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GEOINFORMATICS AND FLOOD WATER LEVEL: A CASE STUDY OF KRISHNA RIVER, SANGLI DISTRICT (MAHARASHTRA)

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1.0 INTRODUCTION:

Natural hazards, which damage national economy and produce hardships for lar sections of population, are one of the single largest concerns for most nations. [1] Flood one of the cumulative atmospheric hazards [2] as well as floods are still very seve environmental hazards which are related to atmospheric processes. Generally, floo are considered to be associated with rivers and people conceive floods as the outcome accumulation of huge volume of water coming out of the rivers through overtopping river banks during peak discharge period. In fact, flood is an attribute of physical environme and thus is a component of hydrological cycle of a drainage basin. [3] It is also important note that floods are aggravated by human activity and thus flood hazard is both natural well as man-induced rather than man accentuated phenomenon.[4]

Flood Hazard Mapping is a vital component for appropriate land use planning in floo prone areas. It creates easily-read, rapidly-accessible charts and maps which facilitat the administrators and planners to identify areas of risk and prioritize their mitigatio response efforts [5]. In recent decades Geoinformatics, which includes Remote Sensi (RS) and GIS techniques are used top measure and monitor the real time extent of flood areas, to efficiently target rescue efforts and to provide quantifiable estimates of the amou of land infrastructure affected. In the present research paper an attempt is made to u remote sensing and GIS techniques for the study of flood disaster. [6]

2.0 STUDY REGION:

The Krishna river flow through the Sangli district in the north to south direction but direction is varies from place to place. Its latitudinal extent is16° 42' 41.26" N to 17° 09' 38" N and longitudinal extent is 74° 11' 33.87" E to 74° 41' 10.74" E. It includes tehsils such as Walwa, Palus and Miraj (Fig.1)[7].

3.0 OBJECTIVES:

The present study is dealing with the floods of the year 2005 and 2006 faced by the Upper Krishna river basin from the Sangli district especially experienced by the Miraj, Palus and Walwa. The main objective of the present study is to use modern technique for flood disaster management.

4.0 RESEARCH METHODOLOGY:

4.1 METHODS OF DATA COLLECTION:

The present research work is based on both primary and secondary data. But primary data is the main source to meet the objectives of the study. Therefore, the correlated data is collected by conducting intensive field work. The schedule is used for this purpose.

For the purpose of creation of Digital Elevation Model (DEM) the SRTM (Shuttle Radar Topography Mission) data is downloaded from the website. At the same time for the creation of flood line map LISS data is downloaded from the GLCF (Global Land Cover Facility). For the creation of base map of the district topographical maps are used. While the data according to the highest water level of flood is collected from Irrigation Department, Sangli District.

Besides above mentioned major sources of the secondary data, the few data have collected through SOI topographical maps, books and journals, news papers and several websites which are given under the heading of the references and bibliography.

4.2 METHODS OF DATA ANALYSIS:

After the collection of primary and secondary data, data has processed. T processed data is tabulated and presented in the form of charts, diagrams and ma The Digital Elevation Model is generated in Arc GIS software by using SRTM satellite da Maximum Flood level maps are also created in Arc GIS by using Isopleths method.

5.0 Mapping of flood water level:

During the year 2005 as well as 2006 devastating flood situation was occurred in t Krishna river basin and its tributaries. In the history of flood disaster occurred in the riv basin the flood of the year 2005 and 2006 was more disastrous. Mapping of Flood Wat Level (FWL) is essential for the understanding the nature of flood disaster and amount loss occurred due to the flood disaster. [8]

Table I

Highest Water Level Measured at Some Selected River Gauging Stations Located on River Krishna

2005

Sr. No.	Date	Bahe	Takari	Bhilwadi	Sangli	Ankali	Mhaisal
1	2	7	8	9	10	11	12
1	7/20/2005	15'.3"	538.3	535.03	529.14	528.1	16'.2"
2	7/21/2005	16'.4"	19'.8"	535.41	529.14	528.01	15'.10"
3	7/22/2005	16'.0"	538.9	535.92	529.65	528.91	19'.0''
4	7/23/2005	570.394	539.1	536.02	529.57	528.91	18'.6"
5	7/24/2005	16'.5"	539.2	536.12	529.8	528.21	19'.9"
6	7/25/2005	18'.0"	18'.0"	536.88	530.11	530.31	29'.6"
7	7/26/2005	19'.3"	50'.4"	545.17	537.42	536.31	29'.0"

	7/27/2005	20'.0"	52'.9"	49'.0"	540.16	540.03	50'.0"
	7/28/2005	14'.2"	46'.10"	47'.4"	540.4	541.71	53'.8"
	7/29/2005	12'.8"	45'.7"	45'.7"	540.415	541.91	54'.5"
	7/30/2005	15'.6"	48'.6"	47'.3"	540.39	49'.11"	54'.4"
	7/31/2005	24'.1"	57'.0"	51'.6"	540.75	541.94	54'.6"
	8/1/2005	27'.4"	60'.8"	55'.7"	541.83	542.71	55'.10"
	8/2/2005	30'.10"	63'.4"	58'.10"	542.43	543.11	56'.11"
	8/3/2005	32'.4"	64.'10"	64'.4"	543.05	544.01	59'.1"
	8/4/2005	30'.6"	64'.1"	60'.3"	543.36	544.57	61'.6"
	8/5/2005	22'.10"	57'.4"	59'.4"	543.28	544.56	62'.0"
	8/6/2005	17'.2"	50'.10"	59'.4"	552.58	544.18	62'.0"
	8/7/2005	17'.2"	51'.2"	51'.4"	542.13	543.74	60'.5"
	8/8/2005	12'.5"	46'.8"	48'.5"	542.055	545.535	58'.6"
	8/9/2005	10'.9:	43'.6:	45'.2"	549.46	542.06	57'.0"
	8/10/2005	8'.7"	36'.0"	39'.7"	539.22	541.41	54'.3"
	8/11/2005	8'.0"	25'.6"	30'.0"	537.67	538.86	50'.4"
	8/12/2005	7'.6"	20'.0"	21'.6"	534.6	536.11	44'.0"
	8/13/2005	7'.5"	18'.11"	20'.2"	533.3	535.31	39'.0"
	8/14/2005	7'.7"	20'.0"	20'.1"	531.78	533.05	33'.0"

Source: Daily Water Discharge Record Register, Irrigation Department, Sangli (2005).

Table II

Highest Water Level Measured at Some Selected River Gauging Stations Located on River Krishna.

2006

Sr. No.	Date	Bahe	Takari	Bhilwadi	Sangli	Ankali	Mhaisal	Rajapur	Almo
1	2	7	8	9	10	11	12	13	15
1	7/20/2006	17'.11"	18'.11"	19'.7"	531.85	532.81	30'.11"	30'.0"	570.5
2	7/21/2006	18'.3"	20'.0"	20'.4"	531.63	532:31	30'.7	32'.7"	518.0
3	7/22/2006	18'.7"	24'.10"	23'.6"	532.24	532.81	30'.4"	31'.0"	519.1
4	7/23/2006	18'.8"	32'.10"	31'.5"	534.68	534.81	35'.4"	32'.6"	514.1
5	7/24/2006	22'.7"	44'.0"	41'.3"	537.27	536.41	41'.6"	36'.6"	518
6	7/25/2006	22'.7"	44'.1"	43'.7"	537.96	537.91	44'.9"	41'.6"	517.9
7	7/26/2006	19'.8"	40'.7"	40'.8"	537.73	537.91	44'.9"	43'	517.98
8	7/27/2006	18'.9"	23'.0"	28'.0"	534.45	534.51	39'.3"	40'.6"	518.0
9	7/28/2006	18'.9"	23'.0"	23'.0"	532.63	533.61	32'.6"	34'.0"	NA
10	7/29/2006	21'.0"	53'.0"	47'.0"	538.56	538.31	44'.8"	41'.6"	518.0
11	7/29/2006	16'.8"	47'.6"	42'.6"	536.96	535.41	39'.0"	34'.0"	518.0
12	7/26/2006	19'.8"	40'.7"	40'.8"	537.73	537.91	44'.8"	43'	517.16
13	7/27/2006	18'.9"	23'.0"	28'.0"	534.45	535.51	39'.3"	40'.6"	518.0
14	7/27/2006	22'.7"	42'.2"	43'.7"	537.96	537.91	44'.9"	41'.6"	517.8
15	7/28/2006	33'.3"	33'.3"	58'.0"	541.73	541.11	52'.6"	40'.6"	518.0
16	7/29/2006	27'.00"	58'.2"	51'.2"	539.56	539.21	47'.6"	43'.10"	NA
17	7/30/2006	32'.9"	64'.2"	56'.9"	541.08	540.61	51'.3"	47'.6"	517.9
18	7/31/2006	33'.00"	65'.3"	59'.6"	543.23	541.86	55'.3"	534.17	517.7

8/1/2006	34'.7"	59'.10"	59'.3"	542.674	542.26	57'.7"	542.8	517.68
8/2/2006	30'.00"	54'.7"	55'.7"	542.125	543.11	57'.7"	542.77	517.59
8/3/2006	16'.2"	50'.5"	50'.6"	541.56	541.71	57'.0"	54'.3"	NA
8/4/2006	12'.1"	46'.0"	46'.3"	540.37	540.81	55'.0"	535.39	517.33
8/5/2006	10'.3"	39'.6"	43'.0"	539.29	539.61	53'.2"	538.62	517.14
8/6/2006	11'.11"	41'.00"	39'.4"	537.71	537.96	46'.10"	534.16	517.04
8/7/2006	21'.9''	53'.10"	47'.11"	539.25	539.11	49'.4	533.4	NA
8/8/2006	26'.10"	59'.11"	56'.6"	541.53	542.36	54'.6"	NA	NA
8/9/2006	24'.11"	59'.11"	56'.11"	541.66	541.75	55'.11	52'.8"	NA
8/10/2006	23'.4"	58'.3"	56'.9"	542.02	542.01	57'.8"	54'.3"	NA
8/11/2006	21'.1"	55'.4"	54'.2"	541.97	542.26	58'.8"	55'.10"	NA
8/12/2006	21'.0"	55'.4"	53'.7"	48'.10"	54'.5"	58'.10"	56'.6"	NA
8/13/2006	20'.1"	54'.10"	54'.10"	543'.07"	54'.5"	58'.8"	56'.07"	NA
8/14/2006	10'.7"	45'.10"	48'.6"	47'.0"	541.86	58'.8"	56'.07"	NA

Source : Daily Water Discharge Record, Irrigation Department, Sangli. (2006)

In the Krishna river basin from the Sangli district disastrous flood situation was ...red during 2005 as well as 2006. During 2005 the highest flood water level was ...ded on 5th August 2005 at various River Gauging (R. G.) stations. Whereas during ...the highest flood water level was recorded at Sangli station on 31st July was 543.23 ...s from MSL. The dates of highest flood water levels are vary from R. G. station to R. ...ion (Table I and II)

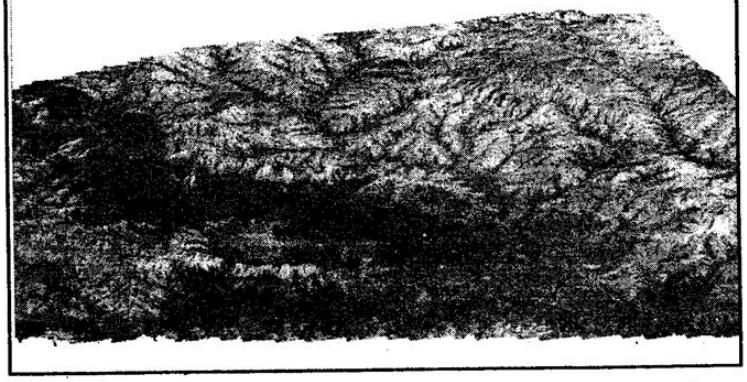
Table No. III

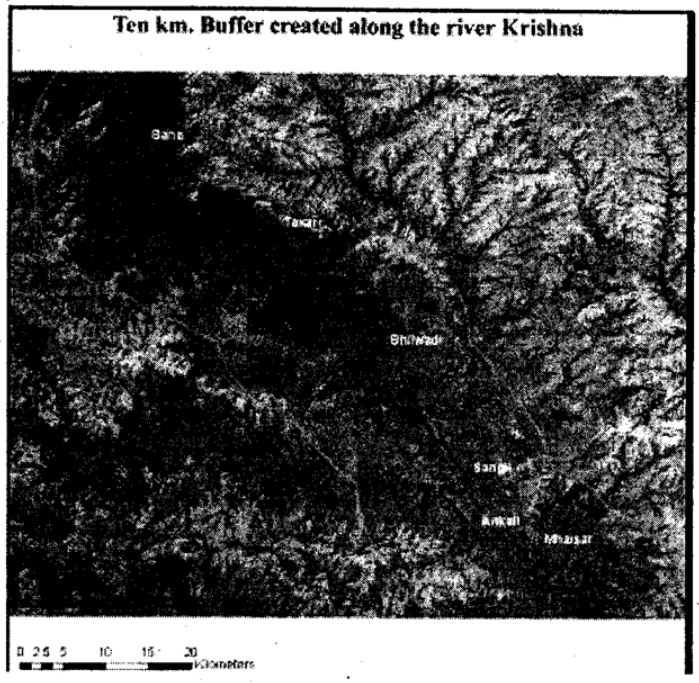
Flood water level and area (in percentage) inundated by the flood water

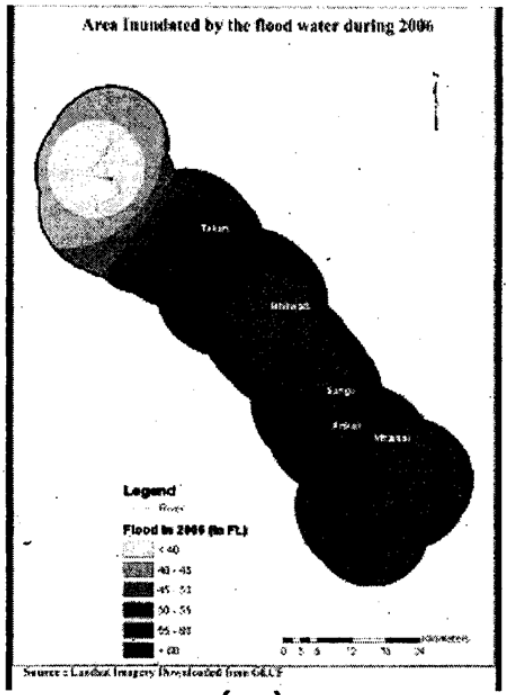
Sr. No.	Flood Water Level in ft	Area inundated by flood water in percentage	
		2005	2006
1	Less than 40	13	11
2	40-45	9	8
3	45-50	8	16
4	50-55	10	7
5	55-60	45	50
6	More than 60	15	8

During 2005, 15 percent area of the river basin is inundated by the more than 6 flood water level. During 2005 45 percent, 10 percent, 8 percent, 9 percent, and 13 per area was inundated 55-60 ft, 50-55 ft, 45-50 ft, 40-45 ft, and below 40 ft respecti Whereas during 2006 it was only 8 percent area was inundated as more than 60 ft. area submerged below 40 ft., 40-45 ft., 50-55 ft., 55-60 ft. was 11 percent, 8 percent percent, 7 percent, and 50 percent respectively (Fig. 4 and 5).

Digital Elevation Model of River Krishna




Ten km. Buffer created along the river Krishna
Sangli
Miraj
0 2.5 5 10 15 20
Kilometers


Area Inundated by the flood water during 2006
Legend
Flood in 2006 (in Ft.)
< 40
40 - 45
45 - 50
50 - 55
55 - 60
> 60
Kilometers
0 3 6 12 18 24

6.0 Conclusions:

Space technology is one of the best-suited means for the assessment of dam brought about by natural disasters like flood. Remote sensing satellites provide sync view of the study region. This advanced sensor technology has provided imme scope to the mapping and analysis of natural hazards like flood. The Krishna r basin has experienced devastating flood in both years. This is observed fact that flood water level was less during 2006 as compared to the year 2005. in both years most of the area was inundated between 55 ft. to 60 ft. water level.

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