



# Urban environment and sustainable water supply: a comprehensive analysis of Darjeeling city, India

Kaberi Koner<sup>1</sup> · Gopa Samanta<sup>1</sup>

Received: 16 November 2019 / Accepted: 2 April 2021  
© The Author(s), under exclusive licence to Springer Nature B.V. 2021

## Abstract

This article is an attempt to analyse the link between the condition of city environment and availability of water in Darjeeling city. Darjeeling, located in the Eastern Himalayan Region of India, is such a city which faces acute water scarcity in most part of the year, except during monsoon. The city cannot use ground water directly, and there is no river as source of water as well. It only uses spring water and rain water. The climatic condition and local environmental conditions have higher control over the availability of daily water. This article analyses the city's 100-year climatic conditions as well as the condition of vegetation cover and built-up areas using NDVI and BUI methods, respectively. The present study explores that the deterioration of natural environmental conditions and increasing demand from both the permanent population and transitory population accelerate the intensity of water scarcity. Measuring the fluctuation of discharge (during pre-monsoon and post-monsoon period), the paper discusses how except in monsoon, most of the spring's discharge gets reduced and increases the level of water stress in the city. Using quantitative methods, this empirical study explores that the loss of vegetation and haphazard constructions have enormous impact on the fragile hill ecosystem and reduce the rate of infiltration of water in the sub-surface zones, thus reducing the discharge ultimately. Therefore, the study recommends immediate actions to protect the city environment and to revive those springs for the city's water security.

**Keywords** City environment · Water scarcity · Natural springs · Darjeeling

## 1 Introduction

Water essentially is a part of the natural environment, and a positive environmental condition ensures the availability of water to a great extent. If environmental perspectives are not included within the framework of governance, it makes the way for social disruption following the environmental deterioration. Mountain ecosystems are the sources of many

---

✉ Kaberi Koner  
kaberikoner.geo@gmail.com

Gopa Samanta  
gopasamanta@gmail.com

<sup>1</sup> Department of Geography, The University of Burdwan, Burdwan, West Bengal 713104, India