

Preventing landslides with hard, technical measures – the western coast of Poland - PL

1. Policy Objective & Theme

- ADAPTATION TO RISK: Preventing and managing natural hazards and technological (human-made) hazards

2. Key Approaches

- Technical

3. Experiences that can be exchanged

The use of hard structures to prevent land slides in an area of severe, cliff erosion. The negative effects are also dealt with so a judgement can be made about their use in similar areas elsewhere.

4. Overview of the case

Severe cliff erosion led the Polish authorities to use hard structures to prevent landslides and damage of property along the coastal strip. The structures have stopped the erosion but there has been a cost: the beaches alongside the cliffs have reduced in width and erosion events are felt in unprotected areas either side of the protected zone.

5. Context and Objectives

a) Context

The western part of the Polish coast is situated at the southern and eastern part of the Pomeranian Bay. It consists of moraine, soft rock cliffs and sandy dunes: the dunes do not exceed 10m width. The cliff coast on the eastern side is 8-30m high and on the western side, the cliffs reach a height of up to 70-80m. The Pomeranian Bay is relatively shallow with depth, in some places, less than 4.5 m. The width of the beach varies from 10- 25m in front of the cliff coast to 65m in front of the dune coast. There is severe erosion in this area, on average 30-80 cm/yr – with variations depending upon location of up to 300cm/yr in periods of more intensive landslides. It is caused by natural processes accelerated in some places by coastal defence constructions. Landslides are common as the cliff faces are near vertical.

The coastline is being heavily urbanised with 7500 m² of new flats being built annually (1996-2001). Most of these are second houses, tourist accommodations or private lodgings. The leading economic activity is tourism and recreation, civil engineering and fisheries although there is poor infrastructure to the hinterland. Otherwise, the main land use of this coastal strip is forestry and agriculture. There are, however, important wetlands, meadows and lagoons in the area. Some of settlements, including their historic buildings, are at high risk with their buildings in danger of being destroyed within the next 30 to 50 years. This has led to the local government and stakeholders supporting largely technical measures to provide long lasting protection of the coast in those areas where buildings are dangerously placed.

b) Objectives

The main objective of the hard structure sea-walls is to stop the erosion of the urbanised cliffs and to increase the safety of the local communities.

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

a) Management

The responsibility for coastal defence falls under the Maritime Office.

b) ICZM tools

The main strategy is to 'hold the line' combined with, in those cases where no hard technical measures are taken, non-intervention (planting vegetation only). The overall coastal defence plan is to select and protect high risk urbanised areas on the coast and to leave lower risk, non-urbanised areas unattended and subject to the natural coastal processes. Practically, coastal protection is often done in two phases. Firstly, the structures that are damaged are repaired and then protection measures are taken for properties that are found in those areas that have a high risk of eroding. The basic strategy for the latter is the selection and protection of high risk areas of the coast. The rest of the coast is virtually left unattended until it is destroyed by natural coastal processes. These measures may, in part, be dictated by the limited funds available: the planned budget 2003-22 is ca. €1.3 m/yr for the area of Rewal and Dziwnów.

A variety of hard structures have been used along this coastline. The use of groynes is now being supported by small movable sea-walls made by tetrapods and pyramids on geo-textile located at the cliff/dune foot. Beach nourishment and re-vegetation is preferred in some places. Most recently, combined sea-walls have been used, especially to repair damaged, older walls. This method combines hard structures with e.g. re-vegetation and is considered to be more flexible.

7. Cost and resources

No costs are available.

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

Cliff erosion has halted along the coastal areas where hard seawalls have been constructed. However, in these same places, the beaches either totally disappear or they become narrower. During the construction of the seawalls and groynes, application of beach nourishment increases the concentration of suspended matter. However, other methods used in the past have also been ineffective viz. soft sea walls built in the 1950's did not last and the concrete blocks from the walls are now buried in the sand and the remains of the wooden or concrete piles are found protruding in either the beach area or in the water and are a hazard for tourists. Many groynes have now been removed.

9. Success and Fail factors

The experience gained from past construction work has proved to be useful in most of the new projects. The hard seawalls require expensive maintenance. There is still insufficient knowledge about the coastal processes in this area which increases the difficulty of developing an all-encompassing coastal protection strategy. There is also still not sufficient social participation in the decision-making processes geared towards the management of the coastal zones.

10. Unforeseen outcomes

The side effects of sea-wall construction include intensive coastal erosion around the protected area which are largely unprotected. This has adversely affected the tourist industry in these places. Alternative methods of combating erosion along this coastline could be considered e.g. using soft techniques like beach nourishment to build up the shoreline or increasing safety through the use of planning instruments to refuse the construction of buildings in areas that have a high risk of erosion.

11. Prepared by

A. H. Pickaver, Coastal & Marine Union (EUCC), The Netherlands

12. Verified by

Kazimierz Furmanczyk, University of Szczecin

13. Sources

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