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# Modelling land use scenarios and consequences on watershed services at the Thadee watershed, Thailand

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## Abstract

The Thadee watershed, covering 112 km<sup>2</sup>, is the main source of water agriculture and household consumption in the Nakhon Srithammarat, Thailand. Natural forests in the watershed have been degraded and transformed to fruit tree and rubber plantations. These activities have resulted in landslide and flooding. This research predicts how further land-use/land-cover changes during 2009–2020 and changes in rainfall scenarios may influence water yield and sediment load in the Thadee River. Local stakeholders defined three different land use scenarios, namely trend, development and conservation. Spatially explicit empirical models were used to allocate future land demands and to assess the contributions of separated and combined effects of land use and rainfall changes. On both ecosystem services. A large expansion of rubber plantations in the upper sub-watersheds under the development land use scenario. A reduction of the current annual rainfall by 30% would decrease the predicted water yields by 38% from 2009. In contrast, an increase of 36% with respect to current rainfall would amplify runoff by 50% of the current runoff. In addition, very high sediment load and runoff levels were predicted under a combination of development and extreme rainfall scenarios. Three conservation activities—protection, reforestation and a mixed-cropping system—are proposed and optimized distributed in the watershed landscape according to the allocated budget in order to have the greatest impact on watershed services of the Thadee watershed.

**Keywords:** Thadee watershed, scenarios, models, watershed services

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