

A METHODOLOGY FOR ASSESSING THE CURRENT STATE AND FUTURE TRENDS IN COASTAL AREAS: THE CASE OF KALLONI BAY, LESVOS, GREECE

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Abstract

In this paper, a methodology is presented for assessing the current state and future trends in coastal areas which are important prerequisites for the implementation of appropriate management schemes. The methodology is based on the integration of Geographical Information Systems and multiple criteria choice methods. A case study is carried out in the coastal area of Kalloni Bay on the island of Lesvos (Greece) where multiple activities take place causing an urgent need for the application of proper management policies.

Keywords : Coastal Management, Coastal Systems, Gis, Eastern Mediterranean.

Introduction

Under the legislation of the European Union, the sustainable development of coastal zones is a main priority. To achieve this priority, long-term economic, environmental and social information data has to be analyzed for gaining a better understanding of coastal areas and designing appropriate management plans [1]. Therefore, decision-making in coastal areas involves collaboration among various disciplines related to environmental and socio-economic issues. Geographical Information Systems play a significant role in that field, since they provide a powerful framework where detailed spatial databases can be developed and integrated with appropriate methodologies and models [2]. In this paper, multi-dimensional evaluation and ranking of coastal areas using a set of selected criteria and based on the combination of multiple criteria choice methods and Geographical Information Systems (GIS) was carried out.

Description of the study area

The Bay of Kalloni is a deep coastal embayment at the south-western part of the island of Lesvos with a surface of 110 km². The watershed is limited by steep mountainous formations. Several small settlements and villages are located around the Bay. The area has remained rural and the total population accounts approximately 12.808 inhabitants [3]. During the last 15 years the development of a confined area in Kalloni settlement as a tourist site has been the key factor controlling the economic development of the region. Until now, activities in the area are based on occasional schemes ignoring any sustainable development.

Methodology and analysis results

In this study, a methodology was developed for assessing the current state of the coastal ecosystem of Kalloni Bay and evaluating its future trends towards different aspects of development. The catchment area was divided into five management zones (Z1 to Z5) with a high degree of homogeneity regarding their socio-economic and environmental characteristics. Assessment of the state of each zone was carried out based on selected criteria. The methodology involved combination of GIS with multiple criteria choice methods. The principle of multiple criteria evaluation choice methods is the classification / ranking of alternative choice possibilities on the basis of various criteria. In this study, the regime multiple criteria choice method was applied [4]. In Fig. 1, the division of the study area into five management zones is illustrated.

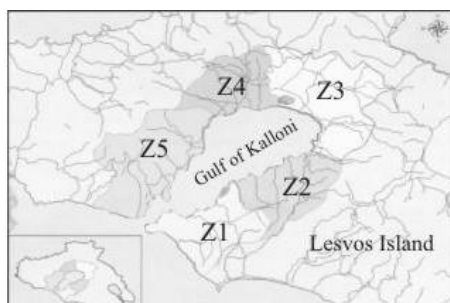


Fig. 1. Division of the study area into five management zones.

The criteria used for the evaluation of the current state of each zone and the comparison among zones, are the following: C1: Natural and cultural resources, C2: Exploitation of resources, C3: Protection of ecosystems, C4: State of pollution, C5: Population, C6: Quality of life, C7: Human

potential, C8: Primary sector, C9: Secondary sector, C10: Tertiary sector. The analysis was carried out by considering three objectives regarding development: Agricultural, Tourism and Sustainable Tourism. Subsequently, the regime multiple criteria choice method was applied twice for each objective: (a) No weights were assigned to the criteria as they were considered of equal importance. (b) Priorities were assigned to the criteria for representing their degree of importance. It should be noted here that some criteria were given negative values; those represent cost criteria, since the lower their value, the better for the considered objective. The rankings of the zones for each objective are shown in Table 1. Zones Z4 and Z1 are ranked at high levels for all the objectives, since well developed infrastructures are available in these zones. Z3 is always ranked in low levels which can be attributed mainly to the lack of infrastructures. Z2 is more orientated to agricultural development and less to tourism development. Furthermore, the potential for touristic development is better when considering sustainable approaches. Z5 is ranked in better place concerning Tourism and Sustainable Tourism compared to Agriculture, since natural land overwhelms agricultural land. Finally, an important feature is that the zones ranked in lower levels are characterized by a serious shrink of the local population.

Tab. 1. Ranking of the five zones for all the objectives under examination.

Objective		Ranking				
		1	2	3	4	5
Agriculture	No weights	Z1	Z4	Z2	Z3	Z5
	Weights	Z1	Z4	Z2	Z3	Z5
Tourism	No weights	Z4	Z1	Z5	Z2	Z3
	Weights	Z4	Z1	Z5	Z2	Z3
Sustainable	No weights	Z4	Z1	Z5	Z3	Z2
	Weights	Z4	Z1	Z5	Z2	Z3

Conclusions

The ranking of coastal zones could be useful to coastal decision-makers for assessing their current state, indicating the ones where specific initiatives should be undertaken and evaluating their potential for development in accordance with specific objectives. Finally, the possibility of assigning priorities to the criteria is important, since it allows the reflectance of different viewpoints to be examined.

References

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