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# Application of Fuzzy Logic Models on Human Interaction at Coastal Areas

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Restoring the balance of coastal landforms is one of the major aims of the Integrated Coastal Zone Management (ICZM). While geomorphologic dynamics of coastal areas influence the character of society, the actions of society change the geomorphology at the same time. As ICZM calls for pro-active management of coastal areas particularly considering the climate change, decision making of complex and interdependent problems such as shoreline management, requires integration of several aspects of the coast. This study presents, possibly, a first time integration of 'coastal scenery assessment' and its influence on 'coastal vulnerability assessment' focusing on the discussions of coastal geomorphology. Two novel models are presented to evaluate the relationship between coastal scenery and coastal vulnerability through a case study area (Goksu) along the Mediterranean coast of Turkey. Both models include parameters of physical and human processes that define or influence the geomorphology such as beach slope, width, existence of built environment and land use.

In order to provide an evidence–based approach to evaluate the coastal scenery, a novel technique "coastal scenic evaluation system (CSES)" is developed by Ergin et al. (2004, 2019). This technique uses fuzzy logic for the quantitative evaluation of coastal scenery based on 26 scenic parameters of physical and human perceptual characteristics. These parameters, obtained by consultation with coastal experts and users, are rated on a five point attribute scale. The weights of the scenic parameters are estimated by public surveys carried in Turkey, United Kingdom, Malta and Croatia, and via consultations with coastal experts from other countries. These attributes, subjected to fuzzy logic mathematics, is used to calculate a coastal scenic evaluation index (D), to categorize the scenic values of coastal sites into five distinct classes depending on landscape and attraction values.

The Fuzzy Coastal Vulnerability Assessment Model (Ozyurt, 2010; Ozyurt and Ergin, 2012) uses 13 physical and 7 human activity parameters to evaluate coastal erosion, inundation, flooding (storm surge) and saltwater intrusion (groundwater and rivers) by method of aggregated coastal vulnerability. A region can be assessed for its vulnerability to different individual impacts as well as for the vulnerability of governing physical\anthropogenic parameters defining each individual impact. The model uses an analytical hierarchy process to integrate stakeholder opinion with the decision-making process and the fuzzy expert system to combine expert opinion, the available data, coastal engineering knowledge, and geographical information systems to calculate
vulnerability indices. The vulnerability of coastal area is categorized in five classes from very low to very high vulnerability.

References

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