Ajit Kumar Rudra 2006: Impacts of Land Use Evolution on Streamflow and Suspended Sediment in Pasak Basin, Thailand. Master of Science (Tropical Forestry), Major Field: Tropical Forestry, Interdisciplinary Graduate Program. Thesis Advisor: Professor Nipon Tangtham, Ph. D. 161 pages.
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This study on the impacts of land use evolution on streamflow and suspended sediment in Pasak Basin was conducted in three parts namely - upper part, small catchments in the middle part and lower part of Basin - using historical observed streamflow, sediment and rainfall records of Royal Irrigation Department during 1980-2004 and land use types interpreted from satellite imagery with GIS. Markov chain model was employed to simulate the land use evolution between this period in terms of forest, agricultural, water, urban and miscellaneous areas. Stepwise multiple regression analysis was used to detect their impact and to obtain representative prediction models for the three investigated parts of Pasak watershed. Flow timing pattern was also investigated in terms of flow interval parameter including quarter flow, half flow, 5% and 1% flow interval and flow date parameter including quartile flow, half flow and 3rd quartile flow date using time series analysis based on daily discharge data obtained from three stations of Royal Irrigation Department for the best available period.

It was found that changes in land use pattern during the mentioned period resulted in the decrease in forest area from 30.89% to 23.27% in the whole Pasak Basin while the agricultural, urban and water bodies were gradually increased from 65.48% to 73.29%, 0.14 % to 0.83% and 0.05% to 1.31% respectively. Miscellaneous land including bare and grass land also decreased from 3.43% to 1.29%. Most of the forest areas were found converted to agricultural and urban areas. Trend of land use evolution during the mentioned period derived from Markov chain model showed increasing trend of agricultural area and decreasing trend of forest area. Streamflow characteristics in all three investigated part of Pasak Basin showed that about 90% of annual flow was occurred during wet period while only 10% flowed in dry season. Streamflow timing investigation revealed that for upper Pasak the period during which 25% and 50% of the annual flow occurred was becoming shorter and the period during which 5% and 1% flow occurred was becoming longer comparing with middle and lower part of Pasak indicating more water shortage in the dry season. It was found from studying the relationship among all variable employed in the study (rainfall, wetflow, dry flow, peak flow, land use types) that rainfall showed high positive correlation with wetflow as R^2 = 0.84 for upper Pasak and same value of R^2 was found for lower Pasak before dam construction. Streamflow specially dryflow in the upper part of Pasak was found to be increased by increasing the forest area while no effect in the lower and middle part of Basin. Land use change increased suspended sediments in the upper part of Pasak but no effect was found in the middle and lower part of Pasak though suspended sediment was found decreased with decreasing wetflow.

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