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LitusGo Manual  
Module 5  
**Fisheries/Fish Farming**



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## **Preface to the LitusGo Education Manual**

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The LitusGo Manual is part of the LitusGo educational package which is included in the LitusGo portal: [www.litusgo.eu](http://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

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- 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
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- Module 11: Landscape and marine-scape management
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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

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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:**

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Coordinator/Beneficiary:

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## Module 5

### Fisheries/fish farming

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#### 1| Theoretical background

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The Mediterranean Sea, with its 46,000 km coastline, is one of the world's 25 hotspots for biodiversity. Despite the fact that it occupies only 0.8% of the world's ocean area and 0.3% of its volume, it hosts an impressive 7%-8% of all known marine species, with over 12,000 having been identified. According to SOED's Plan Bleu 2009, half of those species are native of the Atlantic, 4% are "relic" species, 17% have reached the Mediterranean from the Red Sea, while over 25% are native of the Mediterranean only.

Of the 519 native marine species and subspecies assessed in IUCN's Red List 2011 in the Mediterranean, 43 species are threatened with extinction (8.3%), with sharks and rays constituting the majority in the highest threat categories.

	IUCN Red List Categories	No of native species	No of endemic species
Threatened categories	Critically Endangered (CR)	15	1
	Endangered (EN)	13	2
	Vulnerable (VU)	15	1
	Near Threatened (NT)	22	2
	Least Concern (LC)	303	39
	Data Deficient (DD)	151	29
	<b>Total number of species assessed</b>	<b>519</b>	<b>74</b>
	<b>Total number (and %) of threatened species</b>	<b>43 (8.3%)</b>	<b>4 (5.4%)</b>

**Table 1.** Number of native marine fish species (including both bony and cartilaginous fishes) in each IUCN red list category (IUCN, 2001).

Along with the cartilaginous fish (chimaeras, rays and sharks), amongst the most endangered marine species in the Mediterranean is the monk seal (*Monachus monachus*), which used to be very frequent in the Mediterranean coasts until the beginning of the 20<sup>th</sup> century, yet today it is limited to a population of around 350-450 individuals, mainly in the Aegean coasts (UNEP/MAP, 2009).

Some data:

- 52% of the world's fisheries are fully exploited, and 24% are overexploited, depleted, or recovering from depletion.
- As many as 90% of all the large fish have been fished out.
- Unless the current situation improves, stocks of all species currently fished for food are predicted to collapse by 2048.

Some of the biggest threats to marine biodiversity are the following:

a) Targeted Fishing b) By-catches c) Pollution and Habitat Loss d) Invasive/Alien Species and e) Human Disturbances.

Mediterranean fish catches currently range between 1,500,000 and 1,700,000t per year, with 85% of the production being attributed to six countries (Italy, Turkey, Greece, Spain, Tunisia and Algeria), yet just 1/3 of the demand in the riparian states is being met. At the same time, as a result of overfishing, numerous species of commercial importance are at an alarming state (UNEP/MAP, 2009:94).

One of the suggested solutions to meet the rising demand without adding to the already huge amounts of overfishing in the Mediterranean has been aquaculture. Aquaculture, the farming of aquatic organisms such as fish, molluscs, crustaceans and plants, is the fastest growing food production sector in the world, but its



sustainability is not assured. Despite the fact that it represents more than 80,000 workers corresponding to 57,000 full time jobs, and being a very fast-growing business with an average annual growth rate of 8.4% between 2002 and 2004, pollution, destruction of sensitive coastal habitats, threats to aquatic biodiversity and significant socio-economic costs must be balanced against the substantial benefits.

## 2| Objective

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In the Mediterranean Sea the fishing fleet is currently larger (double) than what the sea can sustainably support, (meaning that humans are taking far more fish out of the ocean than can be replaced by those fish remaining). Also aquaculture, whether inland or coastal, relies on artificial feed to grow fish and faces the quandary of increasing production at the expense of increasing pollution from farm effluent. In addition, aquaculture, despite being presented as a solution to the fisheries crisis, in practice, sometimes puts even more pressure on the fish populations since many of the species farmed are carnivorous, requiring huge amounts of smaller fish to be fed.

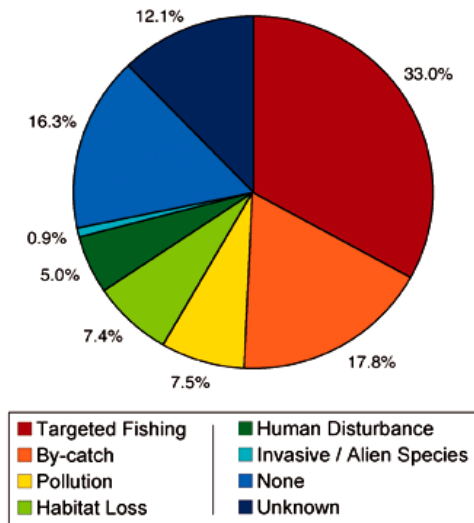
The LitusGo project is aiming to contribute to fill the information and training gap on fisheries, fish farming and generally aquaculture in the Mediterranean at Local level and thus promote sustainable management of these activities.

### 3| Problem

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The most common problem with fisheries is illegal and overfishing activity, which cannot always be successfully controlled or managed by the local authorities and stakeholders.

As the figure below indicates, the most serious threats for the marine fishes in the Mediterranean Sea are: a) Targeted fishing b) By-catch c) Invasive/Alien Species, d) Pollution, Habitat Loss and Human disturbances. And fisheries and fish farming are related to the above mentioned threats.



**Pie 1.** Summary of threats to all 519 native marine fishes in the Mediterranean Sea (IUCN, 2001 and Abdul Malak, D. et al. 2011).

**a) Targeted Fishing:** Fishing is one of the few remaining hunter-gatherer activities left over from the Paleolithic Age and in this field, it is by far, the most important (Salat J. & Franquesa R., 1999). Due to the technological advancement of the fishing gear

though, today fishing has shifted from being a primarily artisanal activity into intensive industrial exploitation (Goni et al. 2000, cited in Abdul Malak, D. et al. 2011). As a result, the majority of the Mediterranean commercial fish stocks are overexploited today. Fishing methods also include benthic trawling, which has destructive effects for the marine habitats.

**b) By-catch:** The capture of non-target fishes is called by-catch. It is estimated to comprise 40% of the world's total fish catch (Davies et al. 2009, cited in Abdul Malak, D. et al. 2011), affecting 18% of the Mediterranean fish species. The fishing methods of highest concern regarding by-catching are trawling and driftnets.



**Photo 1.** A turtle accidentally caught in a fishing net (By-catch) [8].

According to Greenpeace (2006), trawl fisheries discard between 20% - 70% of their catch while with driftnets - although practically banned in the Mediterranean yet still in use in many areas - an estimated 85% of animals caught are thrown back into the sea

(Abdul Malak, D. et al. 2011).

**c) Invasive/Alien Species:** Along with alien species entering the Mediterranean Sea from the Red Sea through the Suez Canal, aquaculture is also one major reason of the introduction of new species in the region.

**d) Pollution, Habitat Loss and Human Disturbances:** The effects of the rapid human population growth along the coastline, together with overfishing, and the space-conflict and farm effluents related with aquaculture, result in the contamination of the food sources of marine species and their habitat loss. If we also consider that the Mediterranean is a semi-closed sea with limited water exchange, it is not difficult to understand why it is considered one of the most polluted semi-closed basins in the world today.

#### 4| **How to deal with the problem**

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From the conservationist's perspective, the solution is not to shut down fisheries but rather to modify the type of their management, and use public awareness to help raise political will for taking responsibility for the conservation of marine systems. Coupling current consumer awareness and purchasing power with strong and effective management could indeed alleviate pressure on many marine species and allow their subsequent recovery. Critical to this effort would be real willingness among government agencies and decision-makers to protect areas needed for spawning, feeding, and

migration through marine reserves, as well as entering into and enforcing international agreements to protect shared or common resources.

This means not only discussing and defining essential fish habitat, but actually biting the bullet and setting strictly enforced Marine Protected Areas (MPAs). Without decision-makers taking more responsibility for fisheries management and habitat protection, fisheries and marine biodiversity will be permanently compromised (Agardy T, 2000). Also solutions must be given to the fish farming case. Aquaculture has great potential for food production and the alleviation of poverty for people living in coastal areas, many of whom are among the poorest in the world. A balance between food security and the environmental costs of production must be attained (Emerson, 1999).

### **Local Authorities can contribute in the effort for sustainable fishing:**

- **Capacity building/awareness raising:** Local Authorities may take the initiative and organize:
  - Targeted seminars for fishermen, with information on the use of environmentally friendly fishing equipment and increasing overall environmental awareness (e.g. good fishing practices, proper disposal of used fishing equipment, use of biodegradable fishing lines, marketing of fish production etc)
  - The introduction and implementation of education/training programs aiming at creating and maintaining awareness among local decision-makers and local stakeholders (e.g. civil society (NGOs) etc), on the possibilities for sustainable fishing,

on the importance of having MPAs in the Municipal coastal area etc.

- Local Authorities should organize **lobbying** for appropriate law and policy implementation.
- **Support sustainable fish farming.** Fish farming is an important resource for local communities. If it is properly controlled, it should be encouraged by Local Authorities.
- Local Authorities could support direct **marketing** of fresh fish and fish from farming. Support fishermen and fish-farmers to get organized into co-operations and help them to promote and sell their own products.
- Local Authorities should support the implementation of **Marine Protected Areas**. Creating marine safe zones and closed breeding areas is another way to help fish populations recover from overfishing. Keeping boats out of certain areas of the water, whether by law or through the mutual agreement of fishermen, allows populations to have a safe area for breeding and building healthy populations, which will in turn provide larger and healthier fish for catching [10].

### **A good example:**

Fishermen cooperation Artesanal Pesca, in Sesimbra- Portugal: the local fishermen of small scale fisheries have been organized into this cooperative and in 5 years they succeeded their economic welfare through a cooperation based on good fishing practices and sustainable fishing [9].

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