

Abstract

Sea level data from Negombo lagoon and from the ocean, outside the lagoon inlet, were analyzed. The open-sea spring tidal range is 0.57 m, whereas the neap tidal range is 0.10 m. In the lagoon, spring tidal range is 0.13 m and neap tidal range is 0.05 m. The lagoon tide is strongly choked because of an inlet channel, through which only a limited water exchange can take place over a tidal cycle. This feature appears also in the form factor and in the choking coefficient; the oceanic tide is mixed, semi-diurnal with form factor of 0.36, while the lagoon tide has a form factor of 1.0. The choking coefficient C_c for the semi-diurnal tide is 0.18-0.25, for the diurnal tide 0.47-0.70.

A model for the lagoon tidal response in relation to the oceanic tide is used to calculate friction coefficients and phase lag. The average drag coefficient was 0.0045 ± 0.002 , the average phase lag 2.5 hrs. The model allows for calculations on how water exchange and salinities vary if the inlet topography or the fresh-water supply changes.

A one year salinity and river discharge series was used to study water exchange. The lagoon salinity varied from 5-30 ‰ for a river input of between $20-225 \text{ m}^3 \text{ s}^{-1}$. The residence time for the lagoon waters varied from 2-11 days. Short residence times occur at high fresh-water discharge. At such occasions the exchange is dominated by estuarine circulation, while for low discharge, the tide is dominating the exchange.

Key words; tidal choking, drag coefficient, water exchange, residence time, Sri Lanka tropical lagoon.