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Ecological Objective 8 Coastal Ecosystems & Landscapes

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ECOLOGICAL OBJECTIVE 8 “COASTAL ECOSYSTEMS AND LANDSCAPES”

1. Introduction

The Ecological Objective 8 “Coastal ecosystems and landscapes”, and in particular the Operational Objective 8.2 ‘Integrity and diversity of coastal ecosystems and landscapes and their geomorphology are preserved’, does not have a precedent in other regional EcAp initiatives, such as Helcom or OSPAR. While their objectives are fully oriented towards marine environment, the Mediterranean countries have opted for a somewhat different approach. While most of the EOs are marine environment oriented, this EO is based on the requirements originating from the geographic coverage of the revised Barcelona Convention and the ICZM Protocol, as well as the LBS Protocol. In all these documents, the spatial coverage extends to the terrestrial part of the coastal zone. The ICZM Protocol best defines such approach through its definition of the coastal zone which says that it is the "...geomorphologic area either side of the sea shore on which the interaction between the marine and land parts occurs in the form of complex ecological and resource systems made up of biotic and abiotic components coexisting and interacting with human communities and relevant socio-economic activities." In fact, this definition is very close to the definition of the "coastal ecosystem". Because the coastal ecosystem is such an important element of the regional Mediterranean space, the introduction of this EO is fully justified. However, this EO, including the relevant indicators, is one of the indicators which were not found mature enough to be included in the list submitted for decision at CoP18 (Istanbul, December 2013). Its key importance for the region, in addition to recent updates in scientific data availability, makes it interesting enough to be discussed as a possible common indicator.

The definition of the term "coastal landscape" is more difficult to find. "Landscape" is generally defined as a mosaic of “interacting ecosystems”. The term has many components including visual, political, socio-economic and cultural. From that perspective, the broad concept of "landscape" encompasses both natural and cultural elements, i.e. the natural landscape is the fabric that integrates settlement, agriculture and ecology. The term coastal landscape implies a relationship between land and sea. Some units in these landscapes, such as beaches or rocky islands, are defined by both sea and land while others, such as mud flats and salt marshes, exist somewhere between land and sea. From the above it results that maintaining and preserving coastal ecosystems and landscapes involves addressing not only the issues related to the geographical settings *per se*, but also the processes influencing the dynamics of these physical settings.

The legal definition of "coastal zone", which states the seaward and landward limits of the coastal zone, is also given in the text of the ICZM Protocol. In the context of EcAp, one could say that it is of less importance, although it emphasises the integrated nature of the coastal zone, particularly through consideration of marine and terrestrial parts as its constituent elements.

The requirements of the ICZM Protocol, in particular the ecosystem approach and balanced allocation of uses, with the aim of avoiding urban sprawl (Article 5 and 6) and limiting linear extension of urban development including transport infrastructure along the coast (Article 8), are among the major objectives and principles of this legal instrument. Regular reporting on the state and evolution of coastal zones (Article 16) on the basis of appropriate indicators (Article 18) is required. Changes of land use have direct implications for the ecosystems, habitats and species in coastal zones in both its terrestrial and marine parts. By changing the land uses, mainly from more natural to more manmade, the integrity and diversity of coastal ecosystems and landscapes is affected or lost.

To comply with these requirements, allow for the assessment, and consequently propose policies to better manage coastal areas it is crucial to start with at least one common

indicator, i.e. change of land use which embraces many concepts that can be derived from this indicator such as land take, the percentage of built up areas, the trends in the evolution of urban areas and detection of urban sprawl areas, continuation of linear development of urban areas along the coast, as well as fragmentation of coastal habitats or change of landscape types, and so on. The latter two are the other two indicators that were excluded for the same reasons from the list of indicators adopted at CoP18. However, the sets of data needed for the land use change can also be used for these two indicators.

It is evident that this indicator on land use change has a higher weight in comparison with any other indicators which are 'one issue' oriented, and should therefore deserve to be considered for re-introduction to the list of common indicators. Data availability and coverage of the whole Mediterranean with the required data was the major obstacle not to insert this indicator to the latest decision of the Contracting parties in Istanbul (December 2013). On the other hand, some major EU funded projects (such as Pegaso and Medina) have made a great progress along this specific indicator as the availability of data has improved, and have produced valuable results that could encourage the CORMON Coast and Hydro meeting to reconsider the importance of this indicator and put it to the common list of EcAp indicators.

1.1 Monitoring of physical characteristics

By definition, the indicator ‘change of land use’ can be described as the extent and type of land use directly affecting wildlife habitat, and consequently the local and global biodiversity. Human alteration of landscapes from natural vegetation to any other use typically results in habitat loss, degradation and fragmentation, all of which can have devastating effects on biodiversity. Land conversion is the single greatest cause of ecosystem and habitat fragmentation, loss or even extinction of species. Of particular concern is urban sprawl in coastal areas, where the natural areas, habitats, agricultural or forestry areas are converted to built-up areas. The process is known as littoralisation. It means the change the way land is used (e.g. clearing of forests for agricultural use, change from agricultural land to urban areas).

Land is a finite resource and the way it is used is one of the principal drivers of environmental change with significant impacts on the quality of life and ecosystems, as well as on the management of infrastructure. Land take by the expansion of residential areas, tourism development, and construction sites are the main causes of the increase in the coverage of urban land at the Mediterranean coastal level. Agricultural zones and, to a lesser extent, forests and semi-natural and natural areas, are disappearing in favour of the development of artificial surfaces. This affects biodiversity since it decreases habitats, the living space of a number of species, and fragments the landscapes that support and connect them.

The impact of urbanisation depends on the area of land taken and on the intensity of land use, for example the degree of soil sealing and the population density. Land take by urban and infrastructure is generally irreversible and results in soil sealing – the loss of soil resources due to the covering of land for housing, roads or other construction work. Converted areas become highly specialised in terms of land use and support few functions related to socio-economic activities and housing. Urban land take consumes mostly agricultural land, but also reduces space for habitats and ecosystems that provide important services like the regulation of the water balance and protection against floods, particularly if soil is highly sealed. Land occupied by man-made surfaces and dense infrastructure connects human settlements and fragments landscapes. It is also a significant source of water, soil and air pollution.

Landscape connectivity, defined as the ability of the landscape to facilitate or impede movement among habitat patches, supports ecological flows and the long-term persistence

of biodiversity. Connectivity is one of the most critical components for animal dispersal, consequent population persistence and the maintenance of ecological functions. Neglecting to consider landscape connectivity may lead to a failure in properly accounting for the spatial variability of ecosystem services caused by the dynamics in the landscape configuration. Biodiversity, in general, is closely and directly related to both landscape connectivity and ecosystem services.

2. GES and targets for Operational objective 8.2

In the previous biennium, the EcAp process has proposed the following Good Environmental Status for this Operational Objective 8.2 and related indicators as:

Perpendicular coastal development, with linear development minimised. Mixed land-use structure achieved (within coastal spatial units, to be established). Perpendicular and linear coastal development is in balance with integrity and diversity of coastal ecosystems and landscape.

Targets proposed are related to some explicit requirements of the Protocol, such as ‘No further construction within 100 m width setback zone is established', or are more descriptive and refer to measures to be implemented by other existing instruments such as 'Cumulative negative impacts of coastal development are not increasing by means of coastal spatial planning with the aim of creating a balanced coastal land-use structure', 'Mixed landscape structure maintained, which avoids dominance of mono-type coastal landscape and where network of protected coastal landscapes is expanded' and 'Share of non-fragmented coastal habitats is maintained at present level or increasing'.

3. Objective of the Indicator ‘Change of land use’

The increase in built-up areas has a potentially high impact on the environment and the living and non-living resources due to soil-sealing, to disturbance resulting from transport, noise, resource use, waste dumping and pollution, and others. Marine and terrestrial transport networks that connect areas of intensified activities in the marine and coastal zones, in particular to build infrastructures (oil and gas platforms, windmills, ports, recreational beaches, coastal towns and urban centres) add to the fragmentation and potential degradation of the natural landscape, both terrestrial and underwater. The intensity and patterns of urban sprawl and the built-up area are the result of three main factors - economic development, demand for housing, and extension of transport networks.

This indicator aims to monitor progress towards achieving the first goal for coastal sustainability set out in the ICZM Protocol. The indicator has one measurement - the percentage of built-up space on land and at sea. The aim is to allow for the evaluation of the trends in urban areas so as to avoid urban sprawl and limitat linear extension of urban development including transport infrastructure along the coast.

The objective is to know the extent to which the coastal zone has been built-up over the past several years because this will indicate the degree of pressure on the coast and the likelihood of further changes in the future. We also want to know whether development on the coast has been greater and more intense than in the wider region, and what is the development trend in the coastal waters. It can also help to understand patterns of development and unravel cause-effect relationships.

4. Monitoring Strategy

4.1 Spatial consideration

Coverage: Coastal zone of the Mediterranean Sea at competent coastal units (defined by the countries according to the ICZM Protocol).

Coastal zone of the Mediterranean: competent coastal units, 0-1 km and 0-10 km buffers from the coastline within coastal zone.

4.2 Temporal consideration

Baseline and reference measurement with 5 or 10 years difference e.g. 1990, 2000 and 2010. Measurements should be consistent in reflecting the situation for comparable reference points in time e.g. 1st of January or 31st of December.

Note: the idea is to dispose of two reference situations e.g. baseline 1990 or 2000 and reference 2010, and to calculate the changes that occurred from baseline to reference 1 to be able to interpret trends. However, we still want to have a view of the land use in the baseline and in the reference situations.

4.3 Parameter(s)

(i) Area (in km²) of built-up land in coastal units as a proportion of the area of built-up land in the wider reference region.
(ii) Area of built-up space in the EEZ, territorial waters, or in other relevant marine spatial units.
(iii) Percent of built-up land by distance from the coastline in 0-1km and 0-10km buffers units.
(iv) Percent of built-up land by distance from the coastline in a 100m buffer zone.

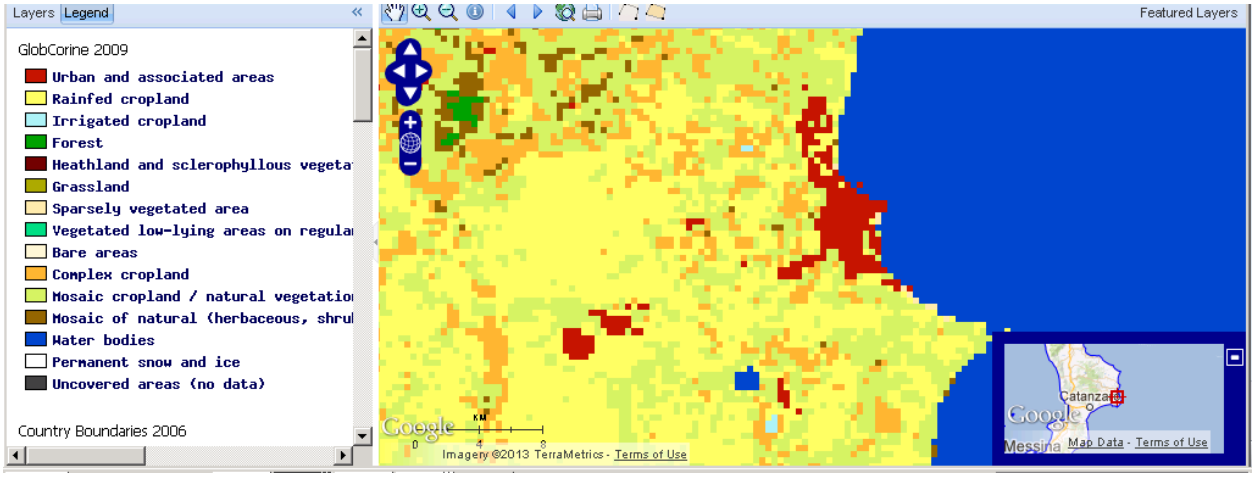
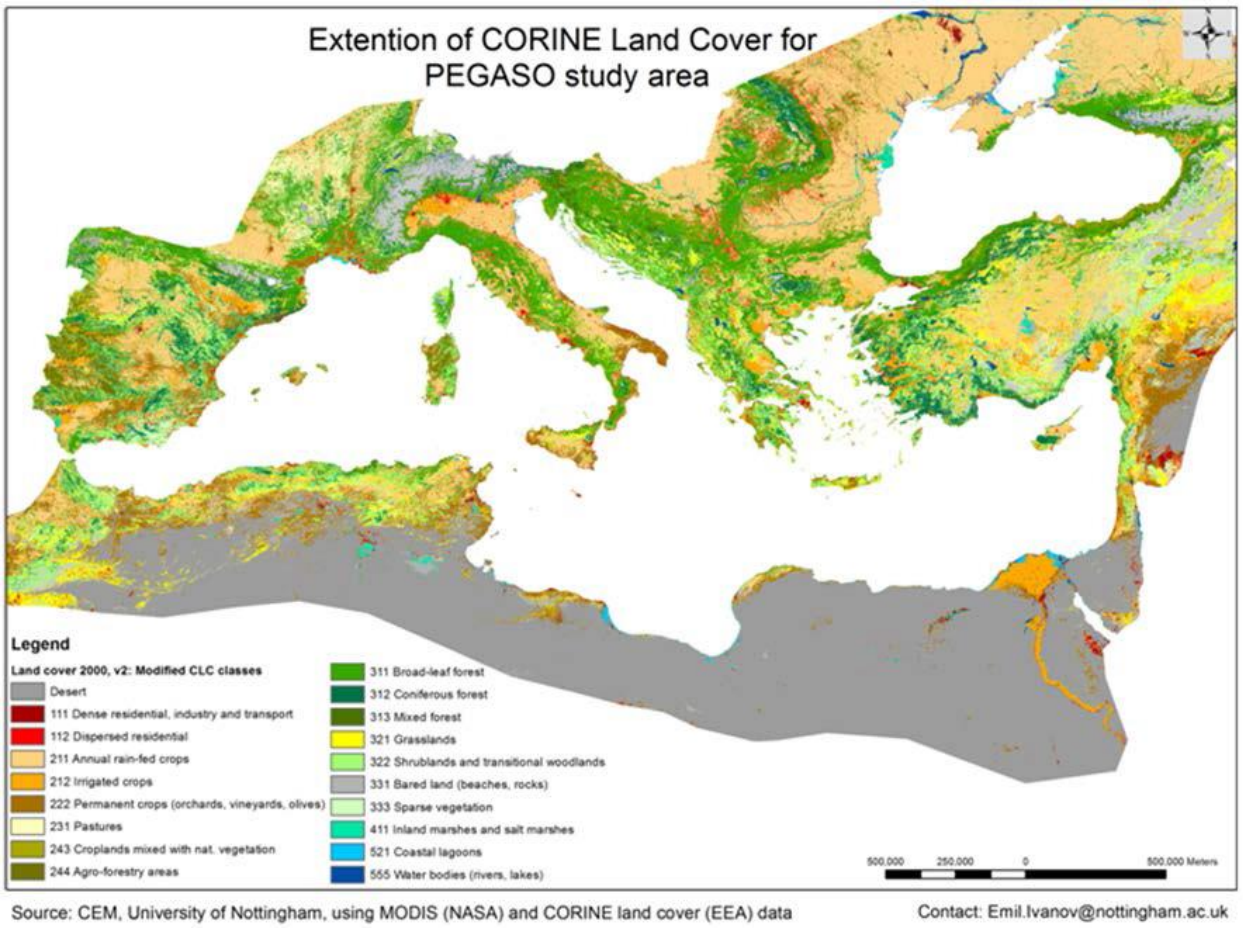


Figure: representation of land use data (GlobCorine 2009) in the coastal zone (Source PEGASO SDI Map Viewer)

4.4 Data sources

Data are available from the Corine Land Cover datasets for 2000 and 2011. Land cover products are created from GlobCorine or other, e.g. MODIS, multispectral data, following discrete CORINE land cover categories corresponding with the INSPIRE Directive. Once the Monitoring programme is approved the validation of remote sensing data/land cover will be done by the official national cartographic institutes which could have higher-resolution data. This could imply validation of some spots, objects or uses misinterpreted or not interpreted by automatic means.

Although Corine Land Cover data can be used as a standardised reference data source, these data may be of insufficient resolution and/or accuracy to be used for certain purposes at the local level/scale. Therefore, the use and sharing of local datasets with high resolution is strongly advocated. Nevertheless, to make sure these data can be compared with the CORINEA or other databases at the regional level, it is important to use the CORINE land cover classifications to analyse and report the data.



Land cover classes are typically mapped from digital remotely sensed data through the process of a supervised digital image classification. The overall objective of the image classification procedure is to automatically categorise all pixels in an image into land cover classes or themes. The maximum likelihood classifier quantitatively evaluates both the variance and covariance of the category spectral response patterns when classifying an

unknown pixel so that it is considered to be one of the most accurate classifiers since it is based on statistical parameters.

5. Scope for improvements

Include analysis of the built-up areas in the 100 m zone at the regional scale in order to assess follow-up of Article 8 on the establishment of the non-construction zone.

Develop methodologies, datasets and classifications for ‘built-up’ in the coastal waters (e.g. windmill parks, oil and gas rigs, energy convertors, mooring facilities).