

Physical habitat quality assessment of three ephemeral streams of Lakhimpur, north-eastern India

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ABSTRACT

This work was, mainly, intended to assess the habitat quality in relation to seasonal variation. Studied three streams were remaining dry during winter and pre monsoon season. A numeric evaluation of habitat by assessing 8 components of habitat was measured using a scoring system of 1 to 20 points for each parameter showed that ranking status of all the three ephemeral streams was optimal.

Key words: Ephemeral streams, habitat quality

INTRODUCTION

Ephemeral streams are watercourses that do not have surface water flow for the entire year and provide a crucial source of water in otherwise dry landscapes and so are of great importance to consumptive, environmental and recreational water users. Ephemeral channels show evidence of fluvial processes but have flows only during and shortly after precipitation events [3]. Many ephemeral stream channels in arid and semi-arid climates are characterized by relatively short periods of flow followed by longer no-flow periods [1] Physical habitat features are some important factors that influence the biotic potential and considered to evaluate health of such ephemeral streams. Habitat assessment can be defined as the evaluation of the structure of the surrounding physical habitat that influences the quality of the water resource and condition of the aquatic community, [4]. Both the quality and quantity of available habitat affect the structure and community of resident biological communities. Habitat parameters are evaluated as they relate to overall aquatic-life use and as a potential source of limitation to the aquatic biota [2]. The presence of quality habitat is a critical factor in the health and diversity of the biological community. The present study involves visual examination of several physical parameters of the stream to determine whether the site is able to sustain a suitable habitat for macrohabitat, fish and other aquatic organisms.

MATERIALS AND METHODS

STUDY AREA

The three different ephemeral streams viz. Bagh Jan, Singi Jan and Ghagor basti are located about 20-25 km away from North Lakhimpur of Assam, North-Eastern India. Bagh Jan lies within the geographic coordinate of 27°26'52" N latitude and 94°12'59" E longitude, while Singi Jan is located within 27°26'70" N latitude and 94°12'86" E longitude. Another stream, Ghagor basti lies between geographic coordinate of 27°26'608" N latitude and 94°12'691" E longitude (**Fig. 1**).

METHODS

The physical habitat assessment was performed by using guidelines of [5]. Several parameters such as In stream habitat, Epifaunal substrate, Embeddedness, pool quality, riffle quality, Bank stability, Channel flow status, Sediment deposition were scored based on visual observation. The assessment of each parameter was done for a period of one year, from September 2011 to August 2012. The observations were recorded on seasonal basis, i.e. .Pre monsoon (Mar-May) Monsoon (Jun-Aug) Post monsoon (Sept-Nov) and winter (Dec-Feb).

The methods used in assessment of habitat quality are based on a numeric evaluation of habitat [5]. Here 8 components of habitat are measured using a scoring system of 1 to 20 points for each parameter. Each of the parameter was ranked as Optimal, Suboptimal, Marginal, or Poor, and given a score. A “Poor” ranking is between 0-5, “Marginal” is 6-10, “Suboptimal” is 11-15, and “Optimal” is 16-20. The last parameter i.e. bank stability are ranked on a 0-10 scale, with each bank of the stream considered separately, resulting in a total score out of 20. The individual scores for each portion were added to give the overall score for the stream at that particular site. A stream with a high score on this portion of the assessment likely provides a suitable habitat for a wide range of organisms, whereas a low score indicates a higher degree of human interference and a lower quality environment [5].

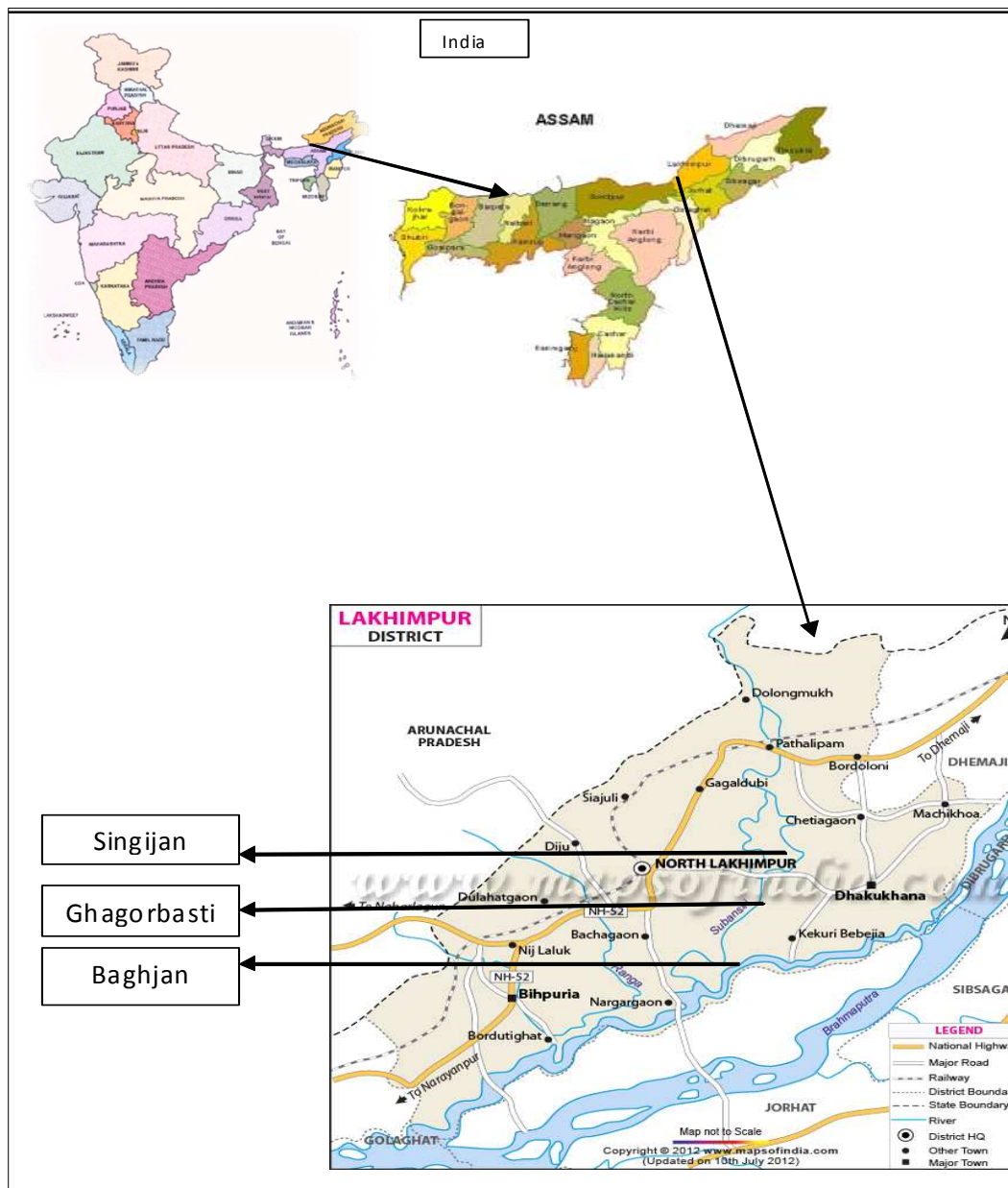


Figure 1: Map showing three sampling stations

RESULTS AND DISCUSSION

The qualitative analysis of various physical habitat parameters of the three streams recorded during the study period is represented in table 1. All the three streams were remaining dry during winter and pre monsoon season.

In Bagh Jan in stream habitat quality was found to be in optimal range during post monsoon and suboptimal range in monsoon. In Singi Jan this parameter was found in optimal range in monsoon and post monsoon. In Ghagor basti, it was in high end of suboptimal range in monsoon and optimal range in post monsoon.

Epifaunal substrate was found in lower end of optimal range at post monsoon while high end of suboptimal range at monsoon in Bagh Jan. In Singi Jan this parameter was found to be in optimal range in post monsoon and suboptimal range in monsoon, while in Ghagor basti it was found in optimal range in post monsoon and suboptimal range in monsoon.

Embeddedness was found to be in optimal range in post monsoon and suboptimal in monsoon in Bagh Jan. In Singi Jan it was found lower end of optimal range in post monsoon and higher end of suboptimal range in monsoon, while in Ghagor basti, embeddedness was found to be in optimal range in post monsoon and lower end of optimal range in monsoon.

Pool quality, another important in stream feature was found to be remaining in suboptimal range in post monsoon and optimal range in monsoon in Bagh Jan. In Singi Jan, this parameter was found optimal range in both post monsoon and monsoon. In Ghagor basti, this parameter showed suboptimal range in post monsoon as well as monsoon period.

In Bagh Jan, riffle quality showed optimal range in both post monsoon and monsoon period while in Singi Jan and Ghagor Basti quality of riffle showed optimal range in both, post monsoon and monsoon period.

Channel flow status showed optimal range in post monsoon and suboptimal range in monsoon in Bagh Jan. In Singi Jan, it was found optimal range in post monsoon and suboptimal range in monsoon while in Ghagor basti, channel flow status showed optimal range for both post monsoon and monsoon.

In Bagh Jan, optimal range was found for sediment deposition in monsoon and a upper ends of suboptimal range in post monsoon. Singi Jan showed optimal range for monsoon and suboptimal range for post monsoon. In Ghagor basti a optimal range was found for both post monsoon and monsoon.

Bank stability showed suboptimal range for post monsoon and monsoon in Bagh Jan and Singi Jan, while it was found to be in optimal range for post monsoon and monsoon in Ghagor basti.

The results of the habitat assessment show that all three streams were at the high end of the optimal range (Table 1) in Monsoon. Bagh Jan and Singi Jan showed high end of suboptimal range during post monsoon but optimal range in Monsoon. In Ghagor basti optimal range was recorded during post monsoon

TABLE 1: Seasonal variation of habitat assessment score in the three study sites (SEP, 2011-AUG2012)

Parameters	Post monsoon,2011			Monsoon,2012		
	Study Areas			Study Areas		
	Bagh Jan	Singi Jan	Ghaogor Basti	Bagh Jan	Singi Jan	Ghagor Basti
Instream habitat	18	18	18	14	16	15
Epifaunal substrate	16	17	18	15	15	14
Embeddedness	18	16	17	14	15	16
Pool quality	12	16	14	19	17	15
Riffle quality	16	16	17	19	17	18
Channel flow status	12	11	17	18	19	19
Sediment deposition	15	15	18	17	18	19
Bank stability	7 (LB) 8 (RB)	7(LB) 6(RB)	9(LB) 9(RB)	7(LB) 8(RB)	7(LB) 6(RB)	9(LB) 9(RB)
Total Score	122	122	137	131	130	134
Average Score	15.25	15.25	17.12	16.37	16.25	16.75

LB=Left bank, R.B=Right bank

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