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SETTING UP OF WRF MODEL FOR DOWNSCALING OF REGIONAL RAINFALL FORECAST TO DEDURU OYA RESERVOIR CATCHMENT IN SRI LANKA

D.S. Sampath[1], S.B. Weerakoon[1], B. K. Mishra[2] and S. Herath[2]

[1]Department of Civil Engineering, University of Peradeniya, Sri Lanka

[2]Institute for Advance Study of Sustainability United Nations University, Tokyo, Japan

Abstract:

The Deduru Oya multipurpose reservoir project has been planned to increase the productivity of irrigated land in the North-Western Province by regulating and diverting the water, flood mitigation in the downstream, hydropower generation and expanding the supply of water for domestic and industrial use. The reservoir supplies water to about 130 small irrigation reservoirs in its basin and the Inginimitiya reservoir in the adjacent basin. Flood inflows into the reservoir need to be effectively utilized by diverting excess flows to these reservoirs. In this study, a regional weather forecast downscaling model is calibrated and validated for the Deduru Oya river basin, and this rainfall forecast coupled to runoff model could be used to forecast flood inflows to the reservoir.

The WRF model is one of the regional weather models used to downscale the predictions from global weather models. The WRF model was applied to downscale selected weather events for predicting rainfall in the basin with numerous combinations of the physics options provided in the model. The predicted rainfall was compared with the observed rainfall at gauging sites by GIS based Inverse Distance Weighting (IDW) technique. The impact of different physics schemes on the predictions of rainfall in the Deduru Oya river basin was investigated by predicting rainfall for selected weather events in the basin and comparing with observed rainfall. The parameters of the physics schemes were optimized to agree the forecast with the observations in the basin. The combination of WSM 3-class simple ice microphysics scheme, thermal diffusion land surface model and Monin-Obukhov scheme clay layer physics and Kain-Fritsch (new Eta) scheme cumulus physics with other default physics options were identified as the most suitable combinations for the Deduru Oya river basin. The calibrated rainfall forecasting model is a useful tool for the reservoir water management under anticipatory high rainfall in the catchment.