FLOOD STUDY IN SHRAWASTI DISTRICT OF UTTAR PRADESH

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ABSTRACT

Floods are regular phenomena in India. Almost every year floods of varying magnitude affect some or other parts of the country. In 2017 around thousands of people were affected in more than 100 villages of Jamunaha and Hariharpur blocks of Shrawasti district due to flooding in Rapti river. Flood maps can be used when drawing up flood-risk management plans, for preventing flood damages, in land use planning, for providing information on floods, in rescue operations, how frequently do floods happen? And how huge floods can be? It is an important measure for minimising loss of lives and properties and helps the concerned authorities, in prompt and effective response during and after floods.

Key words: *Floods, Jamunaha, Hariharpur, Shrawasti, Rapti river, Flood Maps.*

STUDY AREA

Shrawasti district (Fig. 1) is in the north western part of Uttar Pradesh covering an area of 1858.20 Sq. Km. **Shrawasti, Uttar Pradesh, India** is with coordinates of 27° 30' 19.3644'' N and 82° 2' 9.5568'' E. This district is carved out from Bahraich district. Shrawasti, which is closely associated with the life of Lord Buddha, shares border with Balrampur, Gonda & Bahraich districts. Bhinga is the district headquarters of Shrawasti and is approximately 175 kilometers away from the state capital. The district is drained by river Rapti & its tributaries. In 2001 census, Shrawasti has three Tehsils, viz., Bhinga, Jamunaha and Ikauna. Shrawasti is a historically famous district of eastern Uttar Pradesh. As per 2011 census, total population of the district is 1,117,361 persons out of which 593,897 are males and 523,464 are females. The district has having 3 tehsils, 5 blocks and 536 inhabited villages. According to 2001 census, the district accounted 0.56 % of the State's population. Out of the total Shrawasti population for 2011 census, 3.46 percent lives in urban regions of district. In total 38,649 people lives in urban areas of which males are 20,216 and females are 18,433 and 96.54 % population of Shrawasti districts lives in rural areas of villages. The total Shrawasti district population living in rural areas is 1,078,712 of which males and females are 573,681 and 505,031 respectively.

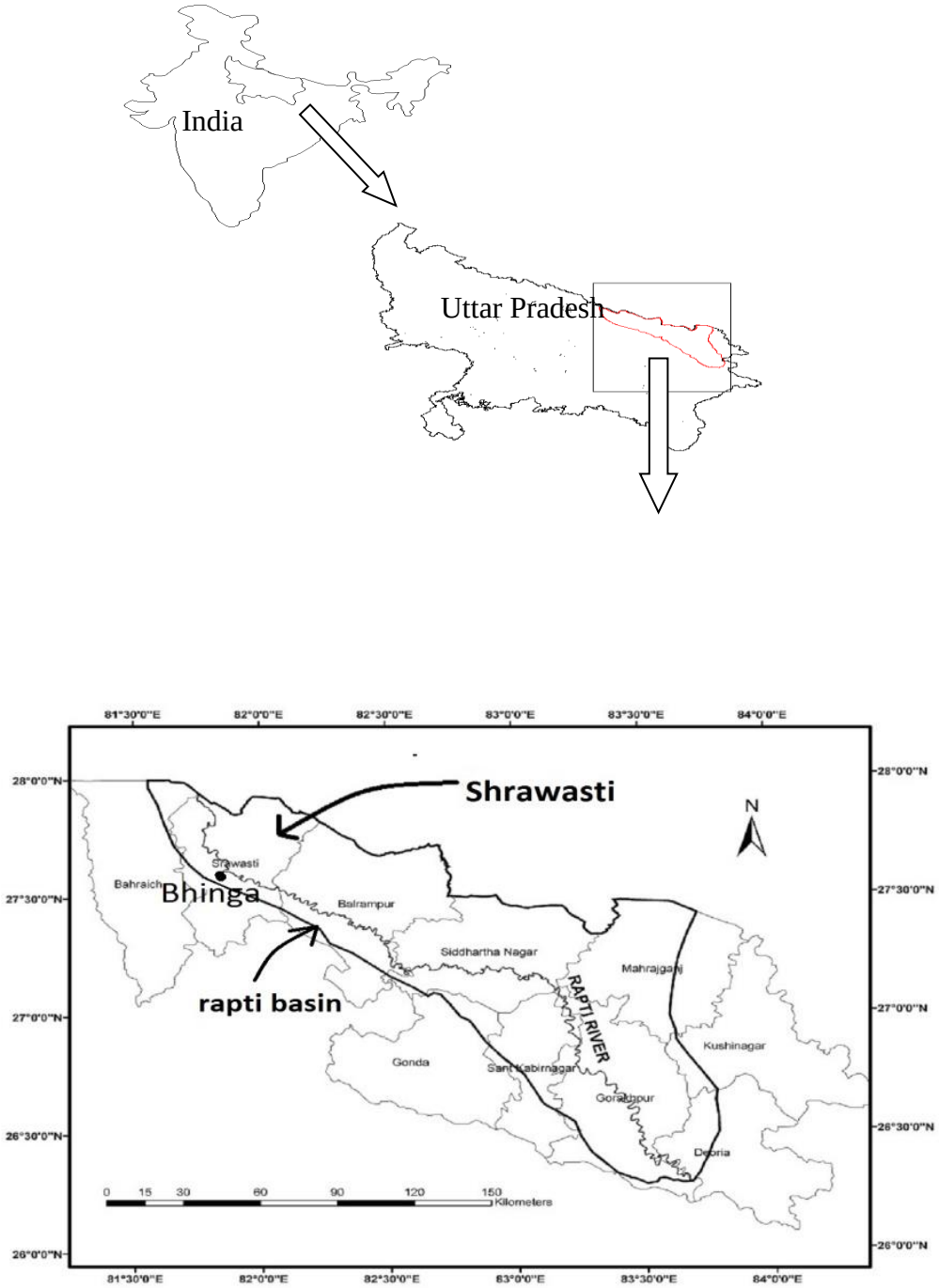

India
Uttar Pradesh
Shrawasti
rapti basin
Bhinga
Shrawasti
Bahraich
Balrampur
Siddhartha Nagar
Mahrajganj
RAPTI RIVER
Gonda
Sant Kabirnagar
Gorakhpur
Kushinagar
Deoria
N
0 15 30 60 90 120 150
Kilometers
81°30'0"E
82°0'0"E
82°30'0"E
83°0'0"E
83°30'0"E
84°0'0"E
28°0'0"N
27°30'0"N
27°0'0"N
26°30'0"N
26°0'0"N

Fig. 1

DRAINAGE AND RAINFALL

The main drainage feature (Table 1) in the area is the river Rapti which originates in Nepal from where it is flows towards west and near about Nepalganj (Nepal) it takes a sudden southerly or south easterly turn and follows a meandering course. A study of the topographical features and geomorphological evidences indicates that the Rapti seen parallel to the present one about 3 to 5 Km.

Drainage system with description of main rivers

SN	Name of the River	Area drained (Sq. Km)	% Area drained in the District
	Rapti	**110**	**18.33**
Salient Features of Important Rivers and Streams :			
SN	**Name of the River oRStream**	**Total Length in the District (in Km)**	**Place of origin**
1	Rapti		Originating from Nepal entering point of the river in Shrawasti district at Patana village and existing point of the is Katara village the drainage of the river is north - west to south -east
2	Bakawa nallah	35	Originating from Nepal and merge in Rapti
3	Bhaisahi nallah	40	Originating from Nepal and merge in Rapti
4	Suraj Kunda nallah	32	Originating from Nepal and merge in Rapti
5	Hathiakunda nallah	38	Originating from Nepal and merge in Rapti
6	Bhauwa nallah	36	Originating from Nepal and merge in Rapti

Table 1

The climate of the district is characterised as sub-humid with hot summer and cold winter. The well distributed rainfall occurs during south west monsoon. There is no meteorological observatory in Shrawasti. Nearest observatory is Bahraich. The climatic data of this observatory has been considered for the evaluation of climate type. The

annual rainfall based on 1931 to 1960 data is 1143.20 mm more than 85% rainfall occur during the monsoon period from June to September. Rapti River Basin part of middle Ganga plain. Indo-Gangetic alluvium is the biggest alluvial tract of the world and this alluvial fill is essentially of Quaternary age. The vast aerial extent and significant thickness of the sedimentary fill of the indo- Gangetic plain is primarily controlled by extensive supply of the sediment from the Himalaya and sinking of the crust in the alluvial plain. The present-day drainage pattern of Gangetic plain is characterised by a few major rivers originating in the Himalaya, which after entering the alluvium, swing in the easterly to south-easterly direction. There are also numbers of streams coming from the peninsular region which flow towards northeast direction until they meet major easterly flowing rivers. The the whole region represents a gentle depression with higher areas both in north and south, and showing a gentle easterly slope (Singh, I.B., 1987). Among all natural hazards, floods occur most often and are the most widespread in scope and severity. Floods are the most frequent occurring natural hazard that affect human and physical environment. River floods, the most common are caused due to prolonged rainfall or rapid snowfall in upstream watershed or extremely heavy rainfall occurring over a short period in relatively flat terrain exceeding the absorptive capacity of the soil and the flow capacity of the rivers. This causes a watercourse to overflow its banks onto adjacent land causing flood. A broad belt of low flat ground bordering the channel on one or both the sides that is flooded by stream water is called floodplain (Singh, D.S., 2007). In India over 40 million hectares (12 percent of land) is prone to floods and river erosion whereas approximately 73.36 lakhs hectare land has been recognized as flood prone due to the flooding in Uttar Pradesh. (Mishra, D & Shukla, S, 2010).

FLOOD MAPPING AND OBSERVATION

Flood mapping is the process of identifying on map areas at risk of flooding. It provides a good foundation for efficient flood-risk management. Flood maps can be used when drawing up flood-risk management plans, for preventing flood damages, in land use planning, for providing information on floods, in rescue operations and in determining what the lowest allowable construction elevation should be in order to avoid flood risk. Based on the analysis of satellite data sentinel 1A SAR and satellite data on dated August 06, 2017 and Radarsat-2 SAR on dated August 16, 2017 and August 19, 2017 which covers part of Uttar Pradesh State. Major Inundation is observed in Shrawasti district. Flood map is prepared which includes riverine flood, low lying areas, wet areas, rainfall induced floods and isolated patches of Waterlogged areas. Inundation includes rain water accumulation / flood water in low lying areas.

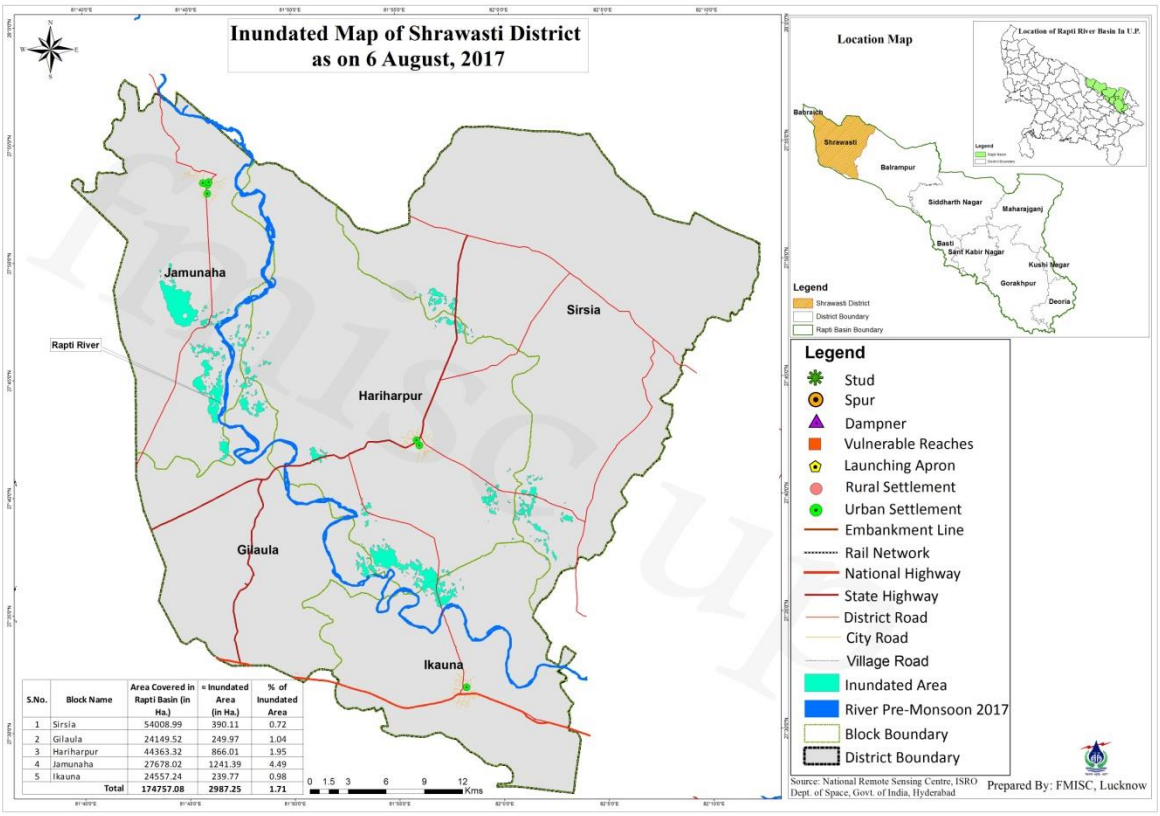
Blocks	06-Aug-17	16-Aug-17	19-Aug-17
	inundated area	inundated area	inundated area
	in Ha.	in Ha.	in Ha.
Sirsia	390.11	618.58	292.74
Hariharpur	866.01	739.19	763.76
Ikauna	239.77	615.9	857.15
Gilaula	249.97	not found	581.97

Jamunaha	1241.39	not found	1402.75
Total	**2987.25**	**1973.67**	**3898.37**

Source : FMISC Lucknow

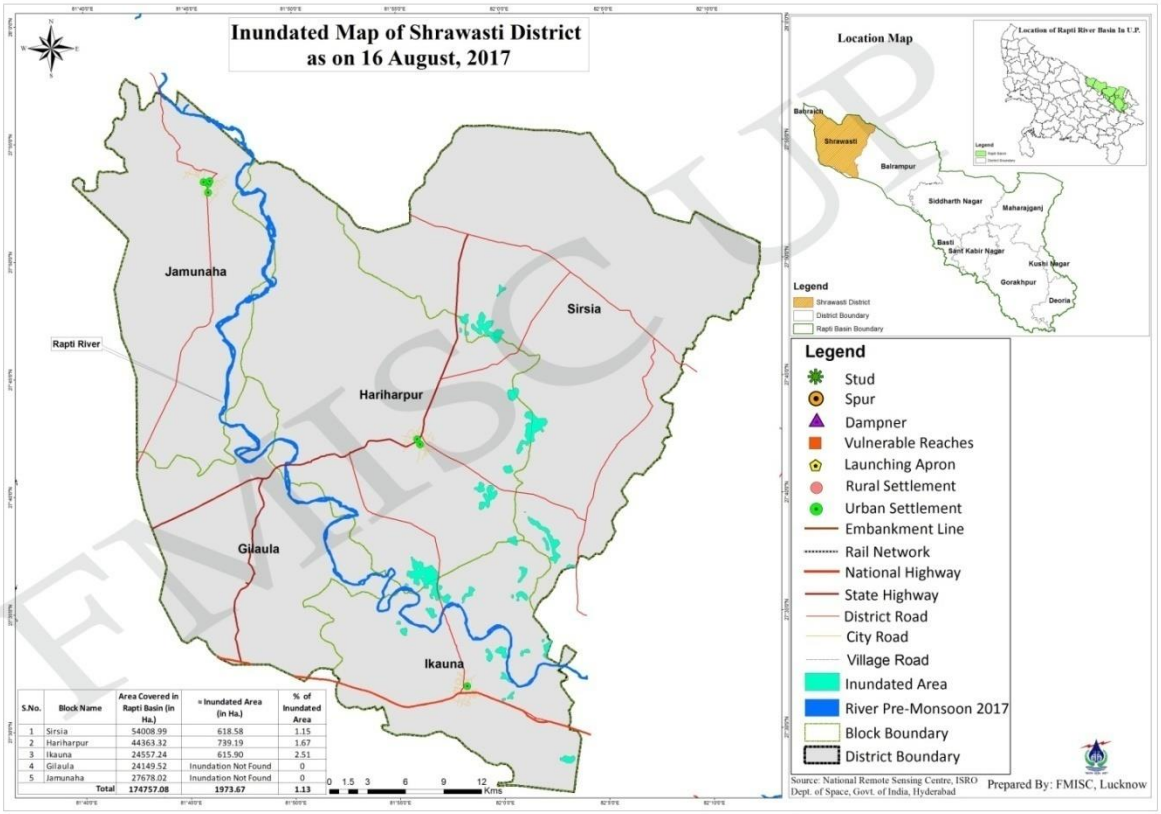
Table 2

On studying the flood map of Srawasti district on 06 august 19 (Fig. 2), 16 august 19 (Fig. 3) and 19 august 19 (Fig. 4), maximum inundation is found on 19 august 2019. The extent of the inundated area is 3898.37 ha. Maximum inundation is found in Jamunaha block 1402.75 ha. (Table 2). Next most affected block is Hariharpur. In the mapping of flooded areas, attention is paid to the reliability and accuracy of the source information.



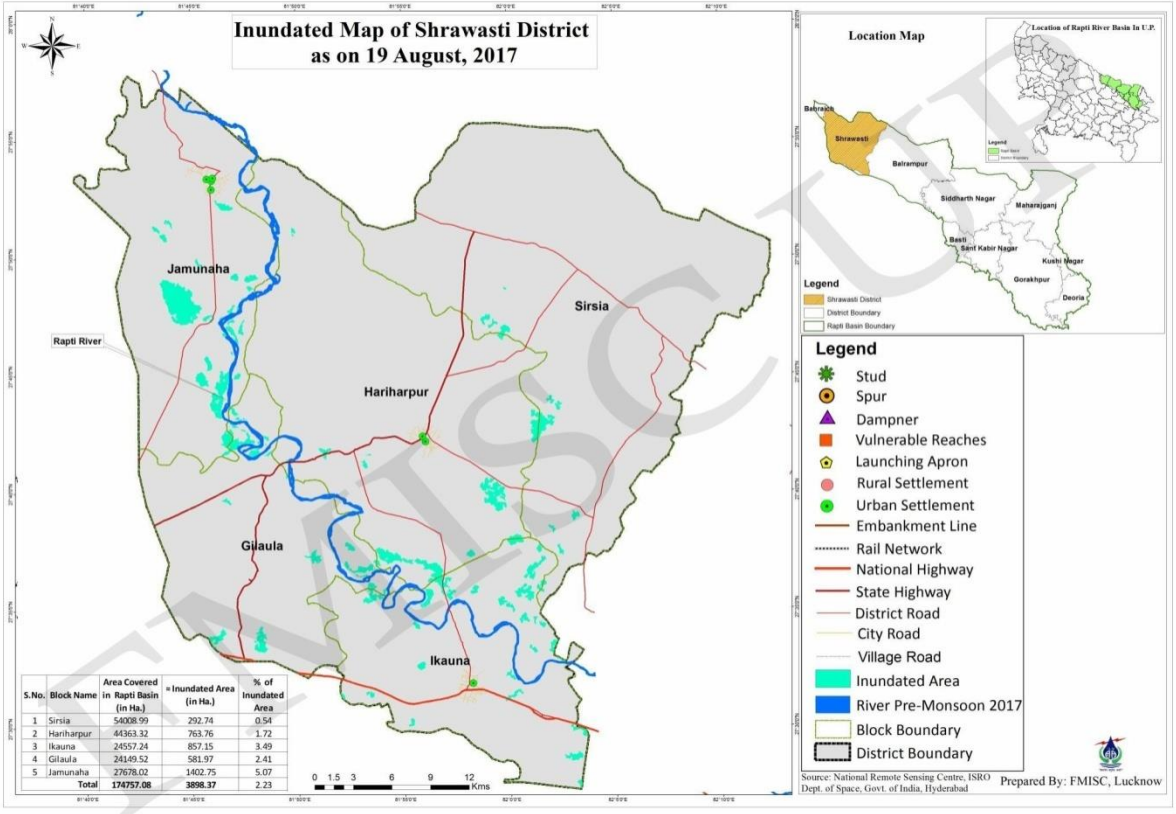
S.No.	Block Name	Area Covered in Rapti Basin (in Ha.)	Inundated Area (in Ha.)	% of Inundated Area
1	Sirsia	54008.99	390.11	0.72
2	Gilaula	24149.52	249.97	1.04
3	Hariharpur	44363.32	866.01	1.95
4	Jamunaha	27678.02	1241.39	4.49
5	Ikauna	24557.24	239.77	0.98
	Total	174757.08	2987.25	1.71

Fig. 2



S.No.	Block Name	Area Covered in Rapti Basin (in Ha.)	= Inundated Area (in Ha.)	% of Inundated Area
1	Sirsia	54008.99	618.58	1.15
2	Hariharpur	44363.32	739.19	1.67
3	Ikauna	24557.24	615.90	2.51
4	Gilaula	24149.52	Inundation Not Found	0
5	Jamunaha	27678.02	Inundation Not Found	0
	Total	174757.08	1973.67	1.13

Fig. 3



S.No.	Block Name	Area Covered in Rapti Basin (in Ha.)	Inundated Area (in Ha.)	% of Inundated Area
1	Sirsia	54008.99	292.74	0.54
2	Hariharpur	44363.32	763.76	1.72
3	Ikauna	24557.24	857.15	3.49
4	Gilaula	24149.52	581.97	2.41
5	Jamunaha	27678.02	1402.75	5.07
	Total	174757.08	3898.37	2.23

Fig. 4

CONCLUSION

The historic flood maps are based on observations and thus they are reliable, especially if the observed flooded area is derived from accurate aerial photographs or satellite images or from the field markings. All these parameters are useful in forecasting and mitigation of the flood. The main vision of this document is to initiate coordinated efforts to have an effective flood management strategy for the State, which will minimise the impact of future disasters. The tragedy and the lessons learnt from the severe floods have changed the mindset of the government and the focus of disaster management shifted from “Rescue, Relief and Restoration” to “Planning, Preparedness & Prevention”. Uttar Pradesh regularly faces the problem of severe flooding due to low terrain relief, meandering nature of rivers and lots of suspended sediments load. Since this part of the state is very important as far as agriculture point of view, hence flood risk assessment and damage assessment is paramount importance. Therefore measures need to be taken up on the basis of information collected by the conventional methodologies together with state of the art technology, which could be cost effective and time saving.

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