SUSTAINABLE WATER RESOURCES MANAGEMENT FOR OPTIMUM UTILIZATION OF WALAWE RIVER BASIN

BY

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A thesis submitted to the University of Moratuwa in partial fulfillment of the requirements for the degree of Master Engineering of Environmental Water Resources Engineering and Management in the Department of Civil Engineering

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June 2008

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This is to certify that I have examined the above ME thesis
and have found that it is complete and satisfactory in all aspects,
and that any and all revisions required by
the thesis examination committee/supervisor have been made.

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Finally, I believe that this study will be very useful for the sustainable water resources management within the Walawe catchment.

ABSTRACT

The basin is undergoing extensive changes due to agro-ecological, socioeconomic and institutional developments. Livelihoods vary from area to area depending on the physiographic conditions and availability of land and water. Irrigation development has been the major strategy for livelihood enhancement of the people in the basin.

However, tea plantations have replaced the natural vegetation that covered the mountains in the past and abandoned tea lands have been degraded by severe soil erosion. Newly introduced trees like pine and eucalyptus were planted under reforestation programs in the 1950s in this area . They have had a negative impact on the hydrology of the basin, causing some small streams to dry up.

The increasing trend of agro-chemicals usage for irrigated agriculture by the basin farmers is likely to have adverse impacts on the biodiversity of the lagoons. Irrigation development has had negative impacts on the aquatic environment also. Specially, large scale deforestation, removal of vegetation cover and encroachment of reservations and other conservative areas within the basin have drastically reduced watershed performance and environmental friendly behaviors which have severely affected the maximum efficiency of the catchments. An increasing competitive usage of water resources by several sectors can also be seen within this basin.

An accurate topographical maps to scale 1:50,000 have been used to digitized the basin and it's sub catchments using Geographic Information System (GIS). Divisional Secretariat Divisions (DSD) falling into the Walawa basin and different types of land usages in the basin were identified using Multi Layer Analysis in GIS – Geoprocessing.

To obtain an average rainfall value over the catchmen and sub catchments of Walawa basin, the Thiessen polygon method was used.

The runoff coefficients for the sub catchments Samanalawewa & Udawalawa of the basin were calculated from the daily reservoir water balance computations under some assumptions for the period.

Irrigation recharge contribution to ground water were also calculated. But, in this study, river recharges were not calculated due to the non-availability of required data. Ground water withdrawal for each seasons were also calculated separately for each zone.

Human, livestock, agro and industrial water consumptions were also calculated under some assumptions from year 2000 to 2005.

Collected the necessary data and information required for the identification of mitigatory measures towards watershed protection to promote soil and water resources conservation within the basin.

Therefore, the output objectives are directly related to draw our attention to identify the suitable strategies for the equitable, efficient and effective water resources management and watershed management practices preserving soil, water and other natural resources, reducing waste to a minimum and meeting the water requirement of a given demand site. This will be very useful for the sustainable development of the basin.

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AET	-	Actual Evapotranspiration
CEA	-	Central Environmental Authority
CEB	-	Ceylon Electricity Board
ID	-	Irrigation Department
JICA	-	Japan International Cooperation Agency
JBIC	-	Japan Bank for International Cooperation
LBMC	-	Left Bank Main Canal
MASL	-	Mahaweli Authority of Sri Lanka
MCM	-	Million Cubic Meters
OFC	-	Other Field Crop
PET	-	Potential Evapotranspiration
RBMC	-	Right Bank Main Canal
WMS	-	Water Management Secretariat