



Explaining the Physical Relation of Estuaries Shape and Bankfull Flood Discharge

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Estimating flood discharge in the tidal region of estuaries is always difficult as most of the available gauging stations are installed much further upstream outside the tidal region. Inside the tidal region, it is hard to observe the river discharge accurately. In the morphology and hydrodynamic studies of estuaries, it is known that river discharge is one of the important parameters. Unfortunately, research on morphology and hydrodynamics in estuaries is done separately. Until today, little research has been done to identify the relationship between these two processes in alluvial estuaries, and to understand why certain relations in nature exist. This study aims to discover the physical explanation for the relation between the geometrical characteristics of estuaries and flood discharge. The relationship between the ideal estuary depth and fresh water discharge was analyzed in 13 estuaries around the world using a stepwise regression and the outcome was compared to Lacey's theory of hydraulic geometry. From the analysis, it shows that the ideal depth of the estuaries is a function to the bankfull flood discharge to the power of $1/3$ to $1/2$ which indicates an agreement with Lacey's formula. In order to verify the accuracy of the relation, more data on the morphology and hydrodynamics are required. Thus, existing and new measurement data from estuaries worldwide will be collected and compiled to strengthen the reliability of the finding.

Keywords: estuaries, geometry, flood discharge, alluvial, tidal