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Dr. K.H.V.DURGA RAO, Scientist/Engineer 'SG'
Head, Disaster Management Support Division

Date: August 31, 2018

No: 11-FL-2018-BR/07

Dear Sir,

Sub: Bihar - Near Real Time Flood Inundation Mapping using satellite data

Please refer to our earlier mail dated 17th August 2018 regarding 'Near Real Time Flood Mapping' project using satellite data. So far we have sent 6 flood map covering floods in Bihar State. Floods were reported due to heavy incessant rains in Bihar state during fifth week of August 2018. We have analyzed Sentinel-1 SAR satellite data of 30th August 2018 and a flood map for part of Bihar State is prepared. The flood map along with a brief report is enclosed herewith for your kind information. Since the image was acquired during/immediate to the rainfall event, large extents of wet areas were also observed.

Further, we request you to visit flood page in Bhuvan portal (bhuvan-noeda.nrsc.gov.in/disaster/disaster/disaster.php) NDEM portal for better visualization of flood extent in Bihar State.

In addition, the inundation layer in GIS format is being transmitted to Flood Management Information System Cell (FMISC) and Bihar Remote Sensing Application Centre (BIRSAC), Patna by e-mail for further value addition and dissemination to user departments. Kindly keep us in the mailing list of the user departments.

We will continue to keep a watch on the flood situation and update the information as and when required. Your support and active interaction is highly appreciated. Please provide feedback on the information being provided.

With kind regards

Yours sincerely,
(K H V Durga Rao)

As per the distribution list enclosed in the report.

Floods in Bihar – 2018

1.0 Background

A heavy incessant rain in Bihar is reported during fifth week of August 2018 caused steady rise in water levels in parts of Bihar state. According to reports, River Kosi at Kursela in Katihar district, Ghantak at Dumariaghat in Gopalganj district, Ghagra at Darauli and Gangpur in Siwan, Bagmati at Benibad in Muzaffarpur district, Kamalabalan at Jhanjharpur in Madhubani, River Kosi at Basua, Baltara in Supaul and Khagaria district respectively were flowing above danger level.

(Source: News Media, CWC)

2.0 Satellite Data

Flood Disaster Team is keeping a constant watch on the situation and checked the satellite data coverage over the affected areas. Sentinel-1 SAR satellite data of 30th August, 2018 was acquired and analyzed. (Refer Table-1).

Table-1 Satellite Data acquired over Flood Affected Area

S No	Date	Satellite / Sensor	Status
1	06-Jul-18	SENTINEL-1/ SAR	Analyzed and 1 flood map was sent.
2	09-Jul-18	RADARSAT-2/ SAR	Analyzed and 1 flood map was sent.
3	06-Aug-18	SENTINEL-1/ SAR	Analyzed and 1 flood map was sent.
4	13-Aug-18	RADARSAT-2/ SAR	Analyzed and 1 flood map was sent.
5	15-Aug-18	SENTINEL-1/ SAR	Analyzed and 1 flood map was sent.
6	16-Aug-18	RADARSAT-2/ SAR	Analyzed and 1 flood map was sent.
7	30-Aug-18	SENTINEL-1/ SAR	Analyzed and 1 flood map is being sent.

3.0 Data Analysis

Satellite data is rectified and inundation layer is extracted. Further, inundation map is composed for part of Bihar state. The inundation layer is integrated with district boundaries layer, for extracting district-wise inundation statistics which are shown in the Table-2.

4.0 Observations

Based on the analysis of satellite data, the following points were observed.

- Satellite data covers part of Bihar state.
- Major Inundation is observed in Khagaria, Bhagalpur, Darbhanga, Begusarai,

Saharsa and Samastipur districts.

- Observed inundation may include wet areas/ rain water accumulation / water in low lying areas

Table-2: District-wise inundated area statistics

S.No.	District	Approx. Inundated Area (ha)
1	Khagaria	10059
2	Bhagalpur*	9549
3	Darbhanga	7123
4	Begusarai	3543
5	Saharsa	3265
6	Samastipur	2946
7	Madhepura	2858
8	Patna*	2601
9	Munger	2597
10	Saran*	1834
11	Vaishali	1407
12	Muzaffarpur*	1383
	Total	49165

Note:

Districts with inundation less than 1000 ha are not included in the statistics.

* Partially covered in satellite data.

5.0 Distribution List:

1	MHA	<ol style="list-style-type: none"> 1. Joint Secretary, NDM, Ministry of Home Affairs, North Block, New Delhi. 2. NDM control Room, Ministry of Home Affairs, North Block, New Delhi 3. Director, DM-III, NDM, Ministry of Home Affairs, North Block, New Delhi.
2	NODAL MINISTRIES NDRF	<ol style="list-style-type: none"> 1. Vice Chairman, National Disaster Management Authority (NDMA), New Delhi 2. Control Room, National Disaster Management Authority (NDMA), New Delhi 3. DG NDRF, Sector-1, R.K. Puram, New Delhi - 110 066. 4. DIG (Ops&Trg.), Sector-1, R.K. Puram, New Delhi - 110 066
3	STATE	<ol style="list-style-type: none"> 1. Commissioner & Secretary, Disaster Management Department, Govt of Bihar, Old Secretariat, PATNA-800015 (Email & hard copy of the map through FMISC/BIRSAC also) 2. In-charge, Flood Management Information System Cell (FMISC), Patna (With a request to disseminate the information to the concerned departments) 3. Project Director, Bihar Remote Sensing Centre (BIRSAC), Planetarium Complex, Bailey Road, Patna 800001. (With a request to disseminate the information to the concerned user depts.)
4	ISRO/DOS	<ol style="list-style-type: none"> 1. Programme Manager, Disaster Management Support Programme, ISRO Head Quarters, Antariksha Bhavan, New

		BEL Road, Bangalore 2. Programme Director, Disaster Management Support Programme, ISRO Head Quarters, Antariksha Bhavan, New BEL Road, Bangalore-560094. (e-mail)
5	NRSC	1. Deputy Director (RSA) & PD, DSC 2. Associate Director, NRSC 3. Director, NRSC

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