An Overview of Surface Water Modelling Applications in Sri Lanka

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Numerical models have been used in civil engineering hydraulics from the 1960s. This work was done mainly in conjunction with university research. However, the widespread practical application of these models did not take place until the 1980s. In the 1990s, the use of mathematical modelling has become a standard tool in many investigations and planning exercises in hydraulics and water resources engineering. Such models were introduced to Sri Lanka in the late 1980s and have now become an often-used tool, particularly at Lanka Hydraulic Institute (LHI). This paper provides an overview what has been done, mainly in Sri Lanka, at LHI.

The paper describes two types of models, one-dimensional river network models used in flood simulations and forecasting and two-dimensional modelling used mainly in shallow coastal reaches and estuaries. This paper does not deal with hydrological modelling or ground water modelling. Neither does it deal with longshore sediment transport modelling which is a widely used and very important tool in Sri Lanka.

One dimensional river network modelling was introduced as a practical application in the Kelani Ganga Flood Study where the flood conveyance/storage properties of the Kelani Ganga Basin was modelled in its present deepened (after excessive sand mining) form and in the original state it was in during the 1947 flood. The flood risk was reassessed in today's context of developing infrastructure in the flood plain. This model, in its two-layer form is later used to estimate salinity intrusion.

Two-dimensional models have been used widely in the computation of wave propagation inshore from the deep sea and later how they penetrate into harbours. The hydrodynamic and sediment transport models have been used to estimate the impacts of wind and wave driven currents superimposed on tidal currents. Recently, the impacts of cyclone driven currents and waves in the presence of sea surface elevation has been studied in connection with Oluvil Harbour have been studied.

The applicability of various types of models and the overwhelming need for good field data have been emphasised.