Flood Control and Prediction of Flood Using HEC-RAS – A Review

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Abstract: *Flood is very common in India. Many parts of the country influenced because of the flood.76% of rainfall out of rainfall total calculated and distributed on the earth surface. Surat is the main city of Gujrat. In rainy season Surat city highly affected due to flood. Flood is the major problem of Surat city. Flood is occurring in Tapti River during monsoon and influence many area. Flood is responsible for property and live losses. HEC-RAS Hydraulic Engineering Center's Analysis System is the software which is used for controlling flood. HEC-RAS is the advance computing technique gives flood warnings govern water flow and compute water surface profile. Various one dimensional hydrodynamics models using for calculating flood event. Simulation of floods 30 years past flood data were addressed in present study. Cross-sections extracted from Auto-Cad file of lower Tapti River.*

Keywords: Flood control, water, simulation, HEC-RAS, numerical technology

1. Introduction

In India flood is the most common disaster. Surat city is thee highly affected city because of flood. City suffers many damages and looses every year or every alternate year due to flood. Advance computing facilities gives easy way to forecasting and mapping of flood. This gives flood warning. Tapi River is the west flowing and among the largest river of India. 725km. long and originated from MP. Arabian sea at west side of theee Surat city which nearly 20km. Tapi tributaries on right bank and left bank are 14. The study area taken from Wair cum causeway at Dumas to Hazira is approximate distance is 19km. Study of various cross-sections to identify problems of the system. When water overflows over the banks in this stage flow rate is high cause flood. Flood causes various losses such as property and life. To increasing carrying capacity of the river by using the past flood data because the water software.

Figure 1: Study Gujrat Tapi River map

2. HEC-RAS

HEC-RAS software is the advance computing technique use to control the flood. This software gives easy for mapping flood and inundation. HEC-RAS provides information about the flood. HEC-RAS software designed the USACE. HEC-RAS calculate 1D steady and unsteady hydraulics of river.1D steady flow is taken in study.

3. Model Parameters

SMC which is provide thee topographic data of reach in the form of CAD-File and Cross-sections at different locations in thee reach. Central Water Commission provided the Daily discharge data for the Tapi basin from 1995-2005 and the Flood data has been provided by Flood Cell Surat. The following data were collected to enhance the study of steady and unsteady flow analysis.

Following are the data collected for study area:
- Index Plan, Toposheets, AutoCAD map of thee reaches.
- Detailed cross sections study river reach were collected from SMC.
- Discharge VS Water Surface Levels (Elevation) were collected from State Water Data Center, Gandhinagar.
- Past Flood Peak Discharge Data were collected from flood cell of Surat Municipal Corporation as shown in Table

Table 1: Flood Data(Source-SMC,Surat)

PAST FLOOD PEAK DISCHARGE			
Sr. No.	Year	Lakh cusecs	Cumecs
1	1990	4.90	10075
2	1991	3.68	10420
3	1992	1.84	5210
4	1993	3.35	9486
5	1994	8.87	14857
6	1995	4.01	11366
7	1996	2.12	5994
8	1997	4.94	13988
9	1998	10.53	19817
10	1999	3.30	9344
11	2000	2.38	6739
12	2001	3.09	8750
13	2002	4.32	12233
14	2003	3.32	9405
15	2004	3.89	11015
16	2005	4.68	13252
17	2006	12.05	25788
18	2007	6.37	18024
19	2013	5.31	15050

4. Literature Review

Fleenor et al.(2003) Evaluated thee Numerical Models of Flood and Tide Propagation which are using widely for prediction of flood stage all around the world. The HEC-RAS and DHI they used this software to bench mark test. Both HECRAS and MIKE11 are successful in bench mark case.

Bennett et al. (2004) It gives the comparison between HECRAS and MIKE11 are used for thee unsteady flow. However, it is a wrong assumption that development of model always done in same way also thee assumption of same modelling also their differences including thee model equation approach for their development resulting which compared with Tillamook Valley.

Goodellet.al.(2006)Examine the steps required to perform a flood inundation mapping which study out using HECRAS for Backlick Run River (W.C) which also evaluating the capabilities of HECRAS and HEC-GeoRAS.

Brunner et al(2008)Carried out the study on HEC-RAS which used for thee a one-dimensional steady or unsteady open channel flow analysis; produce by U.S. Army Corp Engineer Hydrologic Engineering Center's. It mostly used for one-dimensional program in the world, HECRAS is used for a number of applications, such as flood reduction studies, flood insurance and, bridge hydraulics, stream restoration, and dam break analyses.

Agnihotriet. al. (2011) Examined the over-flooded cross-sections and modified that cross-section of river Tapi using geospatial technologies. This helps to prepare plan for flood mitigation in Surat city to thee controlling flood over Tapti River. Modified HECRAS software is used. ArcGIS software use to predations of map for flood inundation.

Desai et. al.(2012)Analysed the flood management approach as available from Literature, Practice reports and also defined thee system which were based on: a) prediction of daily inflow (CWC), b) Decision making Processing of data and (Gov. of Guj.), c) Rules for operation of reservoir to meet specified objective.

5. Conclusion

HEC-RAS is a advance software is easy and powerful to determining water surface profile. It gives flood warning and prevent from flooding. The levees need to increase to prevent excess flooding over retaining wall or levees. Inundation maps created by HEC-RAS are useful for various emergency plan of action.

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