P R E F A C E

Rivers have fascinated generations of hydraulic engineers with their variety of form and behaviour. The large potential benefits of successful river engineering works, combined with the dire consequences of failures, have provided one of the earliest and the greatest challenges to the profession. Today this challenge continues to be met in research on river related processes and by systematic collection of river data. Much progress has been made in both respects but it is the present investigator's contention that the bias of most engineers towards readily quantifiable topics has led to a serious gap in this work, the neglect of interpretative work on the interactions of atmospheric hydrological processes and the river flows.

Many river engineering problems unfortunately lie outside areas where research or routine observations are presently connected and thus have to be solved by a combination of intuition, past experience and interpretation of the physical processes affecting the river systems. Some examples of such river engineering problems are : selecting locations for river crossings for highways, pipe lines or railways ; location and conceptual design of water intakes, training works ; prediction of bank stability and lateral shift rates ;

and prediction of mixing characteristics over the range of flows.

Interpretation of the fluvial features is not a new study and an extensive literature exists on it. However, much of it is oriented towards the interpretation of the geological history rather than towards deriving present river process rates, hydraulic parameters and the associated interactions of rainfall on run off, the parameters most frequently sought by engineers. The characteristics of a river depends on the conditions that govern the fluvial morphology and a reasonably detailed knowledge of these conditions is therefore an essential prerequisite to the proper planning of any engineering interference with a river. The present investigation is directed towards bridging this gap - the modelling of the river flows incorporating the interactions of different hydrological and hydraulic parameters.

This investigation would help the Teesta Water Management to regulate and to control Teesta water all the year round. The real time prediction of river flows during the flood period would save life and property in the Teesta basin. In fact, the dire necessity of this investigation was felt by this investigator a long time back, in 1968. The nightmarish holocaust of the Teesta flood on October 4,

1968 is vivid in the mind of this investigator - a mute witness of the nature's cruelty unleashed by the rolling surges of the furious Teesta.