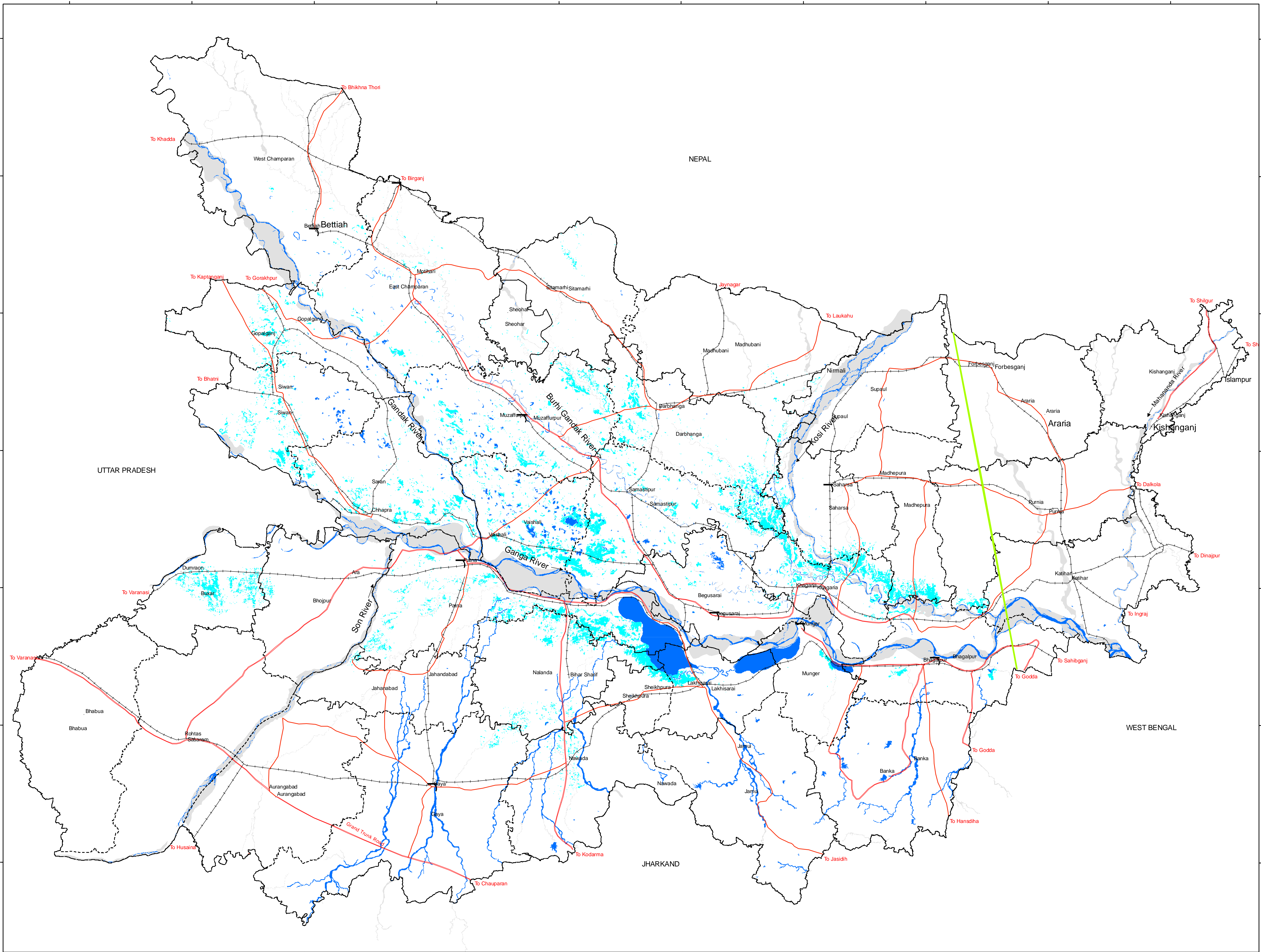# Flood Inundated areas in Bihar state
Based on the analysis of Radarsat data of 08-August-2008

NEPAL

To Bhikhna Thori

To Khadda

West Champaran

To Birganj

Bettiah

Bettiah

To Kaptanganj   To Gorakhpur

Motihari

East Champaran

Sitamarhi Sitamarhi

Jaynagar

To Shilgur

Gopalganj

Gopalganj

Sheohar

Sheohar

Madhubani

Madhubani

To Laukahu

Nirmali

Forbesganj Forbesganj

Kishanganj

To Sh

To Bhatni

Siwan

Siwan

Muzaffar

Muzaffurpur

Darbhanga

Supaul

Supaul

Araria

Araria

Araria

Mahananda River

Naibanj

Kishanganj

Islampur

UTTAR PRADESH

Chhapra

Saran

Samastipur

Samastipur

Saharsa

Saharsa

Madhepura

Madhepura

Purnia

Purnia

To Dalkola

Vaishali

Vaishali

Kosi River

To Dinapur

Dumraon

Ganga River

Katihar

Katihar

To Varanasi

Buxa

Son River

Ara

Patna

Begusarai

Begusarai

Khagaria Khagaria

To Ingraj

Bhojpur

Bihar Shalf

Munger

Munger

Bhagalpur Bhagalpur

To Sahibganj

Nalanda

Jahandaba

Sheikhpura

Sheikhpura

Lakhisarai

Lakhisarai

To Godda

To Varanasi

Bhabua

Bhabua

Jahanabad

Rohtas

Sasaram

WEST BENGAL

Aurangabad

Aurangabad

Nawada

Nawada

Banka

Banka

To Godda

Gaya

Jamui

To Hansdiha

Grand Trunk Road

Gaya

To Husaini

To Kodarma

To Jasidih

JHARKHAND

To Chauparan

Legend

- ✈ Airport
- District HQ
- Major Roads
- Other Roads
- Railway
- International Boundary
- State Boundary
- District Boundary
- End of satellite coverage
- River Bank
- Normal river/water bodies
- Flood Inundation

Location Map

Scale: 1:600,000

0 10 20 30 40 50
Kilometers

μ
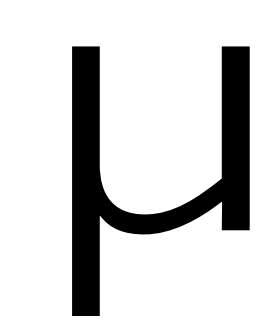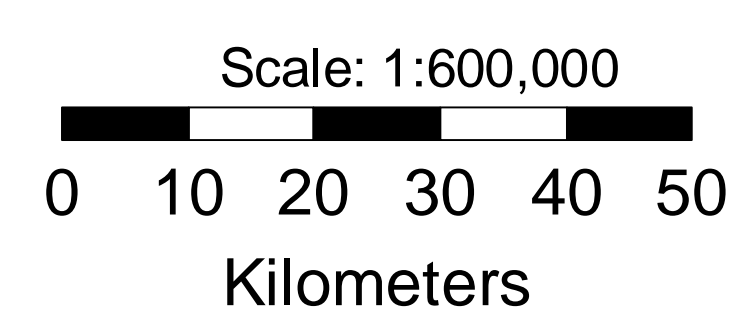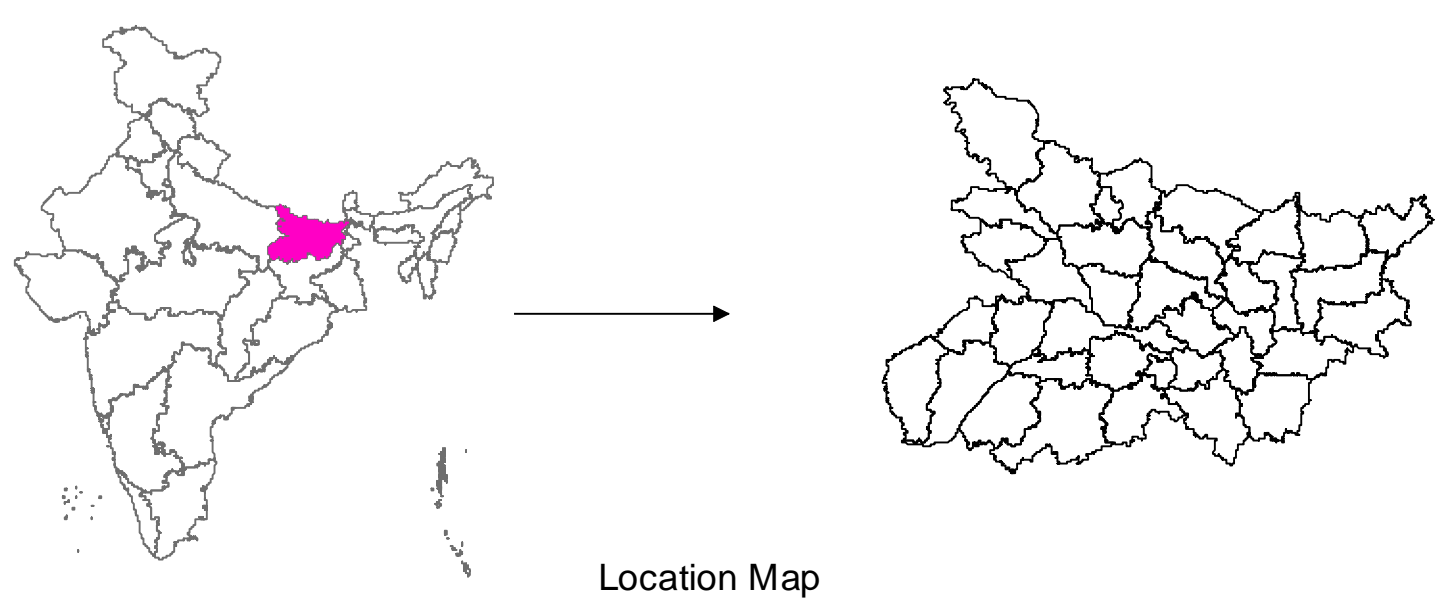
Decision Support Centre (DSC)
RS & GIS Applications Area
National Remote Sensing Agency
Dept. of Space, Govt. of India
HYDERABAD- 500 037
E-Mail: flood@nrsa.gov.in

nrsa

nrsa
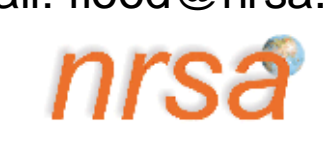
V. Bhanumurthy
Head, Disaster Management Support Division &
Dy. Project Director (DSC-Applns)

नेशनल national
रिमोट remote
सेन्सिंग sensing
एजेन्सी agency

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भारत सरकार **Government of India**
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आंध्र प्रदेश, भारत Andhra Pradesh, India

Phone: 040-23884252, Fax: 040-23870445
e-mail: bhanumurthy_v@nrsa.gov.in

Date: Aug 09, 2008

Dear Sir,

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

Please refer to our earlier letter dated 05-Aug-2008 regarding 'Near Real Time Flood Mapping' project using satellite data. So far, we have sent 47 flood maps covering floods in Bihar. In continuation, we have programmed Radarsat-1 data of 08-Aug-2008. The satellite data was analysed and a state-level flood map was composed on 1: 600,000 scale for Bihar. Further, district and detailed flood map are prepared for Darbhanga district. A brief report along with the flood maps are attached herewith containing the statistics.

In addition, the flood layer in GIS ready format and inundation statistics are transmitted to Bihar Remote Sensing Application Centre (BIRSAC) and Flood Management Information System Cell (FMISC), Patna by e-mail for further dissemination to 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 us the feedback on the flood maps.

Regards

Yours sincerely,

(V BHANU MURTHY)

1. Joint Secretary, NDM, Ministry of Home Affairs, New Delhi - 110 001. (Through e-mail and Hard copy by post)
2. NDM control Room, Ministry of Home Affairs, New Delhi - 110 001(e-mail)
3. Chairman, Central Water Commission, Sewa Bhavan, R K PURAM, New Delhi-110066. (Through e-mail and Hard copy by post)
4. Commissioner & Secretary, Disaster Management Department, Govt of Bihar, Old Secretariat, PATNA-800015 (E-mail and hard copy of the map through BIRSAC also)
5. In-charge, Flood Management Information System Cell (FMISC), Patna (e-mail)
6. Project Director, Bihar Remote Sensing Centre (BIRSAC), Planetarium Complex, Bailey Road, Patna 800001. (With a request to disseminate the information to Shri C.K.Anil, Additional Secretary to Government, Department of Agriculture, Patna and other concerned user depts.)
7. Dr V S Hegde, Programme Director, DMSP, ISRO Head Quarters, Antariksha Bhavan, New BEL Road, Bangalore-560094. (e-mail)
8. ADGM (H & A), India Meteorological Department, Mausam Bhavan New Delhi -110003

CC
PD (DSC) |
DD (RS & GIS-AA) | for kind information please
DIRECTOR, NRSA |

Bihar Floods – 2008

1.0 Background

Floods have struck South Bihar during third week of June 2008 due to heavy rains. An embankment breach was reported in Patna. The water levels of Bagmati, Kosi, Gandak, Ganga and Punpun River are nearing the danger level mark at some places. According to ground news, a breach in an embankment in Sitamarhi district was reported. Further, during third week of July 2008, it was reported that moderate flooding is in Bagmati, Punpun and Kosi rivers. Most of the areas in North and South Bihar were reported to be in flood-like situation. Muzaffurpur, Supaul, Patna, Saharsa, katihar, Nalanda, Arari and West Champaran districts were reported to be affected. The flood situation is reported to be improving. (Source: News Media)

2.0 Satellite Data

Flood Disaster Team is keeping a constant watch on the flood situation and checked the satellite data coverage over the flood affected areas. Anticipating cloud cover, Radarsat data of 08-Aug-2008 was programmed, procured and analysed. (Refer Table-1).

Table-1 Satellite Data acquired over Flood Affected Areas of Bihar

S No	Date	Satellite/ Sensor	Status
1	21-06-08	Radarsat	Procured, analysed and a flood map was sent
2	28-06-08	Radarsat	Procured, analysed and a flood map was sent
3	30-06-08	Radarsat	Procured, analysed and a flood map was sent
4	07-07-08	Radarsat	Procured, analysed and 3 flood maps were sent
5	17-07-08	Radarsat	Procured, analysed and 7 flood maps were sent
6	22-07-08	Radarsat	Procured, analysed and 9 flood maps were sent
7	24-07-08	Radarsat	Procured, analysed and 5 flood maps were sent
8	03-08-08	Radarsat-2	Procured, analysed and 9 flood maps were sent
9	05-08-08	Radarsat-2	Procured, analysed and 11 flood maps were sent
10	08-08-08	Radarsat	Procured, analysed and 3 flood maps are being sent

3.0 Data Analysis

Satellite data is rectified and flood inundation layer is extracted. A flood inundation map is composed on 1:600,000 scale for Bihar state. The flood inundation layer is integrated with district boundaries layer, for extracting district-wise flood inundation statistics which

are shown in the Table-2. Further, district and detailed flood map are prepared for Darbhanga district.

4.0 Observations

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

- Satellite data covers major part of Bihar state.
- Flood appeared to be slightly receded in most of the districts when compared to 5th August 2008.
- However, fresh flood inundation appeared in Buxar and Bhagalpur districts when compared to 5th August 2008.
- Major flood inundation was observed in Patna, Samastipur, Darbhanga, Khagaria, Muzaffurpur, Nalanda, Vaishali, Saran and Buxar districts.
- Most of the flood inundation is due to rain water accumulation / flood water in low lying areas especially in South Bihar.

Table-2

S.No	DISTRICT	INUNDATION AREA(HA)
1	Patna	20673
2	Samastipur	20665
3	Darbhanga	18211
4	Khagaria	16943
5	Vaishali	16014
6	Muzaffurpur	14774
7	Nalanda	13737
8	Saran	12149
19	Buxar	10422
10	Siwan	8082
11	Madhepura	7032
12	Saharsa	5211
13	Bhagalpur*	4550
14	Gopalganj	4401
15	Lakhisarai	3333
16	East Champaran	2922
17	Sheikhpura	2176
18	Nawada	1932
19	Begusarai	1837
20	Purnia*	1606
21	Munger	1148
	TOTAL	187818

Note:
- Inundation less than 1000 ha is not included in the statistics.
* partly covered in satellite data