Environmental Engineering and Management Journal xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

"Gheorghe Asachi" Technical University of Iasi, Romania

EVALUATION OF DEGRADATION OF LACUSTRINE ECOSYSTEMS BY GIS TECHNIQUES

Sorin Avram[1,2*], Radu Burlacu[1], Corina Cipu[1], Ana-Maria Corpade[1,3], Carmen Adriana Gheorghe[1*], Nicolae Manta[4], Mihaita Iulian Niculae[1,5], Florin George Panaitescu[1], Ionuţ Silviu Pascu[1], Róbert Eugen Szép[6]

[1]National Institute for Economic Research "Costin C. Kiriţescu" (INCE), Romanian Academy, 13 September Street, No 13, Bucharest, Romania
[2]University of Craiova, Department of Geography, Al.I. Cuza Street, No 13, Craiova, Romania
[3]Babes-Bolyai University, Faculty of Geography, Clinicilor Street, No 5-7, Cluj-Napoca, Romania
[4]Ministry of Environment, Department of Biodiversity, Libertăţii Boulevard, No 12, Bucharest, Romania
[5]University of Bucharest, Centre for Environmental Research and Impact Studies, Nicolae Balcescu Boulevard, No 1, Bucharest, Romania
[6]National Environmental Guard, Unirii Boulevard, No 78, Bucharest, Romania

Abstract

Globally, both terrestrial and aquatic ecosystems are affected by anthropic activities and natural factors, the main drivers of biodiversity loss. Thus, all countries have to evaluate the ecosystems degradation level for policy- making, an appraisal which will contribute to their protection and reconstruction. This study proposes a methodology for evaluating the degradation state of lacustrine ecosystems using a GIS automated tool, based on analysis of potential degradation sources present in the watershed that supply the lakes with water. It was created a new index, called WRASTIC-HI, completely automated, derived from other relevant indexes described in specialty literature. It was used various data from different sources. A multi-criteria approach was used and a specific weight and grade was attributed to each criterion, allowing the classification of lakes in three categories: degraded, semi-degraded and natural lacustrine ecosystems. All the analyses and calculations were done using ArcGIS software. Finally, it has been tested the new methodology by evaluating the degradation state of 30 lakes with specific conditions. Results show that selected criteria are relevant for assessing the state of lacustrine ecosystems. WRASTIC-HI index processed through the ArcGIS software represents a viable alternative to field and laboratory analyses of physio-chemical and biological indexes of the lake water. The use of WRASTIC-HI index doesn't require high financial and human resources and therefore can be applied on a wide scale.

Key words: degradation state, GIS, lacustrine ecosystem, multi-criteria analysis, Romania

Received: February, 2018; Revised final: May, 2020; Accepted: June, 2020

* Author to whom all correspondence should be addressed: e-mail: avram.sorin32@gmail.com; carmen.adriana@ince.ro