

# Low-cost shoreline management for a large harbour city and adjacent eroded shorelines - EE

## 1. Policy Objective & Theme

- ADAPTATION TO RISK: Integrating coherent strategies covering the risk-dimension (prevention to response) into planning and investment

## 2. Key Approaches

- Integration

## 3. Experiences that can be exchanged

This case study of Tallinn, capital of Estonia, and its adjacent coast shows how ICZM and differentiated application of shoreline management measures can mitigate ever increasing storm surge impact. The study area is the biggest urban agglomeration in Estonia with most urban development taking place within the 5 km coastal zone area. Approximately half of the population lives within the 2 km coastal zone. Hence, the case study presents a valuable experience of how to deal with coastal erosion in the case of large urban agglomerations.

## 4. Overview of the case

In Estonian law, there is no definitive setback line policy. The most opted shoreline management policy in this country in general and in the study area in particular is limited intervention. In Tallinn and Muuga seaports the principal policy is to hold the line in order to protect the port entrance and facilities. New quays and piers are moving the coastline seawards in cases when port facilities are expanded.

## 5. Context and Objectives

### a) Context

A succession of severe storms of the kind seen in the northeast Baltic in recent decades resulted in a more permanent recession of the shoreline and a reshaping of onshore and foreshore profiles along the Gulf of Finland coast. In the last fifty years the northern Estonian coastline has been subjected to at least eleven extremely strong storms (1954, 1967, 1969, 1971, 1975, 1983, 1986, 1990, 1992, 1999 and 2001) of the kind that, according to statistics, should occur only once in a hundred years; storms which enhance the erosion process. With each storm the amount of sand on the beach is decreasing, and after three or four storms the backshore formations are subjected to erosion and bluffing.

### b) Objectives

The specific objective to be achieved is low-cost shoreline management for a large harbour city and adjacent eroded shorelines to prevent damage caused by erosion for the valuable coastal property, harbour and recreational facilities. Other relevant issues being considered in this approach are related to the integration of coastal forest, wetland and fore-dune management with 'hard' shoreline management measures where appropriate. The timescale associated with implementation and goals achievement is 20 years (1980-2000).

## 6. Implementation of the ICZM Approach (i.e. management, tools, resources)

### a) Management

The case area covers the marine coast within the Tallinn metropolitan area. The level of the entities involved is mostly local, except the Olympic Sailing Centre in Piirita, which has national importance. The case area includes Tallinn urban municipality (linn) and Viimsi suburban municipality (vald) of Harju county (maa). The two biggest ports of Estonia are located within the study area – Tallinn passenger harbour and Muuga cargo port which together make the 2nd largest seaport in the eastern Baltic. The Tallinn Port Authority is responsible for the extensive port waterfront management.

### b) ICZM tools

This case study witnesses a complex approach towards ICZM comprising policy, legislative, spatial planning and technical tools. The Act on the Protection of Marine and Freshwater Coasts, Shores and Banks (1995) regulates the extent of coast, shore and bank areas under protection and management of their ecosystems. According to this Act, the main approach to prevent damage caused by erosion is to restrict construction in the coastal zone to 50 m from the mean water level in urban areas and to 100 m elsewhere on the Estonian mainland coast. This restriction provides a fairly effective preventive policy measure against the coastal erosion but not against flooding or ice pile-up in the case of low-lying flat coastal areas. Also, Estonia has a rather strict control of forestry in the coastal zone for landscape protection and in order to fight erosion. The Forest Department of the Ministry of Environment is responsible for the development and implementation of national forest policy and accounting of the forest resources. According to Estonian legislation, all coastal management issues, including coastal defence, development and/or coastal conservation are integrated into the general physical planning and management framework. The Planning Act of Estonia (2002) establishes a planning system on four levels: national planning, county planning, local comprehensive planning and detailed planning. The municipalities prepare comprehensive and detailed plans, secure their implementation and participate in county plan production. A comprehensive plan is prepared for the territory of a rural municipality or a town. Comprehensive planning establishes more specific land use requirements and obligations and defines the primary purpose of certain areas within a local community, town, or particular property. It also determines parts of rural areas where detailed planning is mandatory. There is a comprehensive spatial development plan prepared for the Tallinn mu

The main type of technical measures aimed to prevent coastal erosion and mitigate the effects of erosion is re-vegetation forestry. At the head of the Tallinn bay between Tallinn and Pirita the shallow foreshore was artificially filled. At the same time, the beach at Pirita in the immediate vicinity to the Olympic Sailing Centre was nourished for recreational and coastal protection purposes using quarried and dredged river sand. As a result, the beach was made 0.5 m higher and substantially wider. Between Tallinn and Pirita a seawall was constructed. The coast further north was paved with boulders in 1998 – 2000 and geo-textile combined with boulders have been applied locally in the early 2000s, in order to defend the threatened coastal road. The strip of sandstone cliff near a new residence district was graded in 2000.

## 7. Cost and resources

Waterfront development costs of the Soviet period are incomparable with modern market-related costs of material, labour and technologies. Therefore costs for the earlier measures taken (seawall, nourishments) are not available. Annual maintenance cost for coastal forests is €2,500 per hectare.

## 8. Effectiveness (i.e. were the foreseen goals/objectives of the work reached?)

The chosen strategy has indeed worked to maintain the key socio-economic functions of the coast since the applied measures have served integrated purposes (re-vegetated forests and replenished beaches – for coastal defence and for recreation, breakwaters and seawalls – for coastal defence and for transport infrastructure development, etc.).

## 9. Success and Fail factors

The beach nourishment efforts at the Olympic Sailing Centre have been relatively effective in terms of limiting erosion. The strengthening of the coast with boulders is relatively effective in the case of an indented and sheltered study area, however

latest investigations show that it should be even more effective if applied in combination with geo-textile.

## 10. Unforeseen outcomes

Overall the coastal protection scheme has been reasonably effective; apparently hard measures are effective in this area where the long shore transport is negligible. The main erosion problems are caused by cross-shore transport. No undesirable side effects have been identified so far at these relatively low-energy coasts. However in the conditions of sediment deficit and the increasing storm activity any future interventions into the coastal zone should be considered cautiously within the study area.

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## 13. Sources

- Povilanskas, R. Tallinn (Estonia) Case Study. In: I. Lucius, A. Salman & al. (eds.) EUROSION. Living with coastal erosion in Europe: A guide to coastal erosion management practices in Europe. RIKZ-EUCC-IGN France International -UAB-BRGM-IFEN-EADS Systems & Defence Electronics <http://herakles.fzi.de/EuroSION/incoming/Tallinn.pdf>



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