

CONTROL OF SALINE WEDGE INTRUSION IN THE ESTUARY OF STRYMONAS RIVER USING AN AIR CURTAIN

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EXTENDED ABSTRACT

The intrusion of saline wedge in rivers is a natural phenomenon, which occurs in many estuaries. Saline water tends to propagate upstream from the river mouth, due to its higher density. This phenomenon may render the quality of the water in the lower river reach unsuitable for some uses, e.g., irrigation of agricultural fields. Several methods, including the construction of small movable dams at the river mouth and the increase of the roughness of the river bottom, have been proposed to control or prevent intrusion. One proposed method is the use of an air curtain, which may be able to reduce or prevent totally the intrusion of the wedge. In this method compressed air is pumped into a perforated pipe, placed at the river bed across the channel, perpendicular to the flow, forming a vertical air curtain which acts as a wall to the intrusion. The use of the air curtain has been studied through limited laboratory experiments and has been applied in some navigation locks.

In this study, a literature search on this method has been made, relevant articles and reports have been collected, classified and studied, an overview is presented, and theory and design parameters are proposed. Furthermore, the method of the air curtain is presented as an application in the estuary of Strymonas River, where the limited discharge of fresh water, mainly caused by the construction of Kerkini dam, results in the creation and upstream intrusion of a salt wedge, affecting water quality and making water unsuitable for irrigation uses. A specifically developed model has been applied to simulate salt intrusion in Strymonas River. This model provided hydraulic parameters, which were used to design the air curtain.

Key words: Salt intrusion, saline wedge, air curtain, water quality.