

Impacts of land use change on streamflows in the Damansara watershed, Malaysia.

ABSTRACT

Land-use change has significant impacts on hydrologic processes at the watershed level. In this study, hydrologic models and spatial data were used to assess the effects of land-use changes and predict the effects of two future land-use scenarios on the flood regime of the Damansara Watershed. Due to urban growth, the Damansara Watershed has seen increasing streamflows and experienced occasional flooding. The hydrology was modeled using the Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS) model, and land-use changes were quantified with land-use maps. Actual storms were used to calibrate and validate HEC-HMS rainfall-runoff model. The calibrated HEC-HMS model was used to simulate future streamflows and to forecast the impact of land-use changes on downstream peak streamflow. The model also estimated the contribution of individual sub-basins to downstream peak streamflows of the entire watershed. The model predicts that changes in land-use will increase the peak streamflow, and the increase is directly proportional to the rate of urbanization. It was found that the sensitivity of the hydrologic response to land-use change increases as the recurrence interval of rainfall events decreases, and that those impacts are more pronounced in different sub-basins. The results of this study provide support for land-use planning and the management of watersheds.

Keyword: Land-use change; Peak flow; Hydrologic modeling; HEC-HMS; Urbanization.