Flow-gauging structures in South African rivers Part 1: An overview

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Abstract

Accurate hydrological information is of paramount importance in a dry country such as South Africa. Flow measurements in rivers are complicated by the high variability of flows as well as by sediment and debris loads. It has been found necessary to modify and even substitute certain internationally accepted gauging structure designs to overcome local practical problems and improve accuracies.

This, Part 1 of a paper in 2 parts, concentrates on the attributes of different types of gauging structures and the information provided on the different structures will assist the reader with the selection of an appropriate structure. The historical development of the gauging structure network in South African rivers is briefly discussed. Gauging structures used in South African rivers and basic design criteria for the preferred structures at this stage, based on past experience, are discussed:

- Crump weirs
- Sharp-crested weirs
- Sluicing flumes.

This paper reflects the lessons that have been learnt by DWAF and other South African organisations and should be of value to others who have to perform flow measurements under similar climatic conditions. Factors that may adversely impact on gauging accuracy are also pointed out in the conclusion. Part 2 of the paper contains information on the calibration theory and techniques to rate the preferred gauging structures.

Keywords: gauging structures, Crump weirs, sharp-crested weirs, modular flows, Parshall flume, Hydro flume, sluicing flume, flow measurement, rivers