



THE FIFTH INTERNATIONAL RESEARCH CONFERENCE  
ON  
HUMANITIES AND SOCIAL SCIENCES  
(IRCHSS – 2016)

*"Transformation for Empowerment: Moving beyond Buzzwords"*

CONFERENCE PROCEEDINGS

10<sup>th</sup> & 11<sup>th</sup> November, 2016

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## Modeling for River Basin Management: Its application to Mi Oya in the Dry Zone of Sri Lanka

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Sri Lanka has 103 river basins that have water flows starting from the central highland. Most of the river basins have already been used for many purposes such as irrigation, hydro-power generation, industries and urban water supplies. In addition, the most upper basins have undergone high utilization by human activities such as upland cultivation, river water withdrawal, road construction and human settlements.

From a hydrological point of view, all these activities directly and indirectly affect the stream water flow to the lower basin. In the case of Mi Oya, for a long time, it has been evident that there is a lack of water for a number of large irrigation reservoirs and hundreds of small tanks located in the lower basin. Hydrologically, the upper catchment is the main source of water to the main flow in turn to the lower basin. When water from the upper catchment is drastically changed, it affects the lower basin water use. Thus, it is essential to adopt a better water management system. Based on this concept, a model for basin management was built up using hydrological parameters and socio-economic data, derived from a research carried out from 2010 - 2015. The model was applied to the Mi Oya upper basin and explored how basin water balance has been affected by human interference. This paper first presents a model developed, and afterwards discusses what measures should be adopted to support more water to be drained to the lower stream. Hydrological parameters namely rainfall, temperature and evaporation were collected from the nearest stations in addition to site measurements in the field. Catchment water yield (Wy) was done by using formula  $Wy = (P - E) \times A$  where P, rainfall E, evaporation A, area of the catchment. Water discharge (Q) of the streams was computed using floating method  $Q = V_a \times A$  where  $V_a$  flow velocity where A cross-section of the stream x depth. Adequacy of water in the reservoirs was calculated by water level studies of reservoirs together with farmer's experiences. It was revealed that the total volume of water produced by the upper catchment has been considerably (40%) decreased due to human activities. The prominent activity is the blocking out of small streams by farmers for their own purposes such as the construction of private tanks and newly made paddy fields. It is also evident that removing vegetation cover for chena cultivation has caused higher water evaporation from the soil resulting in low water discharge to the drainage system. The model proposed measures three types mitigations, improving and controlling to ensure the increase of water derived from the upper basin to the lower basin.

**Keywords.** Basin management, Water yield, Dry Zone