

SELECTION OF THE PRIORITY AREAS ON THE WEST COASTS OF MERSIN USING GIS TO ASSESS A MARINE CONSERVATION PLANNING

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Abstract

The subject of this study is selection of priority areas for marine conservation planning along western coasts of Mersin, by incorporating biological and socioeconomic data through geographical information system (GIS). The geographical borders of the study area were determined by the data availability from previous surveys, which were designed to investigate Mediterranean Monk seal habitats and populations. Consequently a reserve system composed of three segments were found to be the best selection where the patches were located at west of Anamur (Mellec), surroundings of Kizilliman and Between Akkuyu and Ovacik. Along with the recommendation of priority areas for conservation, the methodology used in this study was recommended for further studies in selection of areas for protection.

Keywords: Conservation, Coastal Waters, Levantine Basin

As the important fish stocks continue to decline the need of improving protection and management of marine areas is becoming more evident and marine protected areas are viewed as important tools (Côté and Finney, 2006). The coast of Turkey holds considerable marine biodiversity and marine resources. On all along the Turkish coasts many critical habitats are sheltering endangered species and commercially important species. Despite the more noticeable efforts for the protection of the marine environment within last years, increasing exploitation of coastal regions and degradation of marine resources are emerging as important environmental threats in Turkey. Nevertheless there is still important difficulties in creating the MPAs due to the interference of different institutions in decision making and enforcement of the regulations (Okumus,2002) and lack of methodology for assessment of the coastal areas for producing conservation plans and zonation. The core issue of this study is to generate a methodology on measuring, mapping and analyzing of available marine biodiversity data and surrogates in the study area including the perturbation sources and socioeconomic conflicts, for selection of new priority areas and optimization of the borders of the present protected area. Incorporating all the available information through GIS and prioritization of the sites is the main objectives of this research.

The base data used for this study were derived from field surveys carried out on the coastal area, between Bozyazi and Ovacik. Taking into consideration of the supplementary data, the study was extended the area between Mellec and Bogsak which constitutes a 181km coastline at west of Mersin. The offshore extent of the study area was defined by the trawl data availability, which is limited within 2 nautical mile distance from coastline.

The fish assemblage of shallow coastal area within depth of 0-10m was assessed by visual census survey, covering the whole area where the stations distributed in near equal longitudinal distance. Assemblage of the demersal species of deeper waters (10-100m) was assessed by trawl sampling. Considering the difficulty of measuring whole biodiversity of the area, surrogates were used to represent biodiversity. Surrogates were coastal habitat types, endangered species habitats and some certain fish species data derived from trawl and visual census data sets. Socioeconomic information was also collected during the surveys which were combined with the information extracted from Google Earth satellite images later on. All the obtained data was combined under a geo-database and mapped using GIS. After creation of the data layers Marxan was employed for site selection. Marxan is software designed for selection of the areas for creating marine reserves. With Marxan, it is possible to include socioeconomic information and optimize borders of the reserve system to provide compactness. The strength of the software is the simulated annealing algorithm by which Marxan finds optimal solutions. Several different tests were applied to find suitable values for settings of the software. Afterwards 8 different scenarios were created by changing the representation targets for each conservation feature. Finally a set of different sized but similarly located reserve systems were defined.

Consideration of multiple factors including cost, socioeconomic environment of the area is required along with the ecological factors. The biggest problem is to find an optimal solution that provides the best balance of biodiversity and socioeconomic concerns. The Kizilliman Marine Protected Area is designated to restore the marine ecosystem deteriorated by excess fishing pressure. Since the ultimate goal of this work is to optimize the conservation measures in the MPA analysis have basically focused on the fish communities and use it as a tool for supporting conservation site prioritization. Moreover considering the insufficiency of fish data for site prioritization, supplementary information such as critical habitats and coastline structure were used. As being one of the basic components of the decision making process the socioeconomic structure of the

area was also assessed and incorporated in the analysis.

The framework was constructed to place two predefined critical zones at core of reserve system, which are most effective whelping sites of the Mediterranean monk seals in Turkish seas. With the aid of GIS and Marxan this aim was achieved by including the rest of the available biologic and socioeconomic information where the size and borders were optimized. Additionally a new zone located at neighborhoods of Akkuyu and Ovacik was identified as priority area. Finally two kinds of results were generated: best solution and irreplaceability. While decision of locating the protected areas was accomplished by best solutions, the irreplaceability values were essential for classifying the importance of the zonation and identifying the hotspots.

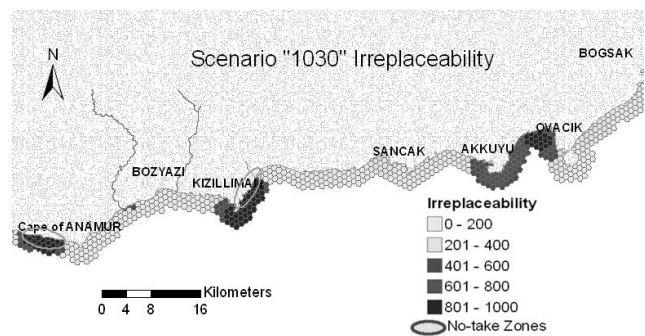


Fig. 1. Best scenario with irreplaceability values

Consequently a reserve system was selected consisting of three regions. The regions were located at Anamur, Bozyazi and Ovacik. Moreover Akkuyu region where the nuclear power plant construction is on focus, found to be located in one of the core area of the reserve system assessed by this study. This result shows that a need for reassessment for the location of power plant need to be done, considering the possible negative effects of the nuclear power plants, over ecosystems.

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