ASSESSMENT OF WATER RESOURCES: A SYSTEM DYNAMICS APPROACH

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An accurate assessment of available water resources and prediction of its use is vital in planning and implementing water resources development activities in a country. Traditional approach used in this process is based on projections of population growth, unit water demand, agriculture production, industry growth, etc. These projections were used to estimate future water demand and water balance. Future water projections are variants of current trends and as such are subject to considerable uncertainty. Dynamic character of main variables such as climatic change, socio-economic change, institutional change, environmental change etc., and how they affect water use in future are not captured in the traditional approach. Therefore, the prediction of future water use and balance is subject to a wide margin of error. In contrast, a novel approach, "system dynamics" offers a new way of modeling the future dynamics of complex water systems increasing the ability to correctly assess and predict availability, use and balance of water, which enhances sustainable management of water resources.

System dynamics is a theory of system structure and a set of tools for representing complex systems and analyzing their dynamic behavior. The most important feature of system dynamics is to elucidate the endogenous structure of the system under study, to see how the different elements of the system actually relate to one another, and to experiment with changing relations within the system when different decisions are included. A system dynamics simulation model developed relating water to all other relevant sectors such as social and economical systems, technology and natural environment in the country would help in identifying water related issues of national priority and can assist policy makers in evaluating sustainable solutions for 'troubled' waters in Sri Lanka.

A system dynamics based simulation model that integrating water with other related sectors is developed to assess water resources and to study relation between water availability and different aspects of development policies in Sri Lanka. The model was calibrated using data, such as meteorological data, land use, population data etc., for a ten year period and verified for a period of four years. The developed model could be used to predict water availability in Sri Lanka at district level, which will be useful in making various development policy decisions.