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ASSESSING ECOLOGICAL QUALITY OF RIPARIAN HABITAT OF STREAMS OF NARMADA RIVER BASIN USING QBR INDEX

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ABSTRACT

The present study was conducted to assess the ecological quality of riparian habitat of streams of Narmada river basin using QBR index. QBR index is used to determine the riparian habitat quality of Barna and Jamner streams. The rapid survey was carried out on the left and right banks of the streams. The results showed that Barna stream showed fair riparian quality due to the presence of a large number of trees on both the banks whilst, Jamner stream is coming under bad riparian quality due to anthropogenic pressure and less vegetation along the banks causing degradation of riparian habitat quality.

KEYWORDS: *Anthropogenic Pressure, Barna Basin, QBR Index, Riparian Habitat*

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INTRODUCTION

The word 'riparian' is derived from Latin word '*riparius*' meaning land adjacent to the water body (Naiman and Decamps, 1997). The transitional zone between these rivers and the land is known as the riparian zone. These riparian areas are considered to be one of the biodiversity rich ecosystems mainly as they act as transitional zones between the terrestrial and aquatic ecosystems, thereby serving as functional interfaces meditating energy and matter between these two ecosystems (Peterjohn and Correll, 1984; Gregory *et al.*, 1987).

Riparian zone are one of the most valuable ecological elements of river systems. They maintain high levels of biological diversity and productivity and provide dynamic habitats for different species (Bennett and Simon, 2004). They also provide many other ecological and social benefits and ecosystem services. Riparian zone is an extremely important component of aquatic ecosystem and it influences physical habitat characteristics and processes of riverine ecosystems (Naiman et al., 2005). The reduction and alteration of riparian forests have resulted in habitat fragmentation and destruction of habitat of diversity in the river system (Mohite and Samant, 2012). The present study was conducted to assess the riparian habitat quality of Barna and Jamner stream by using QBR Index.

MATERIAL AND METHODS

Study Area

The present study was conducted on two streams namely Barna and Jamner of Barna sub-basin of Narmada River basin. These streams join an irrigation reservoir identified under National wetland conservation program by Ministry of Environment, Forest and Climate Change (Government of India), known as Barna reservoir located near Bari village in Raisen district, Madhya Pradesh.

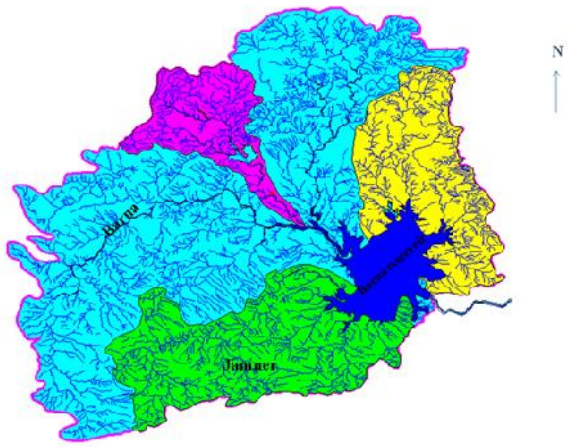

Figure 1 Map Showing Study Area

Methodology

In the present investigation, the riparian habitat quality of Barna and Jamner streams of Barna sub-basin of Narmada River basin were assessed by using QBR Index (Munne *et al.*, 2003). The QBR index (*"qualitat del bosc de ribera"* or riparian forest quality) is an easy-to-use field method for assessing ecological quality of riparian habitat. The QBR index is based on four categories of a riparian habitat *viz.*, vegetation cover, cover structure, cover quality and channel alterations. Each category includes several attributes. The scores for each category range from 0 to 25 being 100 the maximum total score assigned to the highest quality and, representing five classes (Table 1).

Table 1: Quality Classes of Physical Habitat According to the QBR index

Riparian Habitat Quality Class	QBR Score	Color
Riparian habitat in natural condition	>=95	Blue
Some disturbance, good quality	75–90	Green
Disturbance important, fair quality	55–70	Yellow
Strong alteration, poor quality	30–50	Orange
Extreme degradation, bad quality	<=25	Red

RESULTS AND DISCUSSIONS

In the present study, riparian habitat quality of Barna and Jammer streams of Barna sub-basin were assessed (Table 2). During the present survey, riparian habitat quality for Barna stream comes under fair habitat quality (score70) on the basis of QBR index while for Jamner stream riparian habitat quality fall under bad riparian habitat quality (35 score).

Table 2: Score of Riparian Habitat Quality of Barna and Jamner Streams Using QBR Index ((Munne *et al.*, 2003)

Categories	Score	
	Barna Stream	**Jamner Stream**
Total riparian cover	15	0
Cover structure	10	5
Cover quality	20	20
Channel alteration	25	10
Final score	70	35

The riparian cover at Barna stream showed fair quality due to the presence of trees on both right and left side of the bank and anthropogenic activities were not found on the banks of the stream. On the other hand, the riparian cover of Jamner stream comes under bad quality due to influence of human activities *viz.*, agriculture, human settlement in riparian zone of the stream.

The cover structure of Barna stream showed fair quality as large number of trees; shrubs and dense vegetation on both the banks of the stream were observed. On the contrary, Jamner stream showed bad quality of cover structure as forest cover was replaced by human settlement and agricultural activities on its left bank.

The cover quality is based on geomorphology of the stream. It includes slope, form of riparian zone, and percentage of hard substrate which designs the geomorphological characteristics of the stream. The cover quality of Barna stream showed fair quality where as that of Jamner stream was found bad.

The channel alteration of Barna stream showed fair quality due to the unmodified river channel on the contrary Jamner stream showed bad quality due to the modified fluvial terraces, constraining the river channel.

The overall riparian habitat quality of Barna stream comes under fair quality as the presence of large numbers of trees and shrubs was observed on both the banks of the stream whereas, the riparian habitat quality of Jamner stream representing bad quality of riparian habitat due to the presence of less number of trees and more anthropogenic activities on the banks of this stream. It has been found during the study that agricultural and other anthropogenic activities were responsible for decline in the quality of riparian area of Jammer stream. Riparian areas especially in lowlands have very fertile soil that is ideal for agriculture. In addition, these areas typically have plenty of water for irrigation that is in close proximity. As a result, in Jamner stream most of the riparian areas have been converted into agricultural area. It was also suggested that riparian zone widths showed significant difference between land use types with agricultural sites scoring poor and forested sites scoring optimal showing causational relationship between the development of agricultural land with deforestation and physical disturbances in the riparian zone (Dillaha *et al.*, 1989). Similar results were reported for physical habitat assessment of Barna and Jamner streams (Quadar *et al.*, 2016) done with the help of rapid bioassessment protocol (Barbour *et al.*, 1999) hence verifying the findings obtained by QBR index. It was concluded during the study that riparian vegetation needs improvement and plantation on the bank of Jammer stream. Also, this study clearly predicted that the land use pattern and riparian conditions have profound effect in assessing stream riparian habitat conditions.

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