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LitusGo Manual
Module 18
Desertification



Editor: Isotech Ltd, Environmental Research and Consultancy
www.isotech.com.cy

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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 changed.

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
- Module 6: Coastal water quality
- Module 7: Ecosystems management (land and coastal ecosystems)
- Module 8: Waste management/recycling/compost
- Module 9: Air pollution
- Module 10: Land uses/urban planning/coastal over-development
Landscape and marine-scape management
- Module 11: Coastal erosion control
- Module 12: Community annoyance issues 1: noise pollution
- Module 13: Community annoyance issues 2: light and thermal
- Module 14: pollution, odours
Archeological areas/historic sites/cultural heritage
- Module 15: Extreme conditions management: flood risks, coastal
- Module 16: flooding and storm surge
Droughts
- Module 17: Desertification
- Module 18: Energy use, consumption and management
- Module 19: Green buildings
- Module 20:

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.

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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

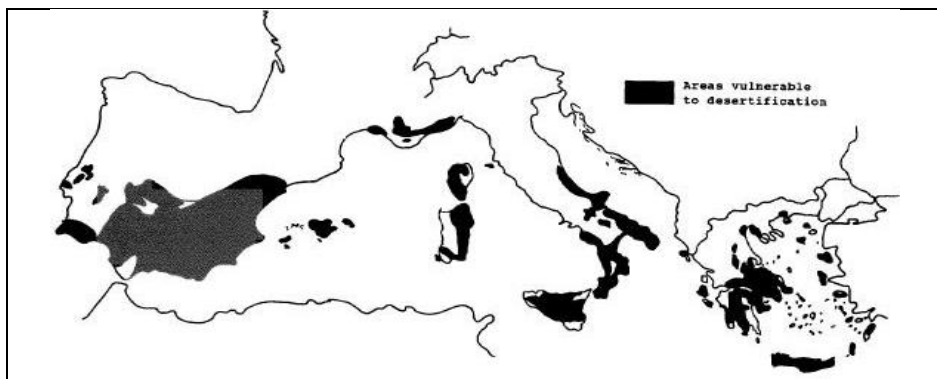
Module 10

Desertification

1| Theoretical background

It has been said that “forests came before human beings, deserts followed them”. Desertification is becoming a major problem as more and more of the world's land surface is turned into desert and soil fertility is declining until it is absolutely lost in some areas. The new deserts which are being created are not necessarily hot, dry sandy places, but are instead any areas where the soil has been so mistreated by humans that it is now useless for growing crops. Cutting down forests and trees, over-cultivation of the soil and over-grazing can all contribute to desertification [1].

The Mediterranean region, in particular, has suffered from the fragility of its ecosystems, and, specifically, of its coastal areas, where most of the population is concentrated [2]. In Europe, desertification is widespread in the Mediterranean semi-arid and dry sub humid regions. This includes the southern and eastern parts of the Iberian Peninsula, parts of Mediterranean France, most of the Mezzogiorno in Italy, Sardinia and Corsica, most of Greece, including the islands, and Cyprus. Generally the most critical areas were identified as having less than 600 mm of rainfall per year, distributed over a few months, with a long dry hot summer. Most of the Mediterranean countries have been identified as having "very high", "high" or "medium" levels of soil degradation severity [3].



Picture 1. Areas Vulnerable to desertification [5].

Estimates suggest that 35% of the earth's land surface is at risk, and the livelihoods of 850 million people are directly affected. 75% of the world's drier lands - 45,000,000 square kilometres are affected by desertification, and every year 6,000,000 hectares of agricultural land are lost and become virtual desert [1].

The United Nations Environment Programme has estimated that 4.5 billion dollars will need to be spent every year for the next twenty years to prevent the process of desertification. It was not possible to reverse desertification in the twentieth century, but it should be possible to do so in this century, if the peoples of the world are prepared to unite and fight against the encroaching deserts [1].

Causes of desertification [6]:

Water shortage, drought, climate aridization, cutting of forest, overgrazing, biological death, lack of drainage, salt accumulation under artesian water impact, salt accumulation on irrigated fields under salt balance violation, salt accumulation caused by inflow from higher elevated areas, salt accumulation under technogenic processes, salt accumulation under wind activity, ground water table lowering, stop of irrigation, water body balance violation, fertility losses, etc.

Desertification affects a wide range of services provided by ecosystems to humans: products such as food and water, natural processes such as climate regulation, but also non-material services such as recreation and supporting services such as soil conservation. Changes can be quantified and methods are available to prevent, reduce, or reverse them. When faced with desertification, people often respond by making use of land that is even less productive, transforming pieces of rangeland into cultivated land, or moving towards cities or even to other countries. This can lead to unsustainable agricultural practices, further land degradation, exacerbated urban sprawl, and socio-political problems [4].

Desertification can be characterized as physical or chemical depending on the processes involved [5].

- *Physical degradation* occurs on sloping land and is very extensive.
 - Desertification is reversible when, soil moisture has been depleted beyond the tolerance level of the economically and environmentally valuable plants, but the rootable soil depth has not been decreased below critical thresholds.
 - Irreversible desertification is the terminal stage of accelerated erosion that has permanently reduced the rootable space and the water storage capacity of the soil below the tolerance levels of economically and environmentally valuable plants. Lands with lithosols (very shallow soils) on limestone and southern slopes are the most vulnerable throughout the Mediterranean Europe [5].
- The dominant process of *Chemical desertification* is secondary salinization of soils through irrational water management in irrigated lands. The main causes are:
 - Irrigation with water containing soluble salts exceeding critical thresholds.
 - Irrigation schemes fail to meet leaching requirement or raising saline ground water tables.
 - Over-pumping of coastal aquifers causing the intrusion of sea water.

2| Objective

Desertification, or “land degradation in arid, semi-arid and dry sub humid areas, resulting from climatic variations and human activities” (UN-CCD 1994) has been known to the people of the Mediterranean and has been of concern since ancient times. Desertification processes are activated and accelerated only when, in addition to climatic limitations, other land parameters are driven beyond critical thresholds by human action. Therefore, the phenomenon is spatially and temporally discontinuous [5].

There has been a lot of research on desertification. However there is a gap in information when it comes to citizens and especially to local authorities and local stakeholders.

LitusGo aims in contributing to filling this gap in information, training and capacity in the Mediterranean at Local level, so as to encourage Local Decision makers to take local actions that can prevent, reduce or even reverse the phenomenon.

Problems caused from desertification:

- Reduced biodiversity
- Diminished productive capacity
- Loss of vegetation
- Extinction of animals
- Land degradation
- Food and water degradation
- Welfare degradation
- Affects livelihoods of millions of people

4| How to deal with the problem

Population growth and increased food demand are expected to drive the expansion and intensification of land cultivation especially in dry areas. If no countermeasures are taken, desertification in dry lands will threaten future improvements in human well-being and possibly reverse gains in some regions. Effective prevention of desertification requires management and policy approaches that promote sustainable resource use. Prevention should be preferred to rehabilitation, which is difficult and costly [7]. Some ways to prevent desertification are given below:

- Major policy interventions and changes in management approaches, both at local and global levels, are needed in order to prevent, stop or reverse desertification.
- The creation of a “culture of prevention” that promotes alternative livelihoods and conservation strategies can go a long way toward protecting dry lands both when desertification is just beginning and when it is ongoing.
- Even once land has been degraded, rehabilitation and restoration measures can help restore lost ecosystem services.

What can we do?

It is important to act locally! Local Authorities and Local Communities can proceed with their own activities to prevent, reduce or even reverse desertification and improve land quality within their areas:

- Organise capacity building and training programmes to enhance local expertise and local skills, so as local stakeholders are aware of the tools and the techniques to combat desertification and are ready to implement them.
- Introduce composting: encourage citizens and farmers to compost! Launch Municipal Compost campaigns and schemes. Compost, when it is put back in earth, gives back all the nutrients that are missing from the land and boosts soil fertility. Check the LitusGo “Waste management” (Module 8) for more details on how to compost.
- **Vegetation cover/ combat soil erosion**
 - Protect the vegetative cover, which can be a major instrument for soil conservation against wind and water erosion. Boost it with local plants.
 - Counter soil erosion through terracing and other measures.
 - Avoid concrete or paved public areas (such as squares). Use local/endemic plants for cover.
 - Involve stakeholders in planting and preserving green areas.
- **Create and boost economic** opportunities through activities that protect soil fertility, eg trade compost, organic farming etc.

References/useful information:

E-Sources:

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