

Derivation of Synthetic unit hydrograph for Vadamarachi lagoon in Jaffna peninsula by Snyder's method

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Abstract

The Peninsula unlike other parts of the Island completely depends for its water on this rainfall which percolates and is retained in subsoil limestone aquifer and subsequently withdrawn for domestic, agricultural and industrial purposes. A limit for the withdrawing is imposed by the amount put in. Over drawing from the well is disastrous, as it leads to salt water intrusion. Jaffna Peninsula includes two internal lagoons such as the Vadamarachchi lagoon, and Upparu lagoon and an external lagoon, named as elephant pass lagoon. A long stretch of water, forming an internal lagoon almost divides the area into two, with the northern outlet at Thondamannar and southern outlet at Ariyalai, Vadamarachchi lagoon starts at Periyapacchilai as its eastern boundary and enters into the sea in Thodamannar. The unit hydrograph was developed synthetically by Snyder's method for Vadamarachi lagoon assigning appropriate values to the Snyder's constants. Length of basin along the main stream (46.6 km), the distance from the outlet to the centroid of the basin (23.68 km) and area of the catchment (294.4 km²) were taken from the map. Hydrograph characteristics were derived by using standard Snyder's formula.

Results of the developed synthetic unit hydrograph showed that; Time for peak discharge as 31.25 h; unit duration of rainfall excess 5.68 h; the base time as 84.28 h; Peak discharge rate as 19.45 m³/s.; 50% width of the hydrograph as 40.32 h and 75% width of the hydrograph as 22.6 h. Once derived, the unit hydrograph can be used to calculate runoff or flood water from the basin for any precipitation depth and duration. From these predicted or estimated runoff water existing flood control structures could be modified to block fresh runoff water without entering into the brackish lagoon which will increase the thickness of fresh water lens and will automatically avoid the sea water intrusion. This replenishment of the groundwater will assure the population of the area, water for both domestic and agricultural use and to develop non arable lands.

Key words: Synthetic unit hydrograph, Vadamarachi lagoon, Jaffna

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