

Title: An Integrated Health Assessment of an Agriculture-Dominated River Basin in India

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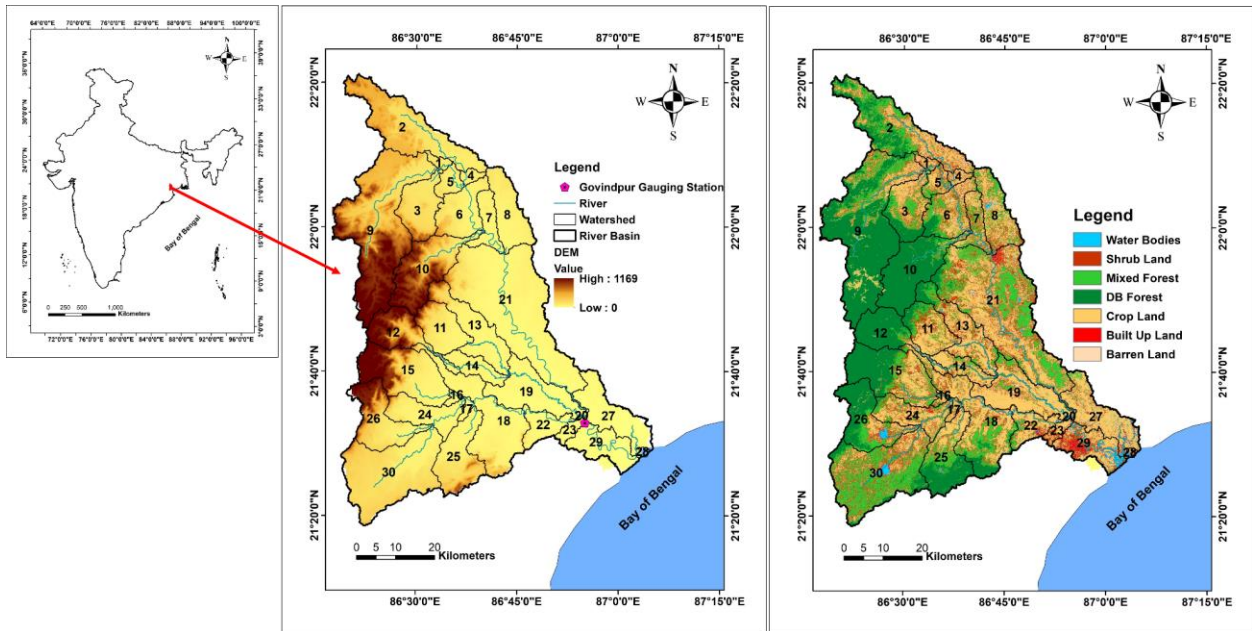
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Abstract:

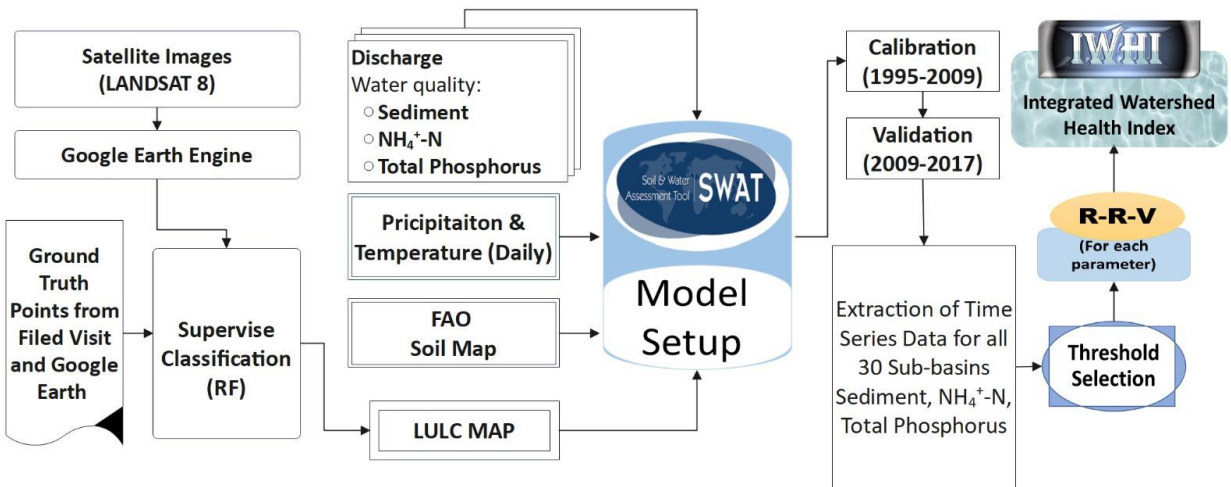
Watersheds are geographically distinct landscape features with complex webs of interactions among physical, ecological, and social factors. Thus, watersheds are complex and dynamic systems. In addition, watersheds offer a variety of ecosystem services that are crucial for society. Their ability to deliver these services is determined by the current state of the watershed. Therefore, the watershed health assessment is essential for the efficient management of the watershed. The purpose of this research is to comprehensively evaluate the watershed health using a risk-based (Reliability-Resilience-Vulnerability) framework for the 30 watersheds of the Budhabalanga River basin in India. To accomplish this hydrological modelling with Soil & Water Assessment Tool (SWAT), a remote sensing approach and field data have been used. The SWAT model is calibrated from 1995 to 2009 and validated from 2010 to 2017 with $NSE > 0.65$, $R^2 > 0.70$, and $PBIAS < \pm 10$. To determine the three most important sub-indicators of watershed health i.e., reliability, resilience, and vulnerability (R-R-V), suitable criteria and acceptable thresholds are taken into account. Using the sub-indicators an Integrated Watershed Health Index is developed for all watersheds during the period 2000 to 2020. Further, the change detection approach is used to study the temporal variation of watershed health during the last two decades. The study revealed that the upstream watersheds are healthier than the other watersheds. In addition, the study will be useful for the watershed managers of the Budhabalanga River basin to prepare a strategic road map for sustainable watershed management. The proposed method can be used as a handy tool for watershed health assessment for any other watershed.

Keywords: Watershed Health, Reliability-Resilience-Vulnerability, SWAT, Remote Sensing

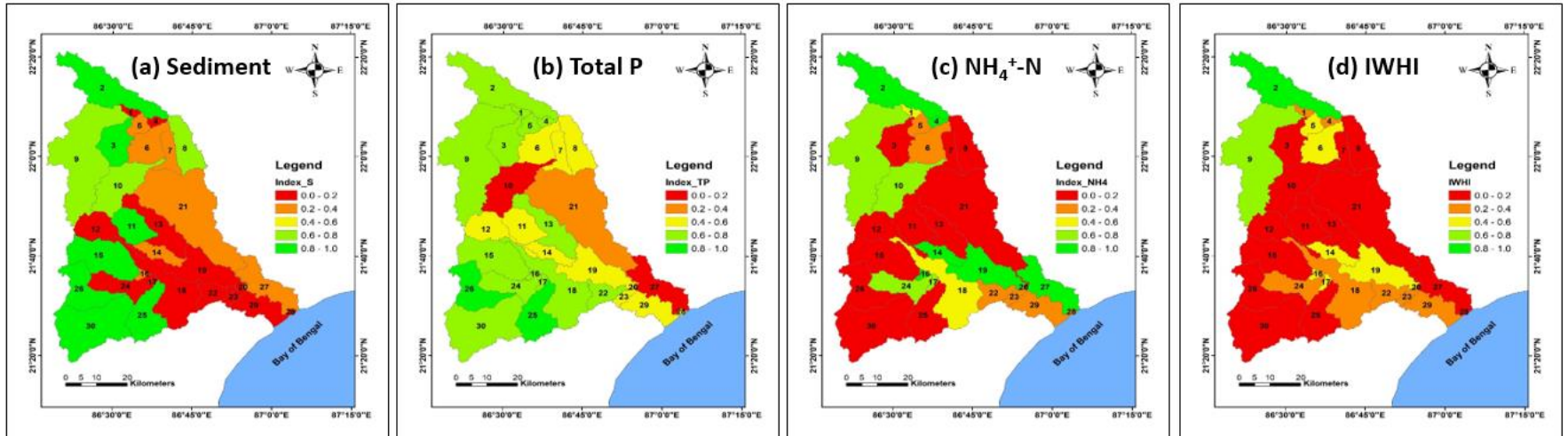
Study Area



Methodology



Results



0.0 - 0.2	0.2 - 0.4	0.4 - 0.6	0.6 - 0.8	0.8 - 1.0
Very Poor	Poor	Average	Good	Very Good

Key Findings

- Most of the watersheds present in the middle part (Agriculture dominated area) of the river basin show very poor health conditions and warrant necessary actions.
- The study revealed that the upstream watersheds are healthier than the other watersheds.
- In addition, the study will be useful for the watershed managers of the Budhabalanga River basin to prepare a strategic road map for sustainable watershed management.
- The proposed method can be used as a handy tool for watershed health assessment for any other watershed.
- Integration of more parameters will provide a holistic picture of the watershed health.