

The effect of development and land use change on rainfall-runoff and runoff-sediment relationships under humid tropical condition : case study of Bernam watershed Malaysia.

ABSTRACT

Study of the land use changes and their effects on runoff and sediment patterns for the watershed level are essential in water resource planning and management. This study provides an approach to identify the effects of land-use changes on rainfall-runoff and runoff-sediment relations in humid tropical region. For this purpose Bernam watershed located in Selangor state of Malaysia which is subjected to rapid land-use changes to residential and agriculture has been selected. The study was based on the comparison of the effect of land-use changes during two periods, 1980s and 1990s. The study objectives were to identify the change of land-use in the years of 1989 and 1998 and analyze its effects on rainfall-runoff and runoff-sediment relationships. In this study, double mass curve with trend curve have been used to examine the effect of land use changes on rainfall-runoff and runoff-sediment relationships. The results showed that the land-use change can be considered as main reason for increased runoff and sediment in tropical regions where the change in rainfall amount can be neglected. Land use changes altered the rainfall-runoff and runoff-sediment relationships and lead to higher slope for the trend (STC) of annual rainfall-runoff mass curve and runoff-sediment mass curve in 1990s than those in 1980s. It is implied that more runoff and sedimentation occurred in 1990s. Hence in order to reduce flood occurrence and sediment increases due to land-use changes, planners should consider tighter and straight control measures to be part of any watershed development plan in the future.

Keyword: Double mass curve; Land-use change; Rainfall-runoff; Runoff-sediment; Slope of Trend Curve (STC).