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STUDY OF SALINITY INTRUSION AND INVESTIGATION A FORMULA TO PREDICT THE LENGHT OF SALINITY INTRUSION IN BAHMANSHIR ESTUARY USING MIKE11 NUMERICALLY MODEL

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ABSTRACT

In this study, salinity intrusion phenomenon is studied. For this purpose, a non-permanent and one-dimensional numerical model as a good model for study of salinity intrusion in River in southwestern Iran is Bahmanshir. Login Persian Gulf saltwater, freshwater, this region is always concern for consumers. The increase upstream salinity reduces the quality of surface water is used for agriculture and industry. The field data for calibration and validation of model is used. Model for different modes of sea level and water flow is at hand And the effect of changes in these parameters have been checked. The results of numerical modeling with empirical formulas to predict the influence of salinity have been compared. In addition, using the results of the model, a simple equation to predict the influence of salinity in the river Bahmanshir obtained.

Keywords: Salinity intrusion, river estuary Bahmanshir, modeling of river

INTRODUCTION

Saltwater intrusion in estuaries of rivers and water resources are major issues And given the complexity of the problem of finding the saltwater intrusion is always very importantThe purpose of this study Khor Bahmanshir modeling and correlating it is to say, salinity intrusion. One of the factors affecting water quality in coastal areas, salinity intrusion is to them Usually by dredging, dams upstream or drought intensified. With change on many factors including freshwater flow upstream, cross-

sectional geometry and roughness influence of salinity can be controlled floor (Haralambydv *et al*. 2003).

River estuary where the freshwater mixes with saltwater.Salinity intrusion of sea water in river estuaries naturally occurring phenomenon which is very important and affects the water quality (Parsa *et al*. 2007). Find the exact amount of influence, is very complicated and approximate methods provided for this purpose, often with very high error The problem for rivers that provide water for drinking and agriculture in the region is much more important. In this study was to find the influence of a numerical model as a laboratory to determine the influence are used.

The results can help to manage water withdrawals from the river. Bahmanshir River, one of the most important sources of drinking water in Abadan and Khorramshahr and agriculture in the southwest of the country. Login Persian Gulf saltwater, freshwater, this region is always concern for consumers. Snjavy (1389), based on the hydrogeology of the aquifer saltwater coastal zone of the Caspian Sea, despite some setbacks arising from the Caspian Sea using GIS software and zoning the show. Khalil (2006) to study salt water intrusion in the West Sinai Abozanyma area 60 vertical electrical sounding Schlumberger method used.

According to the maps, he was able to resist salt water and fresh specify the border. Liu and colleagues (2007) also studies on layered in river estuaries dedicated. And low water bowls in different seasons and in different seasons, especially tidal examined. Woo and Yun (2011) examined a one-dimensional model for salinity intrusion in estuaries of Malaysia. It was founded in 2005 based on Savnyh research and to calibrate the model with field data model able to predict the Han River estuary in South Korea find. Rare and colleagues (2013) examined how to prevent salinity intrusion in river estuaries paid by way of a bubble curtain.

Description of the numerical model MIKE 11

The numerical model MIKE 11 is used. Software MIKE 11model is one-dimensional (linear) and is a non-permanent among existing models, to simulate Bahmanshir River, was chosen. This model is capable of hydrodynamic modeling of river sediment and water quality also has the ability to model. Point of the study was to predict the influence of salinity in the river Bahmanshir. The advantage of using numerical models, physical models to lower costs and ease of use of these models.

MATERIALS AND METHODS
The study area

Bahmanshir River in Khuzestan province in southwestern Iran and is situated Bahmanshir the Arvand river flows in parallel, One of the most important sources of drinking water and agriculture is the island of Khorramshahr and Abadan. Since 1302, the entry of salt water from the Persian Gulf in Arvandrivers, the Karun and Bahmanshir observed. This is always concern for consumers of freshwater, such as National Iranian Oil Company, the city of Abadan and Khorramshahr and owners of palm in the region. After construction of multipurpose dams for power generation, flood control and irrigation on Dezrivers, the Tigris and the Euphrates, Karun has increased the likelihood of loss of fresh water.

All forward resulting in increased salinity and Arvand were Bahmanshir (Mahab Soykou1976). Middle school level, the average width and depth of the river, respectively, with 600 square meters, 200 meters and 4 meters. Annual average rate in the range of 35 to230 cubic meters per second. The maximum tidal range at the mouth about 6/3 meters.

Modeling of river

In order to calibrate models of hydrodynamic and advection distribution Bahmanshir River, The hydrodynamic model was implemented to achieve optimal roughness coefficients.

The model hydrodynamics

In order to obtain roughness, according to available data, part of theriverfromkm18/7to 73(compared tothree branches) was selected And the geometry of the frame to the model. In this period the average length of one kilometer along the river to Alman are divided

RESULTS

Effects of critical parameters on the influence of salinity Rising

Sea levels will cause the change in hydrodynamic river estuary. These changes affect parameters such as depth and speed of the river. As well as changes in the input to the estuary of the river is also an important factor affecting the salinity intrusion. In this section, the effect of important parameters during salinity intrusion will be described. Figures 1 and 2 due to changes in freshwater flow and salinity range of tidal influence in perfect fashion by the length (L HWS) in the river Bahmanshir show. These results are based on numerical modeling and in different conditions is obtained. It is better to determine the effect of each parameter on the salinity influence the outcome by changing a parameter.

in a reasonable range, and keeping other factors that affect the salinity penetration is achieved. During the salinity intrusion to

freshwater rivers to flow rate changes from 20 to 700 cubic meters per second was investigated. With the increasing flow of saline water into the mouth of the river moved And when the flow decreases Tidal flow and density difference between fresh and salt water in the river flow has overcome And thus the influence of upstream salinity increases. As is clear from Figure 1 At low rates (20 cubic meters per second) to km 54 of influence during the Soviet influence, And the highest rate of 700 cubic meters per second during the Soviet influence only 6 km (of the mouth) is completed.

Another important factor to influence the salinity and tidal amplitude (H) is. Model for different tidal ranges with constant flow rate of 100 cubic meters per second (a discharge) is executed. Figure 2 shows that the influence of the tidal range increases with increasing salinity. Lowest tidal range in the tide (neap) happens to be the equivalent of a meter, and in this case the influence of salinity is 12 km from the crater. The fog condition tide (spring) tidal range to 3/56 meters . In which case the salt penetration will increase to 29 km.

The reason for this is that the speed of tidal tidal amplitude is proportional to (Prndl 2004- Aypen 1996) And an increase in the rate of tidal range, tidal and therefore increase the penetration of salt.

Seawater influence on pumping stations

The pumping station is located at a distance of 32 kilometers three branches,The salt concentration in the water for agriculture should be less than ppt5 / 1 is. Has always been one of the concerns of farmers has been increasing salinity at this station. Figure 3 Series once a month on the station displayed the salt concentration. In this case, the model is 50 cubic meters per second flow rate is observed. At any time of the Soviet period did not exceed the standard limit. And all the time can be used for water pumping for irrigation. In Figure 4 the river constant tidal graph and by reducing the discharge time runs out. This simulation can be seen that the low flow rate of 25 cubic meters per second of water has been in the low season. It can be seen that in this case the salinity of 4% of the time exceeded 5 / 1ppt exceeded. This implies that the quality of water for irrigation in this mode.
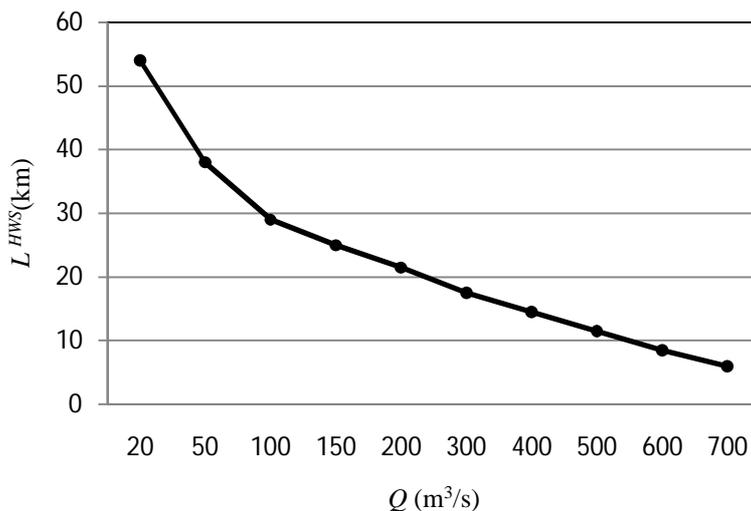
Figure 1: Variations in salinity influence over the changes in the freshwater discharge Bahmanshir
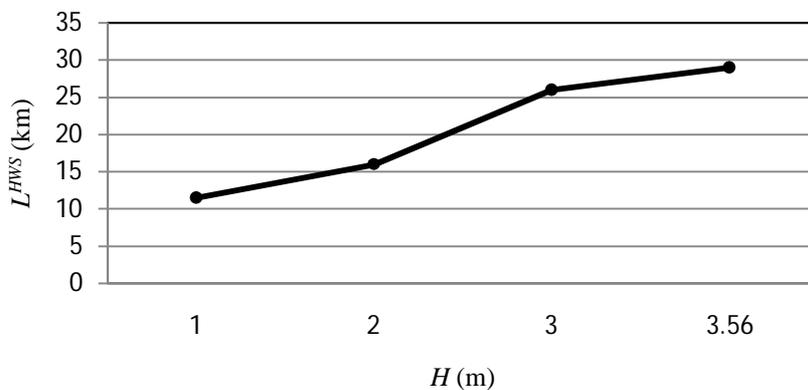

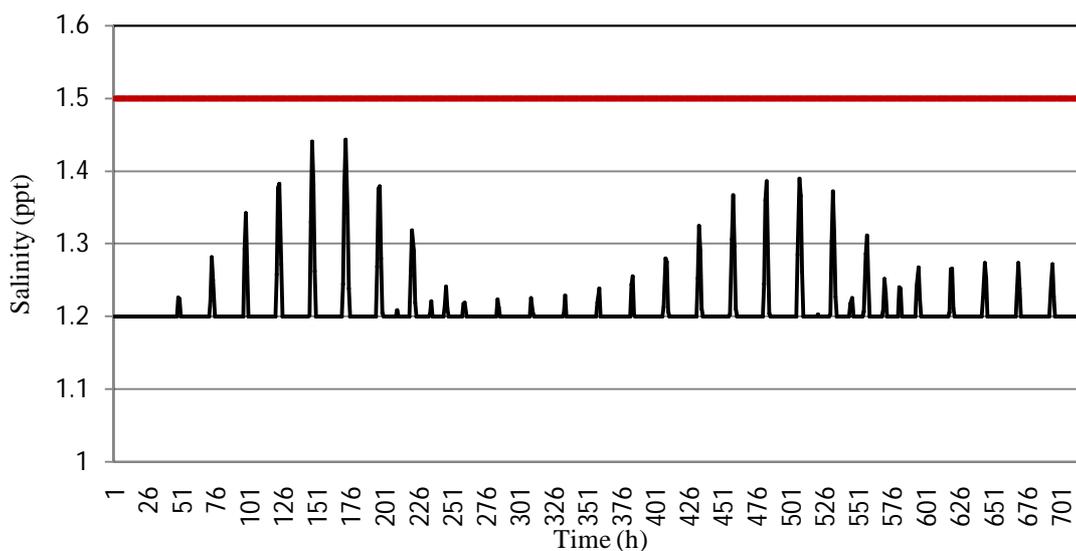**Figure 2: Variations in salinity influence over the changes in tidal range**

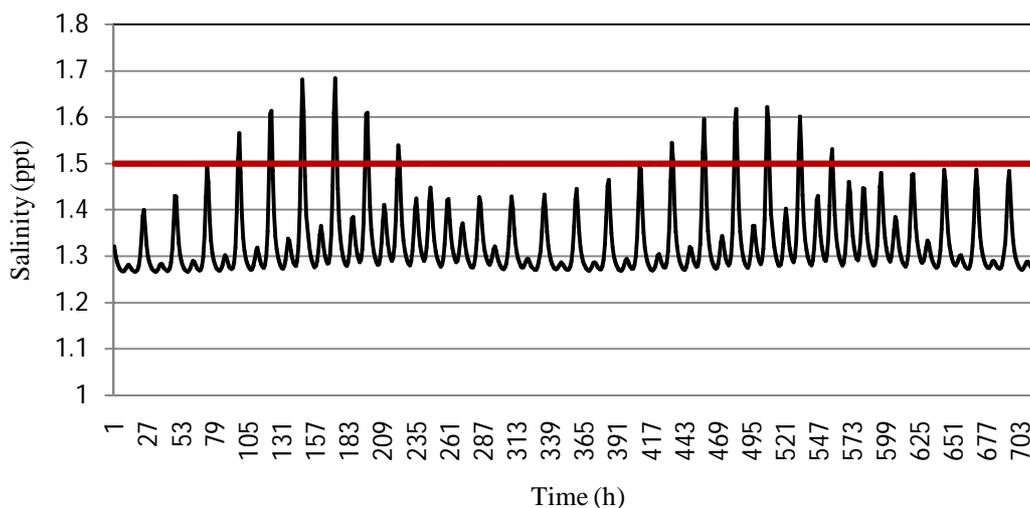**Figure 3: The amount of saltinone-month periodgivenDubai50cubic meters per second**

Figure 4: Theamount ofsaltinone-month periodgiven therateof 25cubic meters per second

CONCLUSION

The study predicts the influence of salinity in the estuary of the river Bahmanshir was studied. To check the items listed in a numerical model was used to simulate Bahmanshir river estuary. The model was calibrated and validated by existing data. Finally the hydrodynamic model to study different parameters, the quality was used. The effects of various parameters on the influence of salinity were studied. And also in relation to predict the salinity intrusion was Bahmanshir. To provide the formula of dimensionless parameters that were used in previous studies were used. And finally fitted with a non-linear relationship was observed. As well as other estimates of the influence of salt were used to estimate the salinity intrusion in Bahmanshir. It turns out that the relationship between fan. Drborg (1972) has done a better predictor than other relationships. This is probably due to better predict the corresponding coefficients which makes it very flexible in this regard than other relationships. The study concluded that the pumping station located at km 32: In this case, the model is run with the flow of 50 cubic meters per second. It can be seen that at no time does not exceed the standard levels of salinity But with low flow rate of 25 cubic meters per second of water is observed in low season In which case the salt in 4% of cases exceeded 5 / 1ppt exceeded. This implies that the quality of water for irrigation in this mode.

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