

SEASONAL FRESHWATER OUTFLOW VARIATION OF GIN AND NILWALA RIVER BASINS

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River discharge is primarily related to water resource management because it is an important event in the global water cycle. The hydrological processes within a catchment are influenced by land usage, land cover, soil properties, and climate. These factors must be considered when calculating accurate river discharges. This study assessed the seasonal variation of freshwater outflow over 20 years from the Gin, and Nilwala River basins using a rainfall-run-off model developed based on Rainfall-Runoff-Inundation (RRI) software. Daily precipitation, streamflow, pan evaporation, and topography data were used to develop, calibrate, and carry out model runs.

Manning's roughness coefficient for the river (nr) and the slop (ns), soil depth, saturated hydraulic conductivity (ka), and vertical infiltration (ksv) were the calibration parameters of the RRI Model. In addition, deviation of runoff volume (DV), Nash Sutcliffe, Pearson correlation coefficient (R), and root-mean-square error (RMSE) were performed as objective functions in comparing the observed and simulated discharge for the calibration and validation of the model. Because the model cannot predict the sudden peak flow, the model flow upstream does not simulate well with the observed flow, yet the overall model performs well in the calibration and validation process in both catchments.

The Monthly, seasonal, and annual trends of both river basins were analysed from 2001 to 2020. The non-parametric Mann-Kendall approach was used to assess the statistical significance of any positive or negative trends in freshwater discharge. The freshwater outflow increased significantly in June, August, and September in Gin River while the Nilwala river had a significant increasing trend in August and September. While the Nilwala river had a substantial growing trend in the first inter-monsoon, the freshwater output in the Gin River increased significantly during the Southwest monsoon. Besides, neither river's yearly outflow showed any discernible trends. The RRI model is suitable for analysing the total discharge to the sea since inundation is also considered.

Keywords: Freshwater Outflow Variation, Gin River Basin, Nilwala River basin, RRI model, Trend Analysis

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