EUSEAMAP PROJECT: MODELLING EUROPEAN SEABED HABITATS - A FOCUS ON THE WESTERN MEDITERRANEAN

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Abstract

This document gives an overview of the EUSeaMap project and its part in the implementation of the EC policies involving marine habitat mapping. The EUSeaMap project will produce broad-scale predictive habitat maps for over 2 million square kilometres of European seabed covering four geographic areas of the European seas: Celtic, North, Baltic and western Mediterranean seas. Some preliminary results for the western Mediterranean are given.

Keywords: Mapping, Models, Western Mediterranean

Marine habitat mapping is required for the implementation of various EC Directives and Regulations in that it is the baseline for environmental assessment and monitoring requirements as well as for the enactment of protection measures for marine habitats and species. In its Blue Book on an integrated maritime policy for the European Union, the EC proposed to take steps towards building a network that "*assembles fragmented and inaccessible marine data into interoperable, contiguous and publicly available data streams for complete maritime basins*". EUSeaMap is a preparatory action, funded by the DG MARE, that is functional to the setting up of this European network through the creation of models capable of predicting seabed habitat maps. The project aims to provide a tool for marine spatial planning by Member States and at the same type supports the implementation requirements of the Marine Strategy Framework Directive. The EUSeaMap is run by a consortium of partners (BLST, Denmark; DHI, Denmark; IFREMER, France; IEO, Spain; ISPRA, Italy; SEPA, Sweden) led by the Joint Nature Conservation Committee (UK). The project is based on the habitat modelling approach developed within the framework of the previous INTERREG IIIB-funded MESH [1] and BALANCE [2] projects, and will develop a common methodology for broad-scale seabed habitat mapping across Europe, using the EUNIS classification (http://eunis.eea.europa.eu/) across four marine study-areas covering over 2 million square kilometres of Europe's seabed: the Celtic, North, Baltic, and western Mediterranean Seas. The EUNIS habitat classification scheme, originally developed in 1996 by the EEA, has recently incorporated several marine habitat lists developed at biogeographic levels. Such is the case for the North Atlantic habitats, identified by Connor *et al*. [3], which have been incorporated into EUNIS. Similarly, a list of benthic Mediterranean habitats adopted under the framework of the Barcelona Convention [4], has also been incorporated into EUNIS [5]. To this effect, EUNIS represents a univocal comprehensive system for the identification and classification of marine habitats across European seas, a long needed measure as pointed out by several authors [6].

The project will introduce better quality habitat maps through the use of best-available data and refined modelling processes. It will make the digital map layers available to stakeholders and develop an on-line mapping tool to display the layers. Attention will be focussed on assessing the benefits and constraints of a broad-scale habitat map with respect to higher resolution maps produced from detailed survey data, and demonstrate how the Marine Strategy Framework Directive Annex III requirements can be used in characterising the marine environment. This exercise will allow estimation of the effort required to develop complete broad-scale coverage of waters surrounding the European continent as well as higher resolution ones. The EUSeaMap will utilise GIS software to model seabed habitats through the assembling and integration of several layers representing abiotic parameters (sediment, bathymetry, light, wave and tidal energy at seabed, salinity at seabed, temperature at seabed, dissolved oxygen, ice cover, stratification). Careful selection and analysis of ecologically relevant thresholds will be performed for each abiotic parameter in every region. Through the expert application of the EUNIS classification scheme, combinations of these parameters will be used to predict habitats at the high level habitats of EUNIS (levels 3 and 4).The approach will also quantify the degree of confidence of the generated maps. This will be done both on the basis of the source of each data layer used, and through the use of fuzzy boundaries for habitats, according to our knowledge of the required conditions for a given habitat to occur. The array of abiotic parameters used to model habitats will vary according to each study area.

In the western Mediterranean sea the following parameters will be used: sediment, bathymetry, light, energy at seabed, temperature at seabed. Since the nature of the broad scale map determines a pixel size of analysis of 250 m, it is expected that at least 15 habitat types, according to the EUNIS classification, will be modelled in this basin. The habitats expected to be modelled for the Mediterranean (see Table 1.) are distributed as follows: 3 in the infralittoral zone, 7 in the circalittoral, 4 in the bathyal and 1 in the abyssal zone.

Tab. 1. List of the Mediterranean habitats to be modelled.

EUNIS Habitat code	Eunis name (in parenthesis eventual notes)	RAC/SPA Code [4]
A3	Infralittoral rock and other hard substrata	III.6.
A5.23	Infralittoral fine sands	III.2.
A5.28	Infralittoral Mediterranean biocoenosis of superficial muddy sands in sheltered waters	III.2.3.
A4.26	Mediterranean coralligenous communities moderately exposed to hydrodynamic action (we intend Coralligenous beds)	IV.3.1
A5.51	Maerl beds (we intend Rhodoliths beds in general)	VI.2.2.1; VI.2.2.2
A5.46	Mediterranean biocoenosis of coastal detritic bottoms	IV.2.2.
A5.38	Mediterranean biocoenosis of muddy detritic bottoms	IV.2.1.
A5.39	Mediterranean biocoenosis of coastal terrigenous muds	IV.1.1.
A4.27	Faunal communities on deep moderate energy circalittoral rock	IV.3.3.
A5.47	Mediterranean communities of shelf-edge detritic bottoms	IV.2.3.
A6.1	Deep-sea rock and artificial hard substrata	V.3.
A6.51	Mediterranean communities of bathyal muds	V.1.1.
A6.511	Facies of sandy muds with *Thenea muricata*	V.1.1.1.
A6.3	Deep-sea sand	V.2.
A6.52	Communities of abyssal muds	VI.1.1.

EUSeaMap will produce a modelled EUNIS habitat map, harmonised across the four regions, as well as associated confidence layers available through a purpose built webGIS. The webGIS will comply with INSPIRE standards and the layers will be available for viewing through WISE-Marine on its inception. The project will assess the feasibility and work resources required to extending the modelling process to other regions of Europe to produce broad-scale EUNIS habitat maps. Furthermore, it is proposed to provide generic resource requirements for new remote and ground-truth survey, probably per unit area, adjusted to suit the different major zones for survey.

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