

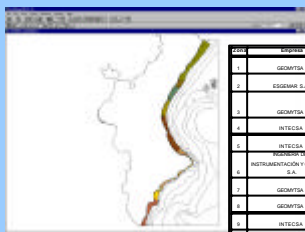
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## INTRODUCTION

A GIS had been used for the collection, organization and geo-referenziation of data and informations to manage sand extraction activities for beach nourishment in the Comunidad Valenciana, Spain.  
 This activity is part of the BEACHMED project, funded by the UE through the InterregIIIB initiative focused on beach nourishment and coastal environment restoration using sand extracted from the continental shelf, in western mediterranean regions.  
 The participation of the Generalitat Valenciana in this project is part of the long term strategy for ICM "Estrategia Valenciana para la Gestión Integrada de la Costa" presented in 2002 by the Generalitat Valenciana, in the framework of the European Union ICZM policy and the coastal policy of the spanish government.

## SAND DREDGING ACTIVITIES FOR BEACH NOURISHMENT

Beach erosion is one of the main problem of our coasts: the Comunidad Valenciana has 454 km of coasts, and the 52% of the coastline is affected by strong regression (1 m / year).  
 The beach represents, in the spanish mediterranean coasts, a high value space because of touristic demand: beaches, the 0.001 of the Spanish territory, are responsible of the 10% of the GIP.  
 The beach represents a fragile ecosystem threatened by heavy human pressure: sand losses along the sand cycles, sewage outfalls, wrong coastal planning are some of the causes of the degradation of beach ecosystem..  
 Beach nourishment is a short term strategy that can be adopted to maintain beaches under strong erosion tendence: Spain had been using marine deposits for beach nourishment for more than 20 years, and in the Comunidad Valenciana more than 10 million m<sup>3</sup> had been used for this purpose.  
 Beach nourishment with marine sand deposits can affect the continental shelf bottom, the water column and nourished beach ecosystem. This problem and its possible solutions are studied by the Generalitat Valenciana in the framework of the BEACHMED Project.



ID	ENTIDAD	TÍTULO	FECHA
1	GEOMATIA	Investigación Geofísica de la Zona de Estudio de Marina y Marisqueo (provincia de Alicante y Murcia)	01/11/84
2	ESOMAR S.A.	Estudio geofísico de la zona de estudio de Marina y Marisqueo (provincia de Alicante y Murcia)	01/03/84
3	GEOMATIA	Estudio geofísico de la zona de estudio de Marina y Marisqueo (provincia de Alicante y Murcia)	01/12/84
4	INTECCA	Estudio geofísico de la zona de estudio de Marina y Marisqueo (provincia de Alicante y Murcia)	01/12/84
5	INTECCA	Estudio geofísico de la zona de estudio de Marina y Marisqueo (provincia de Alicante y Murcia)	01/12/84
6	INTECCA	Estudio geofísico de la zona de estudio de Marina y Marisqueo (provincia de Alicante y Murcia)	01/12/84
7	INSTRUMENTACIÓN Y CONTROL, S.A.	Estudio Geofísico Marítimo entre Punta Alta y punta de San Bartolomé de Alicantina	01/07/84
8	GEOMATIA	Estudio Geofísico Marítimo entre Punta Alta y punta de San Bartolomé de Alicantina	01/07/84
9	GEOMATIA	Estudio Geofísico Marítimo entre Punta Alta y punta de San Bartolomé de Alicantina	01/07/84
10	INTECCA	Estudio Geofísico Marítimo entre Punta Alta y punta de San Bartolomé de Alicantina	01/07/84
11	INTECCA	Estudio Geofísico Marítimo entre Punta Alta y punta de San Bartolomé de Alicantina	01/07/84
12	INTECCA	Estudio Geofísico Marítimo entre Punta Alta y punta de San Bartolomé de Alicantina	01/07/84
13	GEOSICA BORG S.A.	Estudio Geofísico Marítimo entre Punta Alta y punta de San Bartolomé de Alicantina	01/07/84
14	GEOMATIA	Estudio Geofísico Marítimo entre Punta Alta y punta de San Bartolomé de Alicantina	01/07/84
15	ESOMAR S.A.	Estudio Geofísico Marítimo entre Punta Alta y punta de San Bartolomé de Alicantina	01/07/84

## MARINE GEOPHYSICAL STUDIES

The input data used to implement the GIS had been taken out from 13 marine geophysical studies that cover the 97 % of the coastal bottoms of the Comunidad Valenciana, at a depth between 5 and 35 m; these data had been first collected between 1985 and 1990 in the framework of the Dirección General de Costas – Ministerio de Medio Ambiente coastal nourishment policy, and the results included:

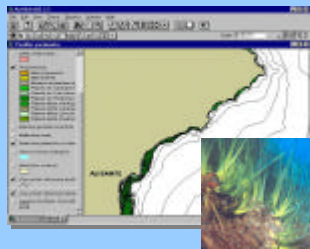
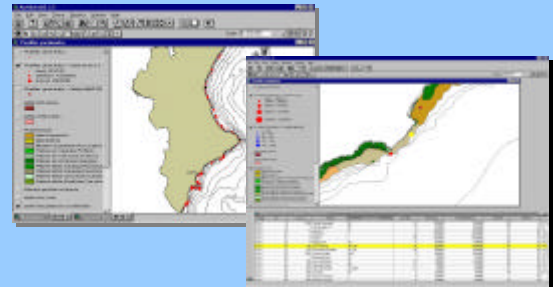
- Coastal geology studies .
- Bathymetric charts.
- Sediment thickness charts.
- Bottom morphology charts.
- Sediment's size distribution data.

Low depth due to technological limits of dredging vessels during the '80 characterize all of these marine geophysical surveys; at present time dredging activities are pushed toward the external margin of the continental shelf, thanks to dredging technologies progress, reducing the impact on coastal ecosystem, on coastal dynamics and on social and economical activities.

## SAND DEPOSITS

The analysis of the marine geophysical studies led to the location of 60 possible marine sand deposits, all of them pointed out by the geophysical surveyor.  
 Each deposit had been represented by a point feature and the following aspects had been considered in the attributes table:

- Grain size distribution, Wentworth Scale.
- Sand sample code.
- Estimated area, in m<sup>2</sup>.
- Estimated volume, in m<sup>3</sup>.
- Minimum depth, in m.
- Maximum depth in m.
- Marine geophysical study code.
- Code of the paper plan in the corresponding marine geophysical study.



## ENVIRONMENTAL IMPACT

Environmental impact of sand extraction activities had been analyzed using two GIS layer that represent coastal ecosystem features: this analysis focused on the possible impact on the seagrass *Posidonia oceanica* and on MPAs, considering the impact of the dispersion of suspended fine sediment, and using dispersion modelling results as a referenceto calculate the influence area of dredging activities. This analysis filtered off most of the potential sand deposits located in the first stage.

Tabla descriptiva de las variables de interés ecológico	
Distancia al borde de la zona de estudio	0
Distancia al borde de la zona de estudio	1
Distancia al borde de la zona de estudio	2
Distancia al borde de la zona de estudio	3
Distancia al borde de la zona de estudio	4
Distancia al borde de la zona de estudio	5
Distancia al borde de la zona de estudio	6
Distancia al borde de la zona de estudio	7
Distancia al borde de la zona de estudio	8
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Distancia al borde de la zona de estudio	10
Distancia al borde de la zona de estudio	11
Distancia al borde de la zona de estudio	12
Distancia al borde de la zona de estudio	13
Distancia al borde de la zona de estudio	14
Distancia al borde de la zona de estudio	15
Distancia al borde de la zona de estudio	16
Distancia al borde de la zona de estudio	17
Distancia al borde de la zona de estudio	18
Distancia al borde de la zona de estudio	19
Distancia al borde de la zona de estudio	20

## MEDSED

The MEDSED decision support system (MEDiterranean Sand Extraction Decision-maker), made of the combination of four indicators, had been proposed as a tool for decision making in sand extraction from the coastal shelf.  
 Each indicator describes the following variables, and they are synthesized by a MEDSED value:

- Coastal ecosystem distance
- Depth of the sand deposit
- Volume of the sand deposit.
- Grain size distribution.

$$MEDSED = UCv * UCg * UCp * UCe$$

## SISTEMA INFORMATIVO COSTERO v9.0

Marine sand deposits data had been used to implement the SIC 9.0, a user friendly GIS interface developed by the DG Puertos y Costas, Generalitat Valenciana; this tool is the main instrument used to manage information about the coast of the Comunidad Valenciana.  
 The SIC 9.0 data include:

- 40 thematic layers.
- Cartography 1:10000.
- Ortophotography .
- Historical vertical aerial photography .
- Oblique aerial photography .

