must be at least as rough as in the beach, which is to be worked on, but preferably rougher. Beach nourishment is not a once off but periodic measure taking place every 3-10 years, depending on how fast strong storms wash the sand into the sea. To eliminate or reduce catastrophic coastal erosion in a 1.1 km long and approx. 50-60 m wide segment the beach needs to be drifted (i.e. made 2-3 times wider than the existing one), and the amount of sand needed is 100.000-150.000 m<sup>3</sup>. Building booms or other waterworks systems in the sea and on land that degrade the natural landscape would decrease or even eliminate erosion of the mainland, but the erosion would become even more intense to the north of the protected coastal segment. Building waterworks for the protection of coast would be more expensive than renewal of the beach and widening and elevating it.

Obviously, in the northern part of Ventspils' seashore the 3<sup>rd</sup> option is not recommended, neither from the point of view of preserving natural coastal environment, nor from an economic point of view, but the first one is advocated– not to do anything.

#### **4.3.2. Research on urban forest quality and impacts**

Another investigation of natural resources and their features carried out in cooperation with scientists is the **investigation of forest health and the impact of the city.**

In the administrative region of Ventspils City there are considerable areas with preserved natural ecosystems– mainly forests– 1648 ha, or 30 % of the total city area. Forests are mainly located in the northern part of the city along the Baltic Sea coast and around Lake Busnieku. The forested land reaches out into the industrial area of the city. It consists mainly of pine (87%), with the majority of the trees being middle aged. In the southern part of the city black alder woods occur. Ventspils City's forests are ranked among the outstanding national forest areas, with the highest cadastral value (154) in the country. Ventspils City's forests are multifunctional. They perform a sanitary function – intercepting polluting substances and noise, and a recreation function – serving as the environment for active recreation of the population. The forests play a great role in the regulation of the microclimate of the city, in anti-erosion measures, in preservation of the environment, as well as in biological diversity. The forests of the city are an integral part of the urban scenery and serve an important social function. The forest in the dunes and the direct proximity of the sea create a beautiful natural scenery for people to enjoy the peculiar forest microclimate, silence and tranquility.

Urban forests are subject to intensive anthropogenic loadings that adversely affect their quality. In the forests with a high recreation load it is very difficult and near to impossible to protect the disturbance of sensitive species. Due to increased trampling the soil is being compressed and the wood growth decreases. In the regions adjacent to construction areas the soil is subject to eutrophication, and synantrophic species appear in the ground vegetation and undergrowth due to human activities. In certain localities deciduous trees appear among the typical pines. As the load created by the holiday-makers in the natural habitats in the area of the city often exceeds the optimum, the habitats have significantly changed and their recreational value has decreased. Forest fractioning caused by construction works also is a negative aspect. The forests are being polluted with household waste, causing change not only to the structure of species in the forest stand, undergrowth and ground vegetation but decreasing its aesthetic value and naturalness, and reducing the ability of the forest stand to perform air and soil protection functions as well.



*Photo 5: Oil terminal surrounded by forest (Photo: „RHINO dizains”, 2003)*

Plants can react very sensitively and dramatically to changes in the environment. The framework and structure of the forest ecosystem are closely linked to the environmental factors. Forest ecosystems belong to the terrestrial ecosystems that significantly change due to changes in environmental conditions and pollution; therefore both the living organisms and the whole forest ecosystems are sound indicators of the state of the environment. By using the indicator ability of the forest stand and organisms in certain locations of the forest it is possible to evaluate the overall environmental condition of the area.

In order to investigate the impact of the city environment on the forest ecosystems the monitoring of the forest ecosystem condition began in 1993 in the forests of Ventspils under the supervision of Prof. M. Laiviņš (University of Latvia). In the natural forest stands located in the area of the city eight permanent forest monitoring sampling plots were established. They are located at varying distances from industrial objects and residential areas, wherewith anthropogenic load of the different forest stands differs. For data comparison five sampling plots were established outside the city in the forests of Ventspils' region. Local forest monitoring in Ventspils was carried out:

- To obtain data on the framework and structure of the forest stand in the different locations of the city;
- To establish by comparing and analysing the obtained data what changes are taking place in the forest stands due to the human activities, including pollution, to describe the types of changes, to classify them, to attempt revealing the causes of the changes and to forecast the state of the forest stands in the future;
- To evaluate the environmental condition of the city on the grounds of the structure of the plants in the forest stands and peculiarities of wood formation.

At the sampling plots data is collected according to the main parameters of the forest stands – woody plants, herbaceous plants, moss, lichen and soil.

The best indicator for the health condition of woody plants is defoliation of the crown directly reflecting the quality of the growing conditions. The prevailing tree species at the monitoring sampling plots is pine. Changes to the tree crown are caused by both air pollution and strong wind damage, as well as influence of vermin and diseases.

The monitoring of crown health shows that defoliation (loss of needles in the crown) of pines in the forests of Ventspils City is greater than in the forests outside the city. In the forests of the suburbs the fluctuations of defoliation over the years are negligible and generally invariable; however, in the forests of the city a slow but constant defoliation increase is being observed, consequently the health condition of the trees is worsening.

A clear indicator of the air pollution is the number and projective cover of lichen and alga species. The investigation of epiphyte species (lichens and algae growing on the trunk) at the forest monitoring sampling plots shows that the number of species and the projective cover is higher in the sampling plots further from the city and to a lesser extent influenced by human activity. In the forests of the city those sampling spots that are located in the areas under dominant wind influence possess less epiphyte species. All this presents evidence for a greater amount of polluting substances in the air of the city than in the suburbs.

From the investigation of vascular plants and moss in the forest monitoring sampling plots during the 12 year observation period it has been possible to establish a trend for the number of species of the vascular plants and moss to increase. This also clearly shows the changes in the growing conditions due to anthropogenic influences. Usually, the soil of a pine forest is nitrogen poor. When the soil is being fertilised species appear, which are typical for industrially affected areas. Overall, the health of the forests in Ventspils does not differ from the average Latvian level. Changes in the forests of Ventspils City and its suburbs are not rapid, but rather slow and gradual.

#### ***4.4. Voluntary information and public awareness methods***

##### **4.4.1. International certificates for the Quality Management System ISO 9002 and the Environmental Management System ISO 14001**

The largest port companies have international certificates for the Quality Management System ISO 9002 and the Environmental Management System ISO 14001. All of the port companies have obtained permits regarding pollution activities issued by the State Environmental Service's Ventspils Regional Environmental Board and environmental licenses issued by Ventspils City Council.

##### **4.4.2. Blue Flag campaign and cooperation with NGOs**

Coastal management is promoted by various voluntary movements as well. As early as 1997 Ventspils City local government decided to get involved in the Blue Flag movement. Since 1999, each year the **Blue Flag** awarded by the by the Foundation for Environmental Education (FEE) has been flying over Ventspils beach, showing not only development of bathing places and cleanliness of bathing waters, but also a systematic and purposeful approach to solving environmental issues in local government.

Initially, the Blue Flag campaign was a measure to motivate local government institutions to ensure clean and safe beaches and marinas for local residents and tourists. Gradually, the campaign has transformed into a wider one in the context of coastal management. From developing separate beaches the campaign has expanded to defining municipal policies for coastal environment development promoting sustainable use of coastal resources, planning of coastal zone management and improving water quality. Substantial changes in the way of thinking have taken place recognising the meaning of integrated coastal management. In Latvia the Blue Flag programme is being implemented since 1998 when the Environment Protection Club, a Latvian NGO, joined the Blue Flag movement as a national coordinator.

The Blue Flag campaign requires meeting of 28 criteria – the main ones being the high quality of bathing waters and organising environmental education activities. The mentioned education activities in Ventspils have been organised together with the city's Educational Board as competitions on different environmental issues for schoolchildren. Testing of bathing waters is carried out according to state regulations. Samples for bathing waters quality must be taken twice a month at three different points on the beach. These regulations also determine quality indices and desirable and obligatory requirements. Unfortunately, these regulations do not conform to the requirements of the Blue Flag campaign, so it is necessary to carry out additional tests in order to certify the good quality of bathing waters. Because of the main streams that come from the south-west and the location of the sewage treatment plant to the north of the town there are no threats to the bathing waters. The only potential threat is oil, which could come from oil terminals in other countries to the south of Latvia and from ships in case of accidents at sea. Ventspils port is separated from the sea by the breakwaters thus making any potential pollution from the port to the sea near to impossible. In the case of any leakage it is possible to close the sea gateway with the help of booms, and polluted waters can be gathered inside the port.



*Photo 6: Ventspils beach (G. Seilis, 2006)*



## 5. Possible solution and lessons learned

An evaluation of the methods and tools used in organising Baltic Sea coastal zone management and their efficiency will enable research and protection of valuable natural resources in the coastal zone. In turn, analysis of the role of local government in the environmental evaluation procedure will allow full implementation of functions of the municipality prescribed by the legislation. Thereby local government has the potential to implement the goal of the environmental policy – efficient environmental management on behalf of Ventspils' inhabitants, ensuring economic growth and following the principles of sustainable development.

A document such as the Environmental Policy Plan is used by the city as a flexible environmental management tool, which allows it to promptly make informed decisions on effective solutions for various environmental problems and to ensure continuous monitoring of the implementation of the environmental action programme. The plan facilitates negotiations with big companies, encouraging them to be more active in the development or improvement of their environmental management systems, further reduction of the risk of accidents and reduction of pollution. The plan also provides for the dissemination of more comprehensive information to the public on the environmental status of the city and encourages greater public involvement in decision making on environmental issues.

Participation in the Blue Flag movement is a good method for promotion of beach management and environmental education.

The introduction of the strategic environmental impact assessment procedure will ensure that the developers of different planning documents (development plans, strategies of economics and its different branches, as well as regional development plans) will be responsible for the evaluation of how the planned development might influence the environment and that the general public can get acquainted with the draft document and the included environmental review and express their opinion.



*Photo 7: Storage tanks of oil products and trees in blossom (Photo: A. Popeluha, 2004)*

## **6. Conclusions from the case**

Coastal zone management must be organised by implementing a large number of tools and methods on a national and local level, especially spatial planning, as well as by involving all interest groups- municipal and local institutions, developers, enterprises, NGOs, independent consulting companies and scientists.

The most useful instrument for planning not only in the coastal zone but in all the areas of this city located on the coast of the Baltic Sea is strategic environmental assessment, which is carried out during the preparation of the planning document, before this document is being submitted for approval. The strategic impact assessment is to be carried out regarding the planned development, implementation of which can substantially influence the health of the population and/or the environment, including developments in the areas of agriculture, forestry, fishery, energy, industry, transport, waste management, water resource management, telecommunication, tourism, mining, as well as plans related to regional development, land lease, spatial planning and the European Union funds.

Due to the fact that the port plays a dominant role in the development of Ventspils, efforts by environmentalists and planners are devoted to the following aim: the development of economic activities in a free port area while at the same time preserving valuable natural resources is possible only by following the principles of sustainable development – development that meets the needs of the present generation without compromising the needs of the future (Brundlandt report).

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