

Integrating sustainability principles into engineering solutions, low crested breakwaters in Limassol - CY

1. Policy Objective & Theme

- SUSTAINABLE USE OF RESOURCES: Preserving coastal environment (its functioning and integrity) to share space
- SUSTAINABLE ECONOMIC GROWTH: Developing Europe's regional seas sustainably

2. Key Approaches

- Integration
- Participation
- Knowledge-based
- Technical

3. Experiences that can be exchanged

In the ICZM approach, environmental compatibility and aesthetics of coastal structures should play an important role in engineering design. Engineers should work towards sustainable solutions, basing their decisions on sound environmental considerations and aesthetics. Even when intervening in existing situations, sustainable interventions and re-design of structures can have very positive results. The involvement of key-actors from early stages of the studies is a crucial issue for achieving consensus.

4. Overview of the case

During the 1990's, there was an effort to improve the environmental quality and the aesthetics of the coast of Limassol by introducing a more comprehensive and integrated approach and re-designing existing coastal protection structures. A strategy was developed and a Coastal Protection Master Plan was prepared based on ICZM principles and tools. The proposals were implemented in a pilot area with the construction of the proposed works. The whole process was very successful, the implementation of the suggestions was accepted and supported by competent authorities and stakeholders and it is still considered as one of the first cases that ICZM has been successfully implemented in Cyprus.

5. Context and Objectives

a) Context

There is hardly any length of natural beach left along the 20 km of coastline within the urbanised area of Limassol. In several parts the beach is in a rather deplorable state, facing all kind of coastal management problems: mixed and conflicting user functions, lack of space, a mixture of all kinds of coastal structures, coastal erosion, environmental/ water quality degradation etc. All these problems called for a comprehensive and integrated approach. In 1993, the government of Cyprus included the Integrated Coastal Zone Management Study for the coastal area of Limassol within the framework of the study Coastal Zone Management for Cyprus (1993-1995), which was, in those years, carried out by Delft Hydraulics (NL) in cooperation with the Coastal Unit of the Public Works Department of Cyprus. After concluding the Master Plan for Coastal protection and improvement works for the entire coast of Limassol, the project team proceeded with the detailed design of coastal structures to a 2 km pilot coastal area: the beach in front of Famagusta and Limassol Nautical Clubs. There were two huge groynes, the beach was under severe erosion and water quality was bad.

b) Objectives

The major objective was to intervene and improve a degrading coastal area through the re-design of coastal structures, by implementing an ICZM approach to manage a coastal erosion problem, in a way that could be used as a pilot for other coastal areas in Cyprus. A sound knowledge base, good technical documentation, environmental and aesthetical aspects formed the framework for the study, which lasted for 2 years. The implementation phase (coastal works) lasted for 1 year.

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

a) Management

The authority responsible for the technical part of erosion management in Cyprus is the Coastal Unit of the Ministry of Communications and Works. ICZM is not under the explicit responsibility of one authority: 7 Governmental Departments are involved in the decision-making process for coastal policies, planning, and development, among them the Environmental Service (Ministry of the Environment) and the Town Planning Department (Ministry of Interior). The competent authority for licensing coastal structures is the District Officer of each District (Ministry of Interior).

b) ICZM tools

In the early 1990's, very little was known about the natural system of the coast of Limassol, the erosion mechanisms, sediment transport and wave dynamics. It was important to understand the system, in order to proceed with solutions. The approach to cope with coastal erosion was thus structured in targeted phases:

- Problem definition
- Data collection
- Setting-up a system of field measurements (coastal profiles, sediment characteristics, photographic surveys etc)

Based on the data from work already done and on collected data, with the support by the Study "Coastal Zone Management for Cyprus", the coastal engineering studies were carried out with all models calibrated to the local characteristics: wave dynamics, sediment transport, prediction of coastline evolution. Then the strategy for erosion management of Limassol Bay was ready by 1995 for the Government of Cyprus. The strategy was structured on ICZM principles, i.e. it was multi-sectoral, with the involvement of all competent authorities. This was the first integrated coastal study ever undertaken in Cyprus.

The strategy included:

- A Master Plan with interventions for the existing coastal structures. The general rules/ suggestions were to intervene to the present situation in a drastic manner: demolishing all illegal and legal groynes; stabilising the beach with the construction of low crested offshore breakwaters using the material from the demolition of the groynes; and proceeding with small scale beach nourishments where this was possible (material was available).
- An environmental impact study, which included water quality provisions and aesthetic considerations.
- Suggestions to improve the legal and technical management of domestic sewage and industrial waste waters, nutrients from agricultural activities and other issues, targeting mainly to improve coastal water quality.
- A financial study, with phasing of the implementation of the strategy and related cost estimates.
- A pilot area, where detailed design was carried out and technical work was implemented, i.e. the demolition of two existing groynes, the construction of a low crested offshore breakwater and a small scale nourishment. The detailed design included predictions for coastline evolution with the different kinds of structures that had been proposed.
- Monitoring of the pilot beach.
- Stakeholder involvement.

7. Cost and resources

The cost of the Master Plan of Limassol Bay and the relevant studies/ tools of ICZM was undertaken by the Government of Cyprus and supported by the EU through the MEDSPA programme. The cost for the implementation of the proposals (i.e. coastal work) was undertaken by the Municipality of Germarogia (50%) and 50% by the Government through the annual budget of the Coastal Unit. Monitoring of the beach is still carried out annually and the cost is included every year in the annual

budgets of the Coastal Unit.

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

It was the first time that a process like this had been implemented in Cyprus. It was very successful mainly because the whole process and approach was efficiently structured to the local needs and characteristics and all key-actors have been involved from the early stages in the study. The objectives were achieved in the timescale defined.

9. Success and Fail factors

The fact that all key-actors, i.e. competent authorities and stakeholders were involved from the very beginning of the study created a positive potential and made the strategy and the measures accepted by all parties involved, without conflicts. This is one major success of the study, since the demolition and re-construction of structures is not a usual proposal and not an easy one to be accepted and funded. Generally, the study is still considered as one of the most successful and implementable coastal protection and improvement studies ever prepared in Cyprus.

However, the studies that followed since then, have not implemented the ICZM process as it was structured during that first study. Low-crested breakwaters have been constructed in Limassol instead of the conventional ones without, however, incorporating ICZM approaches concerning open spaces, aesthetics and the drastic improvement of the existing situation (such as the demolition of the structures). Perhaps this needed a more strictly legal support.

10. Unforeseen outcomes

The fact that there was funding for the implementation of the proposals in a pilot area played an important role in persuading people and mainly competent Authorities for the functioning of this “soft” solution and the possibility of intervening in a coastal area with existing coastal structures. Since then, all offshore breakwaters that have been constructed in Cyprus are low-crested. The discussion in Cyprus, for the need of an Integrated approach when designing coastal structures, actually started after the implementation of this study.

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13. Sources

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