The Study of Water Banned at Downstream of Karkheh River at Boundary of Hour-Ol-Azim Wetland with Using HEC-RAS Model

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Abstract: Karkheh River is divided to two Branches before Hour-Ol-Azim wetland. These two branch (Hofel and Nissan branches) will reach to wetland, after along path, In this study, Hydraulic algorithm, at Unsteady condition, has been studied very carefully, with using HEC-RAS, version 4. As a result, It is conclude that, Maximum discharge of flow passing through two branches Hofel and Nissan is about 1430 m³/s. This Discharge is equal to flood with 5 years as Return Period are calculated based on Hamidieh Hydrometric Station data. In this condition, the percentage of Hofel and Nissan are 51.5% and 49.5% respectively. Moreover, for the flood with 50 Years as return period, percentage of two branches are 60% and 40%.

Key words: Karkheh · Hofel · Nissan · Hour-Ol-Azim wetland · HEC-RAS · Slope Modifying

INTRODUCTION

Totally, study of flood Hydraulic Consist of Geometric Evaluation, Hydraulic of River and necessary calculation of flood Based on these process, Maximum designing flood and its Effects on offshore line has been studied. Haehemi (et al., 2006) tried to propose some structural suggestions about Hydraulic flood and flow regime through river, for this reason flow are simulated Numerically with using HEC-RAS and it result published at book as “New method of structural protecting ways for River” [1]. Abdoveys et al., (2004) attempt to simulate Karoon River from Ahwaz-Farsiat and study changing behavior by HEC-RAS Model [2]. A first hydraulic description of Hydraulic Characteristic of main River Branches was provided by Studies of Huang and his associates (2002). They used a three dimensional model to record the features of flow in joint area. This model at first assessed by data of Schumate (1998) in upright joint of two opencast channels and then it used for study of impact of the changes in joint angle on flow features. Finally, there was that this 3-dimensional developed model reproduced all important Hydro-dynamic features adapted to lab observations. So, after that, we've had:

- Dimensions of separation area In face was more than floor and with reduction of discharge the main fork in creased.
- In same conditions for greater joint angles, depth of the flow in the up of main and side channels is more. Huang and associates suggested following and using models with higher degree for more attention. Also, they assessed the degree of depth in the up of joint while ratio of main fork to all was 25% and compared them with supposed of HSU (1998) and saw that conclusions of numeric simulations fore see more measures.

METHOD AND MATERIALS

Case Study: The study Zone is Karkheh river basin which is at south west of Country from 46°,57' to 49°,10' longitude and at 49°, 58'latitude.The study zone is located at Azadegan valley between Soosangerd City to Hour-Ol-Azim wetland. This area is almost mild area and after a long time, sedimentation from basin to outlet zone. some tributaries and river branch are enter to boundary of Hour-Ol-Azim wetland. The following table shows descriptions of case study. Karkheh after joint of Symre and kashkan flows to south east and after jointing water two side forks

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Table 1: Geographical data of case study

<table>
<thead>
<tr>
<th>River</th>
<th>Reach</th>
<th>Start point x</th>
<th>y</th>
<th>End point x</th>
<th>y</th>
<th>Length of Reach (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karkheh</td>
<td>Hamidieh-Soosangerd</td>
<td>255787</td>
<td>3486247</td>
<td>232465</td>
<td>3495488</td>
<td>36</td>
</tr>
<tr>
<td>Hofel</td>
<td>Soosangerd-Hour-Ol-Azim wetland</td>
<td>232465</td>
<td>3495488</td>
<td>214089</td>
<td>3514057</td>
<td>33</td>
</tr>
<tr>
<td>Nissan</td>
<td>Soosangerd-Hour-Ol-Azim wetland</td>
<td>232465</td>
<td>3495488</td>
<td>202421</td>
<td>3501763</td>
<td>35</td>
</tr>
<tr>
<td>Sableh</td>
<td>Hofel 2-Hour-Ol-Azim wetland</td>
<td>205008</td>
<td>3506445</td>
<td>219893</td>
<td>3507839</td>
<td>17</td>
</tr>
</tbody>
</table>

Table 2: Maximum discharge of Hamidyeh with different return period

<table>
<thead>
<tr>
<th>Return period (Years)</th>
<th>Discharge (m³/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>983.17</td>
</tr>
<tr>
<td>5</td>
<td>1429.94</td>
</tr>
<tr>
<td>10</td>
<td>1696.92</td>
</tr>
<tr>
<td>25</td>
<td>2010.23</td>
</tr>
<tr>
<td>50</td>
<td>2229.67</td>
</tr>
<tr>
<td>100</td>
<td>2439.38</td>
</tr>
<tr>
<td>200</td>
<td>2642.1</td>
</tr>
</tbody>
</table>

mulab and Aab Zolal Continue to the south. In Khuzestan plain with reduction of slope, form of lake's floor changes to meander and according to reduction of flow speed the level of width of lake increases. Down the Karkheh wall, the lake changes way to west and Northwest and after about 100 km it will be divided in to some forks and end in Hour-al-Azim in periphery of Iran and Iraq. Karkheh in its flow comes to pole Tang in Ahmad shah. Here it passes a very narrow way and its depth increases so that when there is more water increases to 40 m and if not it comes to 15m. Lake's width is reduced to 3 m. It causes pressure and speed. More exciting, it's dropped down a high water fall of 43 m. After going out of zagros, Karkheh comes in to Khuzestan and passed from Dezfoul, shousn, Sousangerd and Bostan and in several forks enters Hour-al-Howyze or Hour-al-Azim. These forks are sable, Al-Abas, Nysan, Mo'rez and karkheh kour. Karkheh kour lake is a fork of karkheh witch has forked from the left channel of karkheh wall in Hamidieh water cast and goes in the souther way with so many bends and goes to Howyze and finally to Hour-al-Azim. Main fork of karkheh near Bostan enters hour-al-Azim. This lake the joins Arvand and Persian Gulf and its long from Gamasiab to Bostan is 755 km and from payepol to Hour is about 120km. Its depth is 4 to 6m.

Physiographic Parameters of Runny Domain of Karkheh: These parameters are: domain form, level of runny domain, average height of domain, domain environment, average slope of domain and slope of lake. Following parameters have been calculated by using the maps of geographical organization with degree of 1:2500000 for Karkheh domain. Plating of Karkheh in Hamidieh station Plating of Karkheh every year in Hamidieh is 4.8 milliard of cube meter, Discharge of at least 26.8 cube min a second, DISCHARGE of at most 427.6 m. in second and Discharge of average 153.7 cube meters in a second. [3-5].

Geometric Data: The basic geometric data consist of establishing the connectivity of the river system (River system schematic; cross section data; reach lengths; energy loss coefficients (friction losses, contraction and expansion losses); and stream junction information [2].

Manning’s Roughness Coefficient: Selection of an appropriate value for Manning’s n is very significant to the accuracy of the computed water surface profiles. The value of Manning’s n is highly variable and deepens on a number of factor including: surface roughness; vegetation; channel irregularities; channel alignment; scour and deposition; obstructions; size and shape of the channel; stage and discharge; seasonal changes; temperature; and suspended material and bed load [6,7]. Manning’s n For Hofel and Nissan rivers 0.030 and Sableh 0.027 are considered. And for another branches selected a suitable Manning’s n.

Hydrological Data: In the Table 2 maximum discharge have been seen.

According to the unsteady condition, flood Hydrograph are used with different return period from 2,5,10,25,50,100 and 200 as upstream boundary condition.

RESULTS

The aim of modeling is study rate of water flow and condition of Hour-Ol-Azim wetland. as a result, model show that, two branches (Hofel and Nissan) could pass water with capacity of 1430 m³/s (equal to discharge with 5 years as return period).

After run following result are conclude:

- Normal water level of flood from Hofel river(reach 1) shore to Sableh River shore is 2 meter for 50 year return period (Figure 4).
- Normal water level of flood for Nissan river shore is below 2 meter for 50 year return period.
Fig. 1: River System Schematic at HEC-RAS environment

Fig. 2: Hofel River with 5 years of return period

Fig. 3: Nissan River with 5 year of return period
Fig. 4: Profile plot of Hofel river with 50 year of return period

Fig. 5: Profile plot of Nissan river with 50 year of return period

Fig. 6: Profile plot of sableh river with 50 year of return period
Normal water level of flood for Sableh river shore is 1 meter for 50 year return period.

**River Bed Slope Modification**: According to the content at normal condition flood cannot pass Hofel and Nissan River path. (50 year return period. This return period used in river engineering works). So slope modification of two River and other branches at downstream can has great effect on River behavior. But in simulation process, it is indicate that, bed modifying didn’t have important effect on River hydraulic. (Because of very long length and none influence of flow).

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