COMPREHENSIVE ASSESSMENT MODEL OF ECOLOGICAL RIPARIAN ZONE

XIA JIHONG[1] ,WU WEI ,YAN ZHONG MIN and JIANG CHUANFENG

[1] College of Water Conservancy and Hydropower Engineering Hohai Univ. Nanjing, 210098, China
(Tel: +86-025-83786539, e-mail: syjhxia@sohu.com)

Riparian zone is ecotone between water ecosystem and land ecosystem, and the edge effect is the most distinct characteristic. Riparian ecosystem is a complex three-dimensional ecosystem, which is affected by land ecosystem and river ecosystem in longitudinal direction, and is affected by upstream and downstream in lateral direction, and is affected by superficial water and ground water in vertical direction. Because of its biodiversity, biotic sensitivity and biotic corridors, riparian zone is regarded as genetic bank and has great influence on both the land ecosystem and the water ecosystem. So it is important to remain its ecological stability, ecological health and ecological safety.

Many researches on riparian zone have been done. However few are quantitative. Because most current conclusions on riparian zone are conceptional and are difficultly performed in practical, there are few standard and criteria of protecting and managing riparian zone. Effective building ecological riparian zone depends on comprehensive assessment of ecological riparian zone. Comprehensive Assessment Model of Ecological Riparian Zone includes logical model, index model, grade model and member function model.

The comprehensive assessment includes general assessment and sub-object assessments. General status assessment of ecological riparian is general object, which depends on sub-object assessments. The sub-object assessments include structure stability assessment, landscape suitability assessment, ecological health assessment and ecological safety assessment.

In the two layers, the AHP-Fuzzy method is used, in which fuzzy subset can be constructed by use of AHP, and fuzzy indexes can be quantified by use of attribute function. In the assessment procedure, the first step is to construct factor sets and grade sets; Secondly, it should be to construct the fuzzy attribute functions of each indexes. According to these functions, the attribute degree can be calculated. Then fuzzy matrix can be formed by use these degree data. Thirdly, the weight of each factor can be calculated by use of AHP method and the weight vectors may be gained. Lastly, complex operation can be done by use of weight vectors and fuzzy matrixes.

In the whole assessment procedure, constructing suitable index system is the base of the comprehensive assessment. The hierarchy of indexes can be divided into two layers. The indexes in first index layer include structure stability, landscape suitability, ecological health and ecological safety. The indices in second index layer are all kinds of classifying factors which affect the indexes in first index layer.

Dividing the grade of assessment object is premise. The assessment grade of ecological riparian zone includes general object grade and sub-object grade. General object grade has four grades: perfect status, nicer status, common status and worse status. So the assessment set of general object is {Perfect status, Nicer status, Common status, Worse

status}. The assessment set of structure stability is {Rather stable, Stable, Unstable, Rather unstable}. The assessment set of landscape suitability is {High suitability, Middle suitability, Low suitability, unfit suitability}. The assessment set of ecological health is {Rather healthy, Healthy, Less healthy, Sick}. The assessment set of ecological safety is {Rather safe, Less safe, Less dangerous and Dangerous}.

For different sub-object, the membership function is different. According to the characteristics of continuous indexes, the degree is measured by use of drop-semi-trapezoid distribution. Normal distribution is used as the membership function for landscape suitability. There two kinds of indexes have influence on ecological health and ecological safety. One is positive indexes while another is negative indexes. The positive indexes have more influence when there values become more. The membership functions of this kind of indexes are described by use of ascend-semi-trapezoid distribution. On the contrast the membership functions are expressed by use of drop-semi-trapezoid distribution.

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