Assessment of Decadal Changes in Water Yield in the Doon Valley: Implications for Watershed Management

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Abstract

Water yield, the volume of water that flows out of a specific area over a defined period, is a critical component of watershed management and planning. Understanding changes in water yield is essential for sustainable water resource management, especially in regions like the Doon Valley, where water availability is crucial for various purposes such as agriculture, industry, and domestic use. Remote sensing and GIS equipped data provide valuable tools for assessing water yield changes over time, offering insights into the dynamics of water resources.

Methodology

In this study, we utilized remote sensing and GIS techniques to assess changes in water yield in the Doon Valley over the past decade. The Doon Valley, located in the Indian state of Uttarakhand, is a region of significant ecological importance and faces challenges related to water scarcity and land use change. By analyzing water yield changes, we aimed to contribute to a better understanding of the hydrological dynamics in this region and provide valuable information for water resource management and planning.

To conduct our analysis, we prepared datasets for the years 2009 and 2019, including data on water demand, Digital Elevation Model (DEM), land use/land cover, vegetation, and rainfall. These datasets were processed using geospatial tools to ensure consistency and accuracy. The datasets were then harmonized and standardized to serve as input for the InVest model, a powerful tool for ecosystem services assessment. The InVest model was configured to analyze water yield changes in the Doon Valley, taking into account the effects of land use change, vegetation cover, and other factors.

Findings/Results

Our analysis revealed significant changes in water yield in the Doon Valley over the past decade. These changes were primarily driven by changes in land use, with areas undergoing urbanization and agricultural expansion experiencing a decrease in water yield. Conversely, areas with intact forests and natural vegetation showed relatively stable water yield. Statistical tests were conducted to assess the significance of these changes, confirming the impact of land use change on water yield in the region.

The findings of our study have important implications for water resource management and planning in the Doon Valley. The results highlight the need for sustainable land use practices that preserve natural vegetation and minimize the expansion of urban and agricultural areas. Additionally, the study demonstrates the value of remote sensing and GIS techniques in monitoring and assessing water resources, providing valuable information for policymakers and stakeholders.

Conclusion

In conclusion, our study contributes to a better understanding of water yield dynamics in the Doon Valley and demonstrates the importance of incorporating remote sensing and GIS techniques into water resource management practices. By understanding the factors influencing water yield, we can develop more effective strategies for sustainable water management in the region, ensuring the availability of water for future generations.

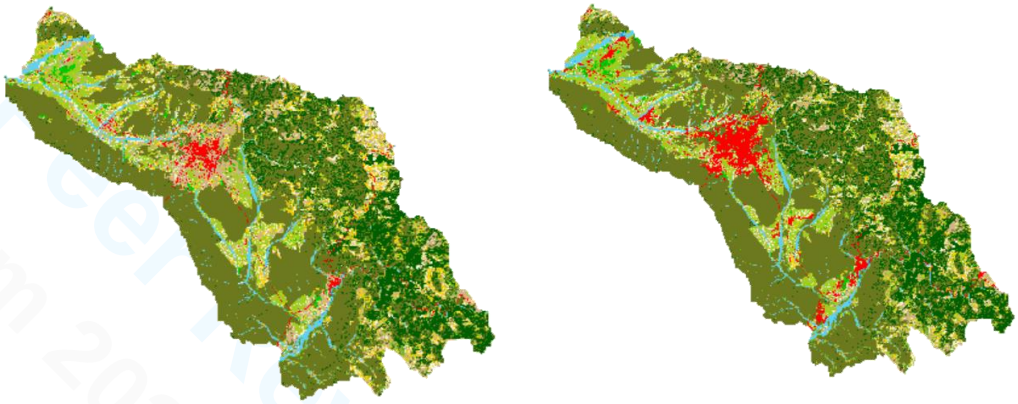

Figure 1. Representing Landuse and Landcover of Doon valley for year 2009 and 2019.