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Land Use Changes: Methodological Approach to Understand the Interactions Nature/Society in Coastal Areas (Alencoast)

Key Point: 'The coastal zone: understanding the interactions between human and biophysical factors'

This study reviews the impact of human and biophysical dynamics based on land use changes in coastal areas. The results show that such an analysis facilitates understanding of the complexity of the change processes involved. Results indicate a sharp contrast between the combined pressure from urban, industrial, and tourist dynamics on the one hand, and agro-forestry pressure on the other.

Key Words:

coastal management, land-use

Policy Drivers:

Coastal Management

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The project investigated land use changes in coastal areas, by designing a methodology for the analysis of the impacts of human and biophysical dynamics. Analysis of the interaction between human and biophysical factors facilitates understanding of the complexity of change processes involved.

Coastal areas are of particular importance, given their significance in the context of present economic climate. Environmental concerns like deforestation, soil erosion and pollution need to be understood in terms of population growth, and changes in land use including agriculture and tourism. The intensity of the diverse demands for space in coastal areas highlights the need for integrated management, to minimise the negative impacts of the increasing number of conflicting activities in these areas.

The nature and distribution of human activities in coastal areas result from the action of a range of driving forces: demographic, institutional, commercial and market, cultural and technological. The impact of these forces results in change of land use, and has an effect on coastal resources. The interactions between all the factors analysed in this study are of significance in terms of land use planning, and facilitate the sustainable development of these regions.



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Land cover data and socio-economic data were analysed (at various levels) using Geographic Information Systems; the Coastal Alentejo (Portugal) was used as a case study. The analysis was based on information obtained through remote sensing instrumentation (satellite images and aerial photographs), which permitted the collection of information on land cover in the coastal area at a regional level. Another exercise was carried out with respect to the socio-economic issues at the local level.

The quality of information collected from the different levels is complementary; this allowed analysis of the dynamics affecting the region studied. Regional dynamics were correlated to: demographic changes, agri-environmental policy assessment and impacts, planning and regulation, and changes in land uses. This study also necessitated analysis of the various land uses. Consequently, operators involved in various land uses were asked about their operational practices, attitudes and expectations with respect to change.

The data collected was analysed through GIS, with land-cover data corresponding to digital maps, scale 1:100.000, obtained from satellite imagery (1975, Landsat MSS; and 1985, Landsat TM) produced by CNIG (Centro Nacional de Informação Geográfica) to JRC (Joint Research Center) in the frame of the CORINE and LACOAST programs. Other ancillary data corresponds to: Topographic Map of Portugal, scale 1:25000 (Serviços Cartográficos do Exército); and Aerial Photographs in false colour, scale 1:5000 (1990, ACEL - Associação das Empresas de Celulose e Papel).



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The land cover in this area is chiefly characterised by agricultural areas (45%) and by forest and semi-natural areas (52%). Other types of land cover are remnants of natural habitats occupying less than 3% of the area studied. A quantitative analysis of the land cover changes reveals a very low rate of change between 1975 and 1985. However, it is possible to identify some significant land use dynamics associated to different processes of change. Although they are small rates, the urban and industrial areas underwent some of the most significant changes between 1975 and 1985.

A principal finding of this study was that between 1981 and 1991, almost all the localities (represented by a kilometric grid) of the coastal zone that were exposed to change, were located in agricultural areas. The main processes of change can be expressed by changes in agricultural and forestry uses of the land, urban concentration, expansion of industrial areas, and the growth of tourism areas.

Of the areas outside those dominated by agriculture, an area located in the south of the coastal band disappeared in 1991 as a result of the decrease of its population, and another emerged next to Tróia as a result of the development of a tourist venture.

Four indicators of socio-economic pressure on land use (Urban Pressure, Industrial Pressure, Tourist Pressure, and Agro-Forestry Pressure) were analysed. Results show that there is a sharp contrast between the combined pressure from urban, industrial, and tourist dynamics on the one hand, and agro-forestry pressure on the other. While the combined pressure of urban, industrial and tourist growth is felt mainly next to the coastline, the agro-forestry pressure is more evident in the interior of the Alentejo coastal zone.

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