



Integrating feedbacks from a hydrologic model into a land use model to improve model predictions

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Integrated environmental modeling approaches are in need to take feedbacks into account when assessing the impacts of land use change on hydrology. Particularly for disciplines like hydrology and land use science, which are interdependent and for which processes act on similar scales, model integration, coupling or close exchange seem indispensable. In this study, we link a hydrologic model to a land use model by integrating spatial predictions of hydrologic variables as provided by the hydrologic model into the land use model for a rapidly urbanizing catchment in India. The benefits of this integration are quantified by comparing predictions of a land use model that uses a basic set of explanatory variables to a land use model that additionally uses the modeled hydrologic variables. Our results indicate that the integration of the hydrologic variables improved the model accuracy indicated by overall accuracy (+3 and +4 percentage points (pp)), class specific user and producer accuracies (up to +8 pp) and figure of merit (+4 and +5.3 pp) when compared with land use classifications at two points in time. Moreover, the land use patterns show that the integration of the hydrologic variables helped to avoid allocation errors. The established link between the hydrologic and the land use model is very promising as it will allow for model coupling in the future.