IWRM2018-10-1
8th International Water Resources Management Conference of ICWRS

Predicting future land cover change and its impact on streamflow and sediment load into Son La Reservoir in a trans-boundary river basin

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We developed an integrated approach to predict land cover for 2050 in the Da River Basin in China and Vietnam to analyze future land cover change impact on the streamflow and sediment load. The framework uses land use change model and ecological model to forecast land cover and leaf area index based on historical land cover changes. Modeled land covers are used as inputs to a calibrated distributed hydrological model and new sediment simulation model to assess hydrological changes and sediment load in the basin. Results show that deforestation likely to continue and forest area will decrease by 21.3% by 2050. Croplands and shrublands will increase by over 11.7% and 10% respectively by replacing forests. Streamflow and sediment load will generally increase due to future land cover change in Da River Basin in 2050s in both wet and dry seasons, especially in wet season. Predicted annual sediment load is predicted to increase by about 9.7% at the Lai Chau station, shortening lifespan of the recently constructed Son La Reservoir due to increased sediment load and reservoir siltation. The integrated modeling approach is essential for comprehensive evaluating land/forest cover change effects on river discharge and sediment load to understand human impacts on the river environments and design watershed management policies.