

Water balance and mean water residence time of the Vembanad Wetland of Kerala State, India

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Abstract The Vembanad Wetland complex of Kerala State in India comprises the Vembanad backwater lake and the deltaic regions of five rivers, which drain into the lake. The wetland has many functions, including flood and pollution control, biodiversity, agriculture, inland navigation and tourism. Artificial impacts including land reclamation and reductions in tidal flushing have led to significant environmental degradation of this wetland complex. This study examines the hydrology of the Vembanad Wetland in terms of river flow variability, seasonal water level variations, residence time and overall water balance. Estimates of water residence time in the Vembanad backwater lake are nearly identical for the scenario of freshwater flows during monsoons and for the non-monsoon scenario, if the lake is left open for tidal flushing. Therefore, one of the strategies for ecological restoration of the Vembanad Wetland is to allow periodic tidal flushing by rescheduling the operation of the Thanneermukkom (TM) barrage during the non-monsoon period. The study also shows that a major share of the freshwater drained into the wetland from the rivers is discharged to the Arabian Sea. Increasing the storage within the river basins is essential for the optimal utilization of river flows and the wetlands' sustainability.

Key words Vembanad Wetland, India; hydrology; hydroperiod; residence time; water balance