

INVESTIGATION OF HYDROLOGICAL RESPONSES TO LAND USE CHANGES  
IN TWO SUBCATCHMENTS OF THE UPPER MAHAWELI CATCHMENT

By

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## ABSTRACT

Accelerated Mahaweli Development Programme (AMDP) was implemented to effectively utilize water resources in the Upper Mahaweli Catchment (UMC). The objectives of the AMDP are hydropower generation, increase food production by diverting water into the dry zone, increase employment opportunities, etc. The success of the programme objectives to a greater extent depends on the water resources of the UMC. However, land use changes of the UMC can obviously have an impact on these water resources. Hence, this study was focused on to investigate hydrological responses to land use changes and to evaluate the impact of such changes.

Randenigala and Kotmale subcatchments were selected as study areas. Trends and shifts (jumps) of rainfall and water yield were tested by time series analysis. Land use changes were assessed from 1956 to 1992 through a Geographic Information System (GIS). Then the hydrological responses to land use changes were investigated through the analysis of runoff-rainfall relationship.

The results of the time series analysis revealed that rainfall regime of the study area is neither increasing nor decreasing for the considered period although there are few anomalies in certain years at certain locations. The similar situation was observed in the flow regime.

Land use change detection revealed that the tree cover has increased by 8.45% in Randenigala subcatchment. This change is due to the establishment of Victoria,

*Randenigala and Rantambe (VRR) sanctuary in 1987. The tree cover has decreased by 8.62 % in Kotmale subcatchment. The decrease in tree cover seems to be the result of decreasing tea lands due to nationalization of tea industries in 1975. The other land use changes could be considered as marginal in both subcatchments.*

*It is observed that possible implications of expansion and reduction of tree cover on water yield were not significant up to 1996 during both rainy seasons and dry seasons. The reasons could be that the magnitude of change, was not sufficient to increase wet flows or decrease dry flows at a subcatchment level. Further, length of data series after the AMDP is not sufficient enough to investigate the impacts of changed tree cover. However, due to estimation errors or some other unaccountable reasons a few anomalies are observed in data analysis.*

*The results of the rainfall–runoff correlation and runoff-rainfall ratio show that there were no considerable impacts of land use changes on water yield in the study area after the AMDP. The changes of hydrological regime may not be visible due to the short time span of the data.*

*The information derived from this study could be used in land use planning and water resource management for long term sustainability of water resources of the subcatchments. Further studies are recommended with long term hydrological records after 1985 period at a micro catchment level.*