

Improving decisions of coastal erosion planning by taking economic factors into consideration - PL

1. Policy Objective & Theme

- ADAPTATION TO RISK: Managing impacts of climate change and safeguarding resilience of coasts/coastal systems
- ADAPTATION TO RISK: Preventing and managing natural hazards and technological (human-made) hazards
- ADAPTATION TO RISK: Integrating coherent strategies covering the risk-dimension (prevention to response) into planning and investment

2. Key Approaches

- Ecosystems based approach
- Technical

3. Experiences that can be exchanged

The use of Multi-Criteria Analysis to aid coastal management decision-making.

4. Overview of the case

A political decision was made to protect ruins on a cliff-face with a hard sea-wall. It was approximately ten times cheaper than re-locating the ruins elsewhere. A later Multi-Criteria Analysis indicated that this option may not have been the best when other, economic factors (from local tourism) would have been considered.

5. Context and Objectives

a) Context

Trzesacz is a small village with less than 100 citizens, sitting on the top of 14 m high soft rock cliff in western Poland on the Baltic Sea. It has a coastline of almost one km length of which the community occupies ca. 400 m. The village is primarily important because of the ruins of its XIII century Gothic church although it is a tourist destination in its own right. The local population of Rewal community, which includes Trzesacz, swells from ca. 3300 to over 26000 in the short summer season. The church had originally been built about very close to the shoreline but progressive coastal erosion has resulted in all but a small fragment of the south wall gradual collapsing. The ruins have more of a symbolic, educational and tourist value, rather than any aesthetic, historical or religious importance. However, if the ruins were to be totally destroyed as a result of erosion, the general public – much of it outside the region - would have a negative perception of the authorities.

Therefore, two options were considered: one was to continue to protect the cliff and the other was to move the remaining ruins to a new location. The direct costs of the preservation of the cliff were estimated at €0.6m and the costs of moving the ruins by a specialist company were deemed to lie between €3 - 6m depending on the technique chosen for the removal. The first choice was taken, based solely on cost, and the cliff was strengthened.

b) Objectives

A Multi-Criteria Analysis (MCA) was conducted to determine if the decision taken to strengthen the cliff was the one which might still have been taken if a more embracing economic assessment had been carried out. This entailed looking at the

economic factors inherent in this case and comparing a number of alternative scenarios.

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

a) Management

The Maritime Office is responsible for coastal erosion and the decisions in this case were taken in cooperation with the local authorities and mostly financed by them. It was they who agreed the variant of protecting the cliff by building a permanent seawall.

b) ICZM tools

Prior to the decision to strengthen the sea-wall, between 1984-89, the ruins had been protected by a seawall made from tetrapods and stones. The new defence is now a 90 m long x 9m wide seawall, built of gabions which protect the scarp of the cliff with its foot. The ruins have been anchored into the ground. The scarp has been covered with a material suitable for vegetation. This sea-wall, although likely to protect the ruins is predicted to increase the erosion rate of the coast either side of it.

In order to determine, with hindsight, if this had been the most suitable option, an MCA was conducted. The reasoning behind this was not to prove that any decision taken might have been mistaken (or indeed, correct) and to try and change that decision but to see what the result would be when more economic criteria were taken into account. This would show whether or not such economic aspects have a place in pragmatic coastal management in the future. The essence of a multi-criteria analysis is the application of various evaluation criteria of individual variants whose evaluation units are points, allocated in the least arbitrary way. These points substitute monetary units in the evaluation of the expenditures when the benefits and losses are not directly known. It, therefore, allows benefits and losses which are difficult to measure in strict monetary values to be included in a more objective assessment. In many cases, the number of granted points for a particular parameter will be weighted as some parameters are deemed to be more relevant than others.

In the case of the church ruins in Trzesacz, the criteria were divided into two basic groups: the value of costs of the measure undertaken (expenditures) and the value of the wider benefits and losses e.g real estate/property values, tourism and recreation-related issues. Seven different scenarios were chosen for comparison. These were:

Variant 0- do nothing i.e. take no action and let erosion continue naturally. It is recognised that this is not a policy option from either a social or a political perspective.

Variant 1- Maintain the cliff i.e. the measure which has been taken and described above.

Variant 2 – Relocation of the ruins i.e. dismantle the church ruins and re-assemble them again in a place not too far distant from the original location, but safe from erosion.

Variant 3 – Pier/Platform construction i.e. building a pier/platform anchored deep into the ground on which the ruins would be placed in their present condition. They would remain as the cliff continued to erode.

Variant 4 – Mark the Position i.e. allow the ruins to collapse but mark the position where the ruins stood with a column, mast, or special construction. Again, as with (1) this is not really a viable option.

Variant 5 – Beach Nourishment i.e. intensively and systematically nourish the beach at the foot of the cliff to prevent erosion. This is still an option for the current structure should it fail to work or any adverse side effects require further intervention.

Variant 6 - Extend the seawall i.e. to make the current seawall longer to further protect the immediate cliff face from erosion.

The results of the analysis show, not-surprisingly, that the most economically effective would have been to do nothing, allow erosion to take its course and let the ruins disappear. Given that this was never an option on social or political grounds, it is most interesting that the most cost-effective measure would have been to re-locate the ruins elsewhere. The third ranked option was to allow the cliffs to erode and mark the site of the ruins. Again not a political option. Only then do we come to the option that was actually taken i.e. holding the line. This had about the same score as preserving the ruins on a platform but letting erosion take its course. Beach nourishment was next in the ranking and the final ranking, a long way behind was the option to extend the seawall.

This analysis would indicate that the executed option may not have been the best solution when the economic factors of the local tourist industry are fed into the equation. Their exposure to risk and potential extra costs as a result of the protective actions taken will negatively burden the overall balance of coastline protection in the area. This is because further measures will still need to be taken in the future as the new seawall has increased erosion either side of it. Although the political decision that was taken might still have been the one chosen had this MCA been conducted earlier, at least more economic arguments

would have been considered. Under the circumstances, perhaps a different solution may have been chosen. The study shows that decisions based solely on short-term economics, however well meant, may not lead to the optimal solution.

7. Cost and resources

No costs are available.

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

The major accomplishment of MCA results is that they allow for a more accurate representation of decisions by accounting for several objectives simultaneously. As with all MCA models, the key question on which the model centres is whose preferences are to be considered. Different stakeholders are likely to assign different priorities to the respective objectives and thus it may be difficult to arrive at a single, best solution. Thus, there is value in constructing options from differing perspectives and comparing the results. Nonetheless, this methodology is proven in reconciling differences between individual and social preferences and in selecting strategic development decisions.

9. Success and Fail factors

Not applicable in this case.

10. Unforeseen outcomes

Not applicable in this case.

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13. Sources

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Evaluating socio-economic development (75.54 KB)



Socio-economic study - Trzesacz (5.09 MB)

