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LitusGo Manual

Module 12

Coastal Erosion Control

Editor: Isotech Ltd, Environmental Research and Consultancy
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Preface to the LitusGo Education Manual

The LitusGo Manual is part of the LitusGo educational package which is included in the LitusGo portal: www.litusgo.eu. LitusGo aims at the training and capacity building of Local Authorities and local stakeholders in Integrated Coastal Zone Management issues and the reaction to the impacts of climate change.

This Manual consists of 20 autonomous, self-contained and inter-related modules. The modules are available in four languages, Greek, English, Maltese and Turkish and in three different forms: the dedicated wiki application in the LitusGo portal, the dvd and the hard copy version. This hard copy version of the LitusGo Manual consists of 20 self-contained booklets, one for each module, kept in a hard collective case.

List of modules of the LitusGo Educational Manual

Module 1:	European legal framework
Module 2:	Stakeholder involvement/Public participation
Module 3:	Sustainable tourism-carrying capacity
Module 4:	Water resources management
Module 5:	Fisheries/fish farming
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Module 7:	Ecosystems management (land and coastal ecosystems)
Module 8:	Waste management/recycling/compost
Module 9:	Air pollution
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Module 11:	Landscape and marine-scape management
Module 12:	Coastal erosion control
Module 13:	Community annoyance issues 1: noise pollution
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Module 15:	Archeological areas/historic sites/cultural heritage
Module 16:	Extreme conditions management: flood risks, coastal flooding and storm surge
Module 17:	Droughts
Module 18:	Desertification
Module 19:	Energy use, consumption and management
Module 20:	Green buildings

Credits

The LitusGo Education Manual has been developed by the LitusGo Educational Manual Working group:
Modules 1, 2, 6, 7, 8, 9, 12, 13, 14, 16, 17, 18, 19 have been prepared by the scientific team of the beneficiary/coordinators ISOTECH Ltd. Major authors: Michael I. Loizides, Chemical/Environmental Engineer and Xenia I. Loizidou, Civil/Coastal Engineer. Constantinos Georgiades (MSc in ICZM) is responsible for the overall editing. The hard copy of the educational Manual is designed by Anastasia Georgiou.

Modules 3, 4, 5, 10, 11, 15, 20 have been prepared by the scientific team of the Sustainable Aegean Programme of ELLINIKI ETAIRIA - Society for the Environment and Cultural Heritage. Major authors: Georgia Kikou, Geographer, MSc Environment (Manager of the Sustainable Aegean Programme), Alexandros Moutaftsis, Economist, MSc Environment, Leonidas Economakis, Political Sciences, MA International Development.

Dr Alan Pickaver on behalf of partner The Coastal & Marine Union (EUCC) was responsible for the quality control of the educational material.

LitusGo partnership:

Coordinator/ Beneficiary**:**

ISOTECH Ltd Environmental Research and Consultancy www.isotech.com.cy

Cyprus:

Municipality of Pafos www.pafos.org.cy

AKTI Project and Research Centre, www.akti.org.cy

Greece:

ELLINIKI ETAIRIA - Society for the Environment and Cultural Heritage www.ellet.gr **/ Sustainable Aegean Programme**, www.egaio.gr

ONISIS web development www.onisis.gr

Malta:

Municipality of Kirkop www.kirkop.gov.mt

The Netherlands:

EUCC – The Coastal & Marine Union www.eucc.net

1| Theoretical background

Coastal systems are among the most fragile and sensitive natural systems. A series of interlinked, interrelated and interactive systems and processes co-exist at this narrow strip of sea and land: natural processes (biological, physical, chemical), environmental parameters, socio-economic developments. The intensive use and exploitation of our coasts results in several problems, one of them is coastal erosion, i.e. the shoreward recession of the shoreline and the loss of land area. Coastal erosion is a problem with growing intensity and significance, especially for areas where the coast is an important "development" asset, mainly areas with tourist activity, such as Cyprus and other Mediterranean countries: the loss of coastal land has high cost. Coastal areas are vulnerable and dynamic multi-systems, characterized by continuous changes induced both by nature and human activity.

20% of European coastline is eroding (EUROSION, 2002): *All European coastal states are to some extent affected by coastal erosion. About twenty thousand kilometres of coasts, corresponding to 20%, face serious impacts (2004). Most of the impact zones (15,100 km) are actively retreating, some of them in spite of coastal protection works (2,900 km). In addition, another 4,700 km have become artificially stabilised.* According to UNEP/MAP, 80% of the Mediterranean coastline will be threatened by erosion during the

following years (UNEP/MAP, 2006).

Mediterranean coastal areas usually have a low resource base and are under severe anthropogenic pressures, a major one being tourism: each year 30% of global tourism visits reach the 46,000 km of Mediterranean coastline, and almost 300 million tourists are added to the 143 million inhabitants. More vulnerable are the 162 Mediterranean large islands and the 4000 smaller islands due to their small scale and limited resources. European Union Recommendation on Integrated Coastal Zone Management (2002/413/EC) after stressing that "(L148/24) *The 1999 assessment report of the European Environment agency indicates a continuing degradation of conditions in the coastal zones of Europe as regards both the coasts themselves and the quality of coastal water*", accepts that "*Community coastal zones are further threatened by the effects of climate change, in particular rising sea levels, changes in storm frequency and strength and increased coastal erosion and flooding*" [1] . And suggests to the Member States to "(L148/26) *determine how appropriate national training and education programmes can support implementation of integrated management principles in the coastal zone*".

2| Objective

Poor management of the coastal zones has led to false, short-term and non-sustainable political and technical decisions for the protection of the eroded coastlines. However, soft or more "modern" alternatives/solutions for erosion management and control are still unfamiliar to people and frequently resisted. Local Authorities and

most stakeholders are persuaded that "their coasts" will be "better" after the construction of hard coastal structures. There is definitely need for information, training and capacity building on erosion control methods and alternatives, especially in the Mediterranean at local level. If Local decision makers are better informed and local communities get to know the alternatives, then the chances for implementing sustainable erosion management and control measures, are much higher. The LitusGo project is making an effort to contribute in creating skills and increasing human capacity on this issue.

3| Problem

What causes coastal erosion? Nature and Man.
The main natural reasons for coastal erosion are:

- Wave action
- Storms
- Tides

However, the major danger comes from human activities:

- Construction of hard coastal structures (erosion is transferred downstream, usually more severe than it was originally)
- Beach mining
- River damming
- Urbanization: construction of structures within the wave dissipation dynamic zone. This results in severe coastal erosion

In Cyprus for example, dam construction, sand mining, coastal structures and urban development too close to the shoreline are

cited as the factors that have triggered and accelerated coastal erosion (Loizidou & Iacovou, 1999).

Hard coastal structures have been the remedy for combating coastal erosion for decades. The years proved that in the long run hard interventions can have serious negative impacts both on coastal morphology and coastal environment. Sustainable development of the coastal areas asks for combining erosion control and good environmental practices, within the framework of Integrate Coastal Zone Management schemes. Often, Environmental Impact Assessments and Studies have been proved insufficient in addressing the impacts of coastal protection works to the wider coastal and social environment. Coastal defense and protection structures are usually constructed as emergency measures without taking into consideration environmental and social impacts.

Each coastal area is unique. It has its own natural and dynamic characteristics and faces a unique combination of problems and pressures. *Move away from piecemeal solutions to a planned approach*, is one of EUROSION's recommendations whereas another one is *Incorporate coastal erosion into planning and investment policies*. In other words, erosion management and control should be incorporated into an Integrated Coastal Zone Management.

4| How to deal with the problem

By adopting the principle that "we go with the sea, we don't fight it" which is included in the European Coastal Code, 1997, the effort is to implement Integrated Coastal Zone Management schemes in

areas where problems exist (erosion etc.) and focus on applying "soft" engineering solutions (e.g. piers, submerged structures, fiscal instruments) rather than constructing "hard" structures (such as breakwaters).

Municipalities and local communities have a very important role to play in managing coastal erosion in a sustainable way. Only a knowledge based society can adopt principles like Integrated Coastal Zone Management. The implementation of ICZM asks as a pre-requisite the consensus and collaboration and active involvement of all parties concerned: engineers, decision makers, environmental experts, stakeholders, Local Authorities etc.

- Capacity building and awareness raising:
  - Local Authorities have an important role in coastal area development. A well informed and trained Local Authority can have a positive and upgraded role in the entire process of erosion management and ICZM, towards sustainable development. The key persons of Local Authorities should go through dedicated trainings, aiming in acquiring new skills and capacities in order to comprehend and support new methods
  - The local authority should organise awareness raising campaigns, training projects, on-the-job trainings and other information and education activities in order to increase the level of knowledge of the local key stakeholders, the local society in general, and the capacity of local stakeholders on sustainable coastal erosion control
  - The local experts and practitioners (engineers, architects, planners etc) should be trained in the new methods and

approaches for erosion management and erosion control.

- Adopt novel participatory methods to achieve the active participation of the stakeholders in the decision making process (e.g. decide on what kind of structures we implement in our area to control coastal erosion?). It is important that local societies can overcome the perception that "a good coast is a sandy coast". All coasts are "good": rocky, sandy, gravel coasts. It is human activities that destroy coastal zones by causing environmental and aesthetic degradation.

- Create Data Bases with Local information, natural conditions, wave and wind data etc. Good knowledge of the local conditions and the local natural system is important in order to have a good baseline study to base all other studies.

- Support the implementation of "soft" solutions:
  - Such as wooden piers or floating platforms, "furnish'' the beach with light and mobile "furniture''. Expenses are minimized, impacts to the environment and coastal morphology are zero, while aesthetics, qualities and amenities uses are promoted in a beautiful way.
  - "Do nothing" is a solution that can be adopted by the Municipalities in selected cases of eroding beaches. "Do nothing" as a matter of fact means "no hard structures".

Photo 1. Floating platforms (photo by Xenia Loizidou).

- The demolition of existing "hard" coastal structures has also been proven to be a solution leading to the improvement of the coast in several cases. Wrong coastal structures cause erosion problems on the coast.

BEFORE AFTER

Picture 1. Demolition of groyns in Limassol – Germasogeia - Cyprus (Photos by Xenia Loizidou).

- Find the reason for erosion and stop it, if possible. If the reason

that creates erosion can stop, the coast can recover its dynamic balance. The following example comes from Larnaca - Cyprus: restaurants were constructed within the buffer zone/coastal protection zone. Due to the vertical walls, the coast was heavily eroding (wave reflection). The Local Authority of Larnaca, in 1987, in cooperation with the governmental department organized the removal of the restaurants in a Municipal area, approximately 100 meters from the coastline. The beach was free from the walls, erosion was stopped and a wide sandy beach was naturally created.

Picture 2. Removal of the restaurants in Makenzy - Larnaca - Cyprus (Photos by Xenia Loizidou).

- Promote the implementation of multi-purpose solutions: for example artificial reefs: they minimize wave energy, i.e. protect the eroded coastline and at the same time they are a significant attraction for diving activities and boost biodiversity by providing a good habitat for the growth of marine vegetation and fauna.

References/useful information:

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