METU Environmental Engineering
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Application of Deep Learning in Modeling Anthropogenically-Impacted Rivers' Flowrate under Food-Water-Energy-Ecosystem Nexus Approach

Abstract: Modeling the flow rate of rivers that are significantly influenced by anthropogenic activities, is typically a struggle in the face of traditional hydrological models. Anthropogenic impacts on rivers cannot be adequately explained by meteorological data and river hydraulic features alone, particularly when human activities profoundly alter the natural flow and quality of water bodies. Addressing this gap, this research employs deep learning techniques to integrate socio-economic indicators with traditional hydrological data, providing a more comprehensive understanding of human impacts on river ecosystems.

The core innovation of this approach lies in the utilization of the Food-Water-Energy-Ecosystem

(FWEE) Nexus to guide the selection and integration of relevant socio-economic indicators. By incorporating these factors into a deep learning model, it will offer a robust method for predicting river flow rates over the long term in regions where anthropogenic activities are predominant drivers of hydrological change. This approach has been initially applied to a specific river system with varying levels of anthropogenic stress and metrological conditions, demonstrating improved accuracy over traditional models in predicting flow rates.

This research not only highlights the potential of deep learning methods in environmental modeling but also underscores the importance of integrating multiple dimensions of human activity into hydrological studies under the FWEE Nexus approach.

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