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Ecological Status of Riparian Zone of Sip River: A Tributary of River Narmada in Central Region

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Abstract

Riparian zone is an interface between the terrestrial and aquatic ecosystem which provides a variety of resources to the organisms. The present study was carried out on Sip River which is a tributary of River Narmada. During the study, QBR (*Qualitat del Bosc de Ribera)* index was used for the assessment of quality of riparian forest. It was observed that out of seven sampling stations, two stations were found in bad quality and extreme degradation on riparian habitat, three stations were found in Fair quality and strongly altered riparian habitat where as two Stations were found in Good quality and some disturbances were observed in these areas. The current status of riparian zone was due to human activities like construction, sand mining, soil mining, deforestation and expansion of crop land for agricultural activities. Livelihood dependence is the major cause of present condition of riparian zone.

Riparian areas are generally long strips of vegetation adjacent to the water bodies such as streams, rivers, lakes, reservoirs and other inland aquatic systems. It occupies one of the most dynamic areas of the landscapes and plays an important role for balancing abiotic and biotic components. Riparian vegetation can helps in reducing contaminants inputs by filtering runoff, promoting denitrification and uptake of nutrients by vegetation. It also provides food and shelter for the fauna living nearby the river and helps in aquifer recharge.

Riparian areas are globally assessed by using different protocols and indices. In the present study, QBR index was chosen among them. The QBR index ("*qualitat del bosc de ribera*" or riparian forest quality) is an easy-to-use field method for assessing the habitat quality of riparian forests. This was designed and developed for use in Mediterranean streams in Spain[6]. It is a score based index divided into four main aspects of the riparian zone which are total riparian cover, cover structure, cover quality and channel alteration. It is used to contrast sites, to compare sites, to ideal conditions and to assess the success of

restoration of riparian zone/riparian forest.

Study Area :

The present study was conducted on Sip River which originates from hilly ranges of Vindhyachal Mountain near Ramdasi village in Sehore district, Madhya Pradesh (Figure 1). It is a tributary of river Narmada and joins river Narmada near Satdev village of Sehore district, Madhya Pradesh. Seven sampling stations were selected for the assessment of riparian zone using QBR index (Figure 3).

QBR (Qualitat del Bosc de Ribera) Index :

The QBR index for assessment of riparian forest quality is a protocol which was developed by F.E.M. (Freshwater Ecology and Management) research group of *UNIVERSITAT DE BARCELONA*[6]. In this protocol, there are four riparian habitat quality levels and for each there is an individual given score. The protocol field data sheet is given in Table-1.

The survey of riparian zone of Sip River was carried out on seven sampling stations using QBR protocol. According to the protocol, strongly altered and bad quality of riparian zone was observed on two stations, fair quality of riparian zone was found in three stations with important disturbances and two Stations were found in Good quality and some disturbances were observed in these areas (Figure 3). On an overall observation of the riparian zone, it was observed that 28 % area of riparian zone was strongly altered and present in bad quality , 43% area of riparian zone was in fair quality and important disturbances were observed where as 28% area of riparian zone was observed in good quality and some disturbances were observed (Figure 4).

According to the study, increases in the land use pattern can increase disturbance on the riparian vegetation. The most predominant activity noticed in the riparian area during the study was agriculture. Many varieties of crops were cultivated on the banks of the river and responsible for degradation of riparian cover in the study area. Human activities like construction, conversion of forest land for agriculture and deforestation in the riparian area are playing major role for the degradation of riparian area of the river.

After the survey of study area, it was observed that expansion of agriculture land on the bank of river for livelihood of local people and construction work on the bank of river are the major cause of encroachment of riparian zone. Similar observation was reported in central region of river Narmada using QBR index for assessing riparian zone quality on 25 station in which 4 stations and found in very bad quality, 13 stations are in bad quality, 7 station are found in fair quality while only one station are found in good quality of riparian zone[5]. Tembhare *et.al.*[10] assessing the ecological quality of riparian habitat of streams of Narmada river basin using QBR index to determine the riparian habitat quality of Barna and Jamner streams a rapid survey was carried out on the left and right banks of the streams. They were found 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. In Sabinal River,

Mexico here RQI (Riparian Quality Index was used to assess the riparian quality, at three catchments areas among 15 reaches in which only two reaches are in good condition while 6 are in bad condition, 5 are in poor condition, 2 are in moderate condition because of human intervention in the catchment areas[8]. In Songhua River which is the fifth longest river of china, where 60% of the riparian zone was disturbed by human activities like build-up and farm land contraction Bolin[2]. In Gadaria Nala which is a tributary of river Narmada in the central zone by Kumar *et.al.*[4]. Degradation in riparian zone of Kaliyadeh stream which is a tributary of River Narmada in the central zone was reported by Pandey *et.al.*[7], the same was observed at Bhahner River by Bahsir, *et.al.*[1] and Chandni Nalla by Chaurasia, *et.al.*[3]. Dominance of agriculture practices on both banks of Chandni Nalla was also reported by War *et al.*,[13] which are more responsible for soil erosion and ecological degradation of a stream/River. Poor quality of riparian zone and floodplain areas in the selected reach of River Narmada through the dominance of agricultural practices were also reported by Vyas *et al.*[12]. Sirombra and Mesa,[9] were reported poor quality of riparian areas near population centres because of livelihood dependence and good quality of riparian zone near areas adjacent to protected region in subtropical Andean stream of the northwest Argentina including within Yungas Biomes.

Worldwide agriculture is the most common practice done in the riparian areas which directly affects the flora and fauna of rivers. Different types of human activities are the major cause of degradation of riparian zone due to which loss of habitat and sources of pollution were introduced in the system. Tüzün,I and Albayrak,I.[11] were assess the riparian quality of Kizilirmak river of Turkey using QBR index and results shows that among three stations two were in extremely degraded condition, while one station was in fair condition. Such status of riparian zone of the river was observed because of excess human disturbance on the bank in the form of settlement, agriculture and effluent discharge from oil refinery.

Table-1. Field data sheet of QBR index

RIPARIAN HABITAT QUALITY LEVEL	QBR
Riparian habitat in natural condition	≥ 95
Some disturbance, good quality	75-90
Disturbance important, fair quality	55-70
Strong alteration, bad quality	30-50
Extreme degradation, very bad quality	≤ 25

According to the QBR index protocol the present study concludes that most of the sampling stations of the Sip River were categorized under fair condition rather than good or very good conditions. These sampling stations were found degraded due to human interference because people of this area were largely dependent on the riparian zone of the river for their basic needs and livelihood. Therefore proper attention should be given by the government for restoration & management of riparian area of the studied river. National policies and guidelines regarding settlement along the buffer zones of the river network must be implemented. So that it can be saved for the future and ecology of the river.

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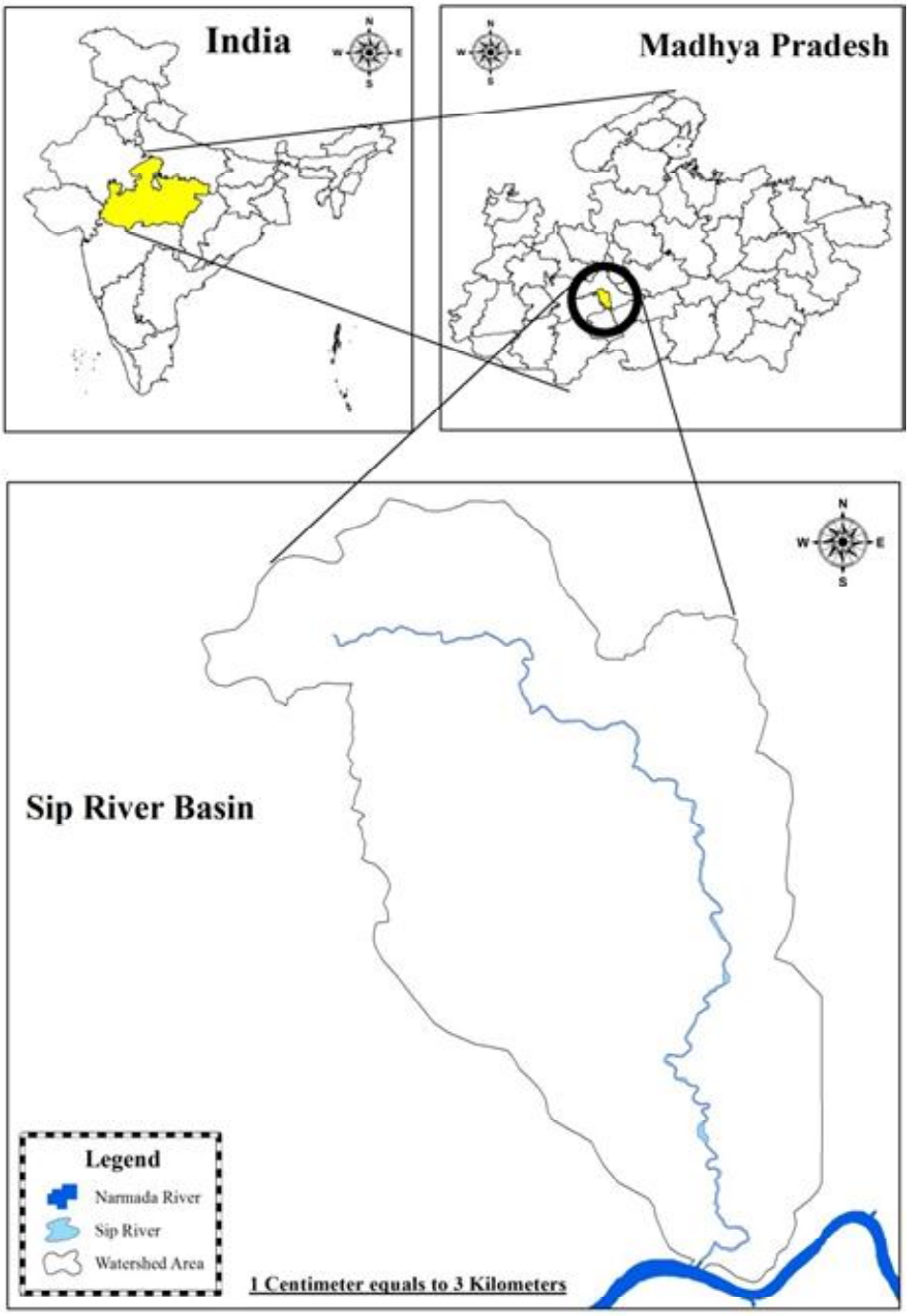

Figure- 1: Location map of the study area

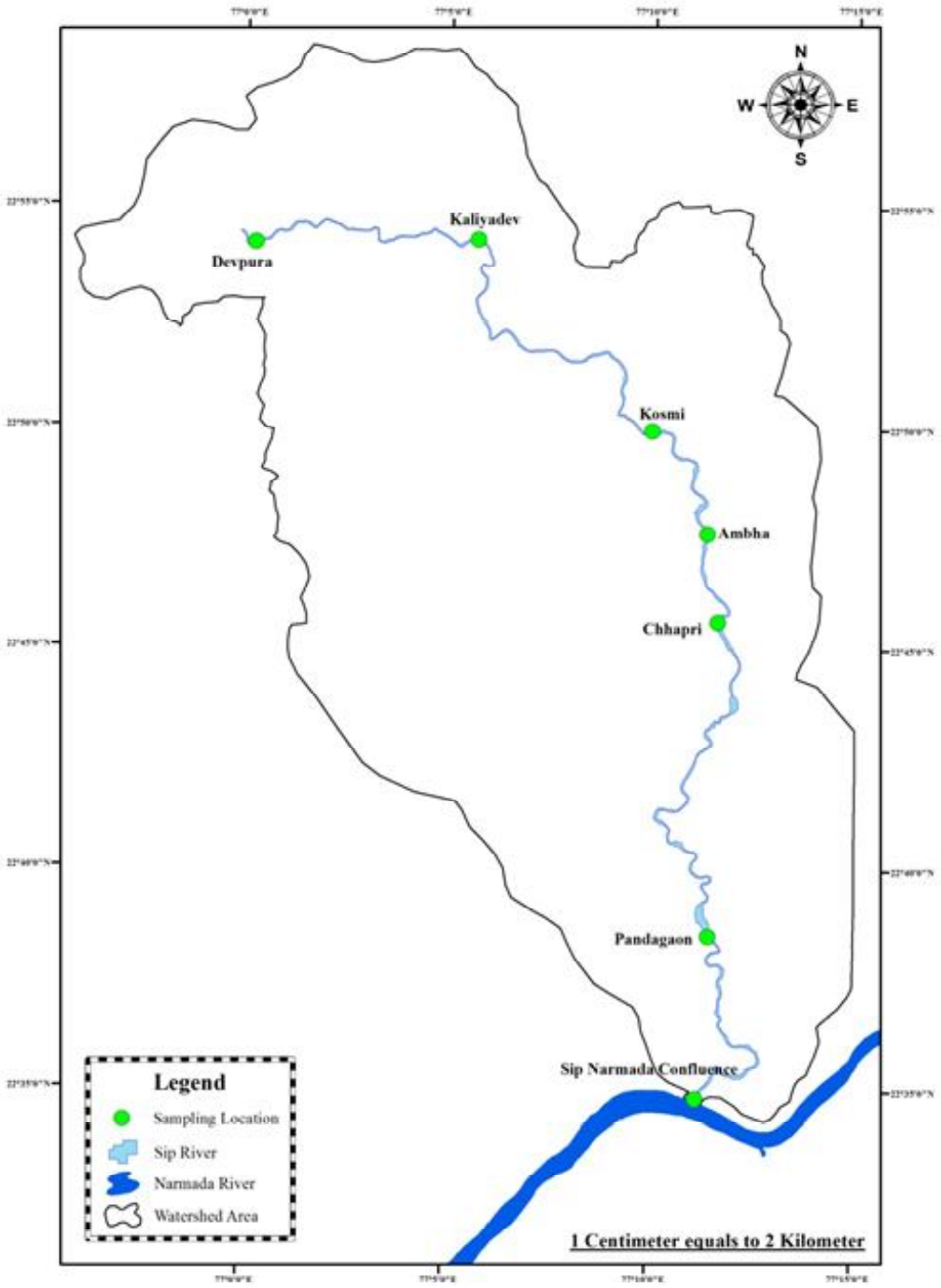

Figure- 2: Sampling stations of the study area

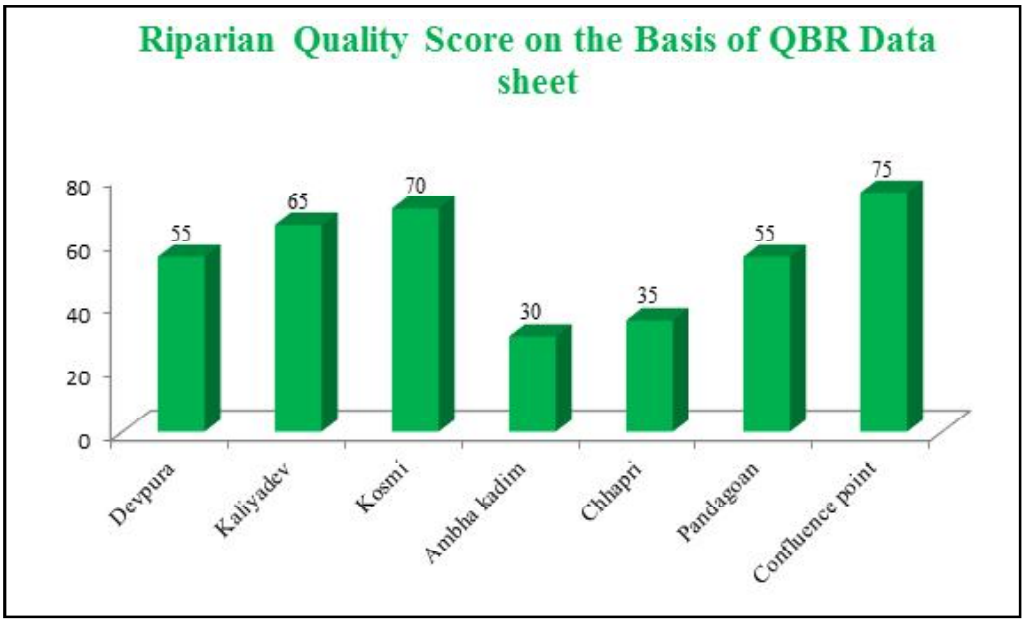

Figure- 3: Riparian Quality Score in Sip River

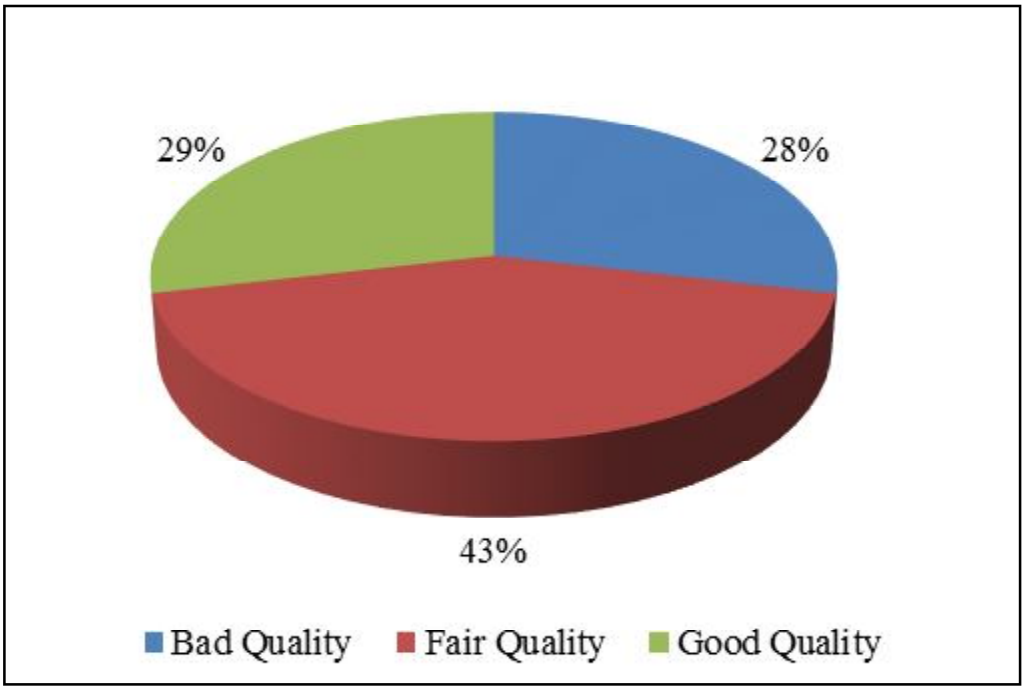

Figure- 4: Status of Riparian zone in Sip River

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