# Development of National Flood Monitoring System ($NFMS_{RG}$) based on Remote Sensing Techniques.

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**Personally I was not involved with this research work.**

**The main technical person behind this work was**

**A. Z. MD. Zahedul Islam**

**Today I am presenting the research work here in favor of SPARRSO.**

**I am afraid it will be difficult for me to answer all technical questions regarding the research.**

**For any query about the research I am requesting to contact with**

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R & D activity for

# Development of National Flood Monitoring System ($NFMS_{RG}$) based on Remote Sensing Techniques.

All information in a single package ……

… is being developed in phases based on it's gradation as shown in the table.

| Output | Grade | Information |
|---|---|---|
| Flood map showing only gross flood area | G -1 | Flood area |
| Flood map showing perennial and extended flood area | G -1A | |
| G -1A + Upazila based population affected | G -2 | Population |
| G -2 + Union based population affected | G -2A | |
| G -2A + District based Aman damage | G -3 | Damage |
| G -3 + Upazila based Aman damage | G -3A | |
| …….. | …… | |
| G -3Z + Early warning with 3 day lead time | G -4 | Early warning |
| …….. | …… | |

A component research for establishment of NFMS

# Generation of Perennial Flood Water Digital Data Layer of Bangladesh Using Optical and Micro-Wave Remote Sensing Datasets.

## General Objective

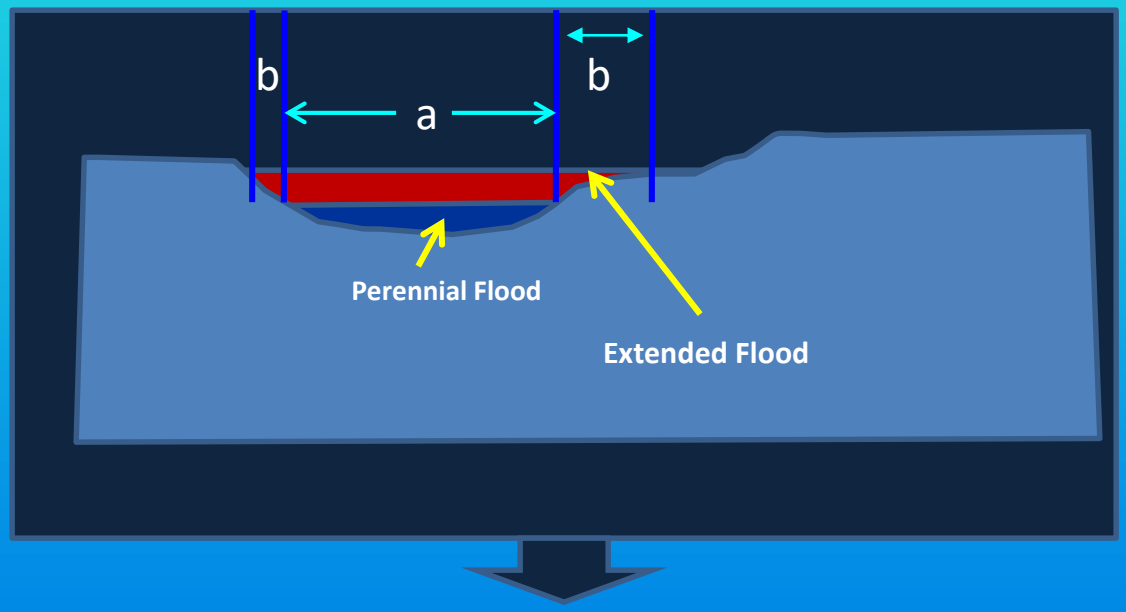
Improvement of the NFMS from G-1 to G-1A.

## Specific Objectives

1. To identify the perennial flood water areas in Bangladesh.
2. To generate digital data layer of the perennial flood water areas of Bangladesh using remote sensing datasets.

# Importance of the Research

**Extended flood affected areas are to be mapped for effective post-flood management**




During flood event, remote sensing can give only the gross flood area

Flood area

Gross =

Perennial + Extended

Needs to generate a perennial flood data layer

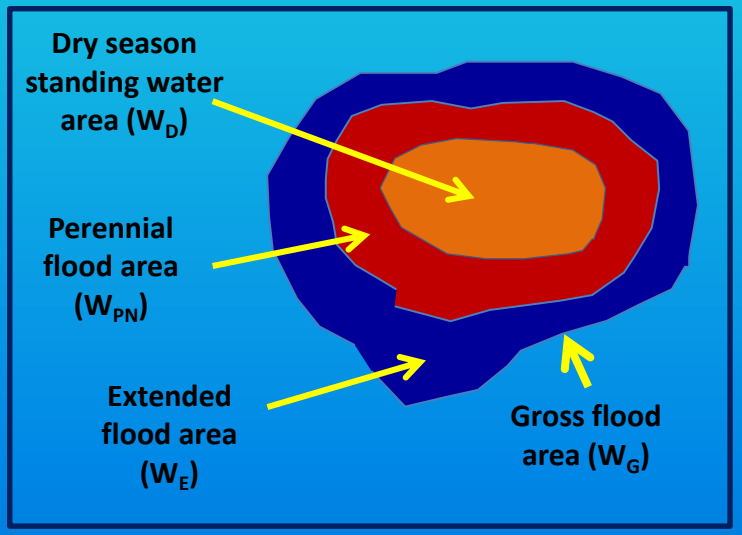
The dataset is the first in its kinds in Bangladesh.

Research Work .....

# Consideration for Perennial Flood Layer Generation

## Flood Area Model

### (Characterization of the Components of Gross Flood Area)




**In terms of area:**

$$W_E = W_G - (W_{PN} + W_D)$$

# Identification of Perennial Flood Area

## Definition

**Flood area in normal monsoon year**

**Difficulties** → **Variation of normal monsoon year itself**

**Solution** → **Peak perennial flood area**

**Synthesis of multi-temporal flood data layers**

# Technology for generation of peak perennial flood water data layer

Synthesis of multi-temporal flood data layers

Selection of multi-temporal satellite dataset of monsoon period

Rainfall analysis for peak flood condition

1. Years
2. Months

Spatial distribution of peak rainfall

Generation of Flood data layer

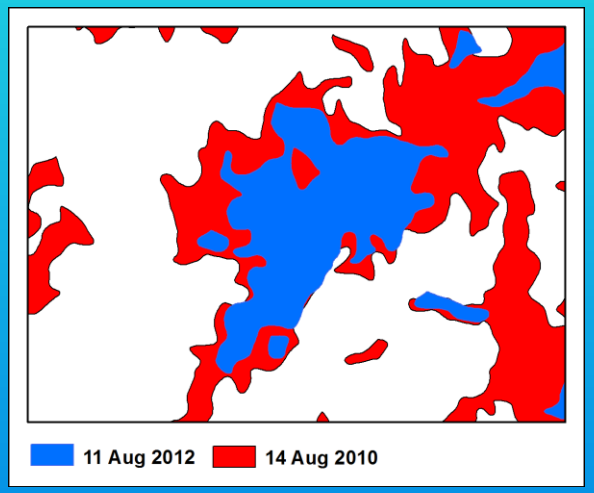
## Synthesis:

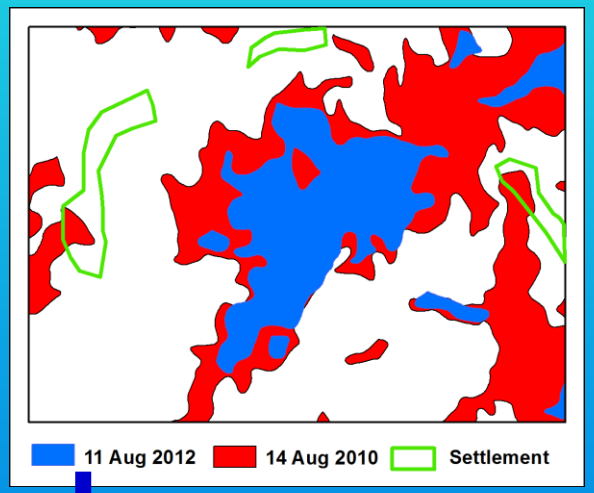
- ❑ Identification of peak flood condition
- ❑ Analysis of Affect/Damage
- ❑ Composition of peak flood condition data layer

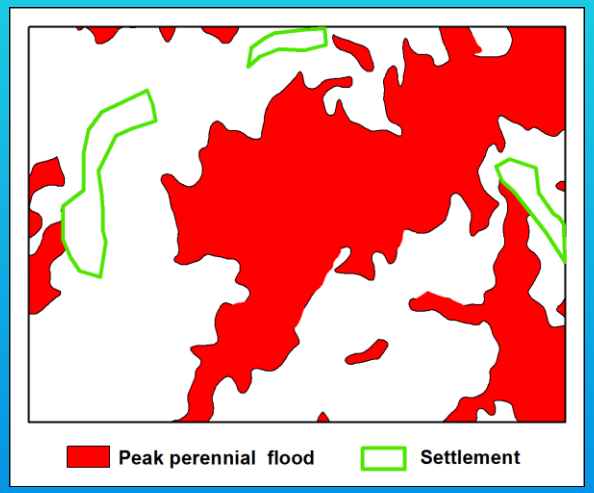
# Technology for generation of peak perennial flood water data layer

## Synthesis:

- ❑ Identification of peak perennial flood condition
- ❑ Analysis of Affect/ Damage
- ❑ Composition of peak flood condition




- ❑ Flash flood.
- ❑ Breaching of embankment.
- ❑ Change of drainage condition

# Practical Aspects

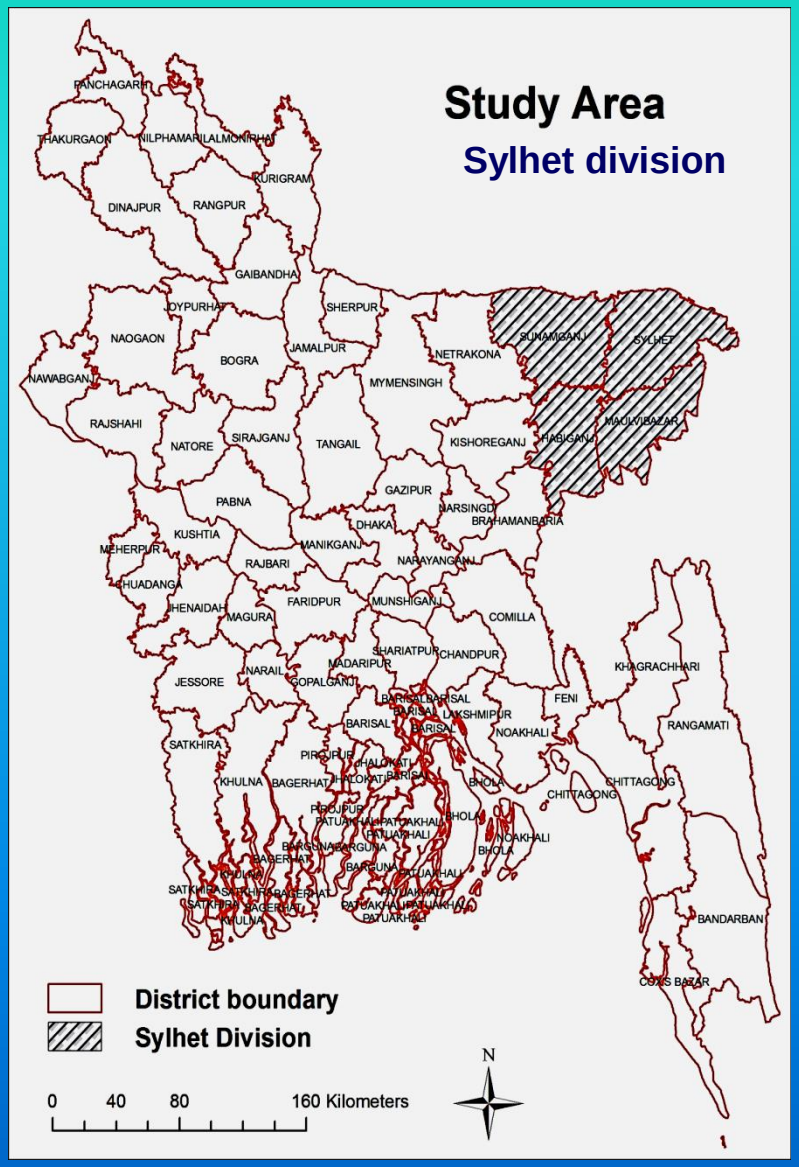
**Study Status:**

**This is a pilot study to develop methodology.**

**Study Area:** **Sylhet division.**

**Study Year:** **2000 -2012**

# Study area: Sylhet Division

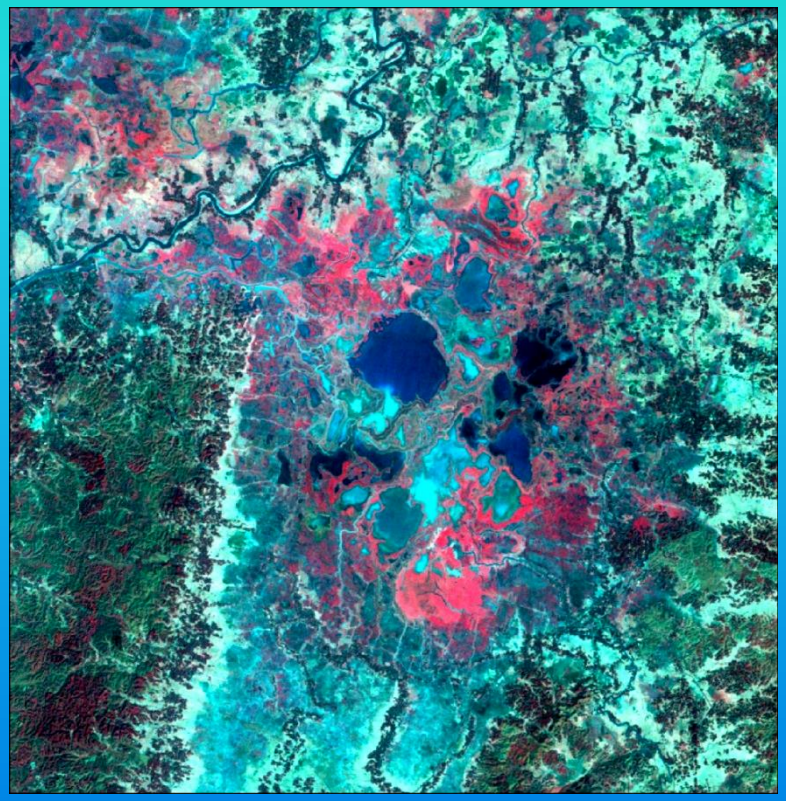



**Area: 12,595.95 Sq km**

**Districts: Sylhet, Sunamganj, Maulvi bazar and Habiganj.**

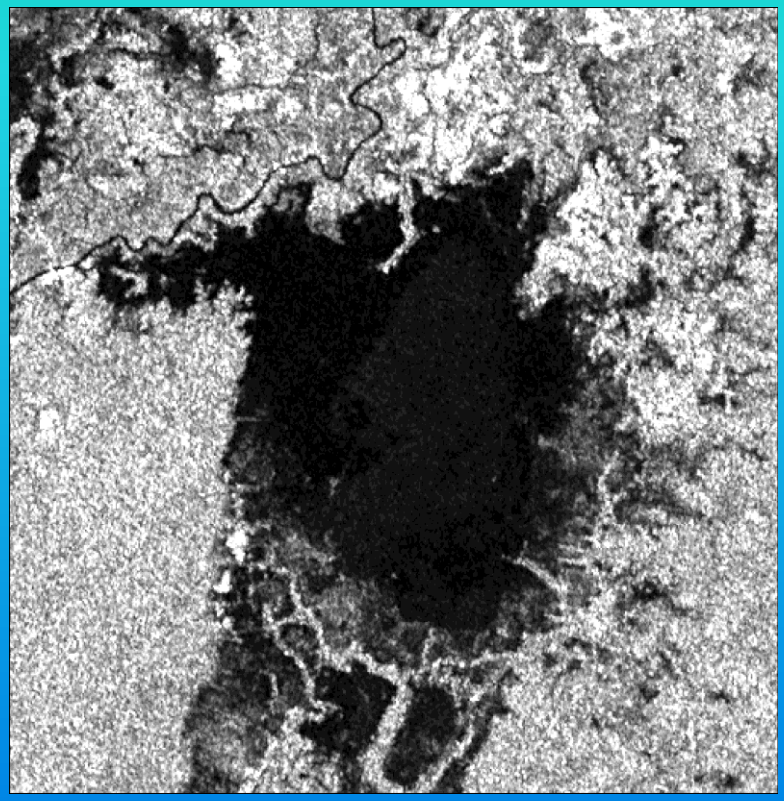
**No. of upazila: 35**

# Data Used



**Dry Season Standing Water: Landsat TM**

**30 m Resolution**



**Perennial flood water:**

**RADARSAT SCANSAR W, 100m**

**Landsat TM, 30m**

# Results

## Perennial Flood Water in Sylhet Division

| Class | Area, Ha | | % of total area | |
|---|---|---|---|---|
| | Gross | Net | Gross | Net |
| Maximum perennial water in July | 8,10,416 | 7,56,659 | 64 | 60 |
| Maximum perennial water in August/on-wards | 6,77,023 | 6,38,887 | 54 | 50 |
| Minimum perennial water | 3,54,917 | 3,01,160 | 28 | 24 |
| Dry season standing water | 53,757 | - | 4 | - |

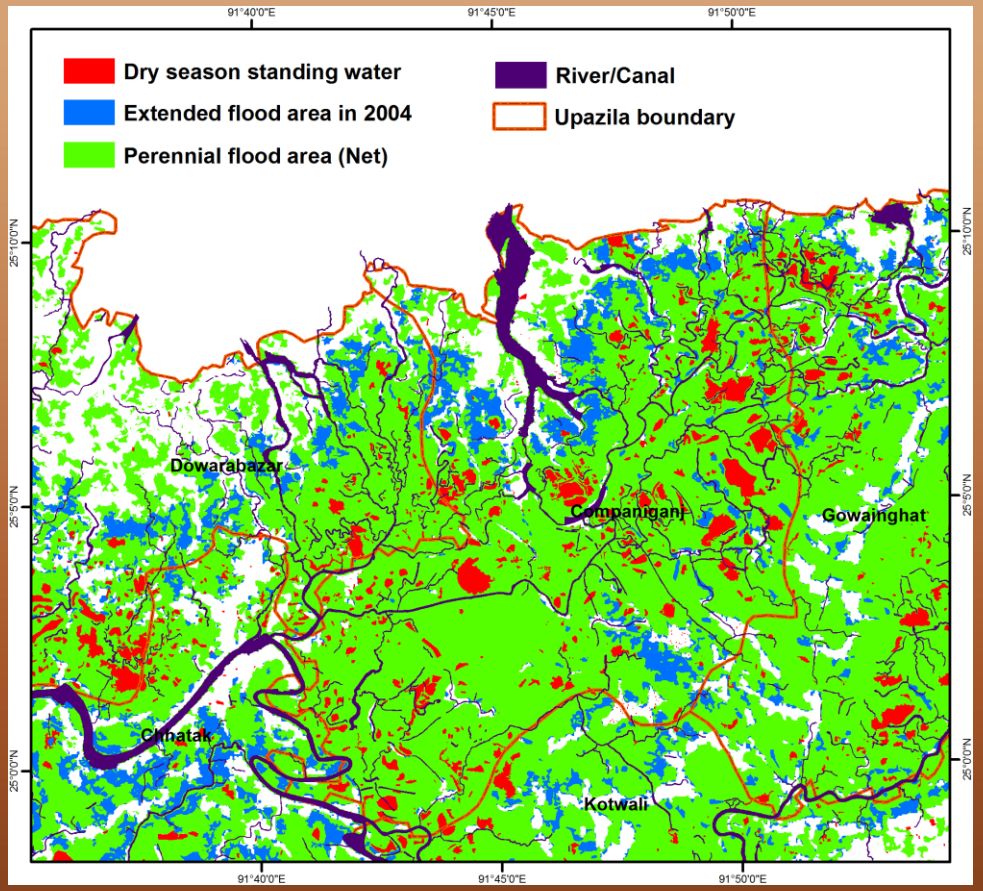
**Gross Perennial flood water in Sylhet division ranges from 28-64 % of the total area of the division**

Results

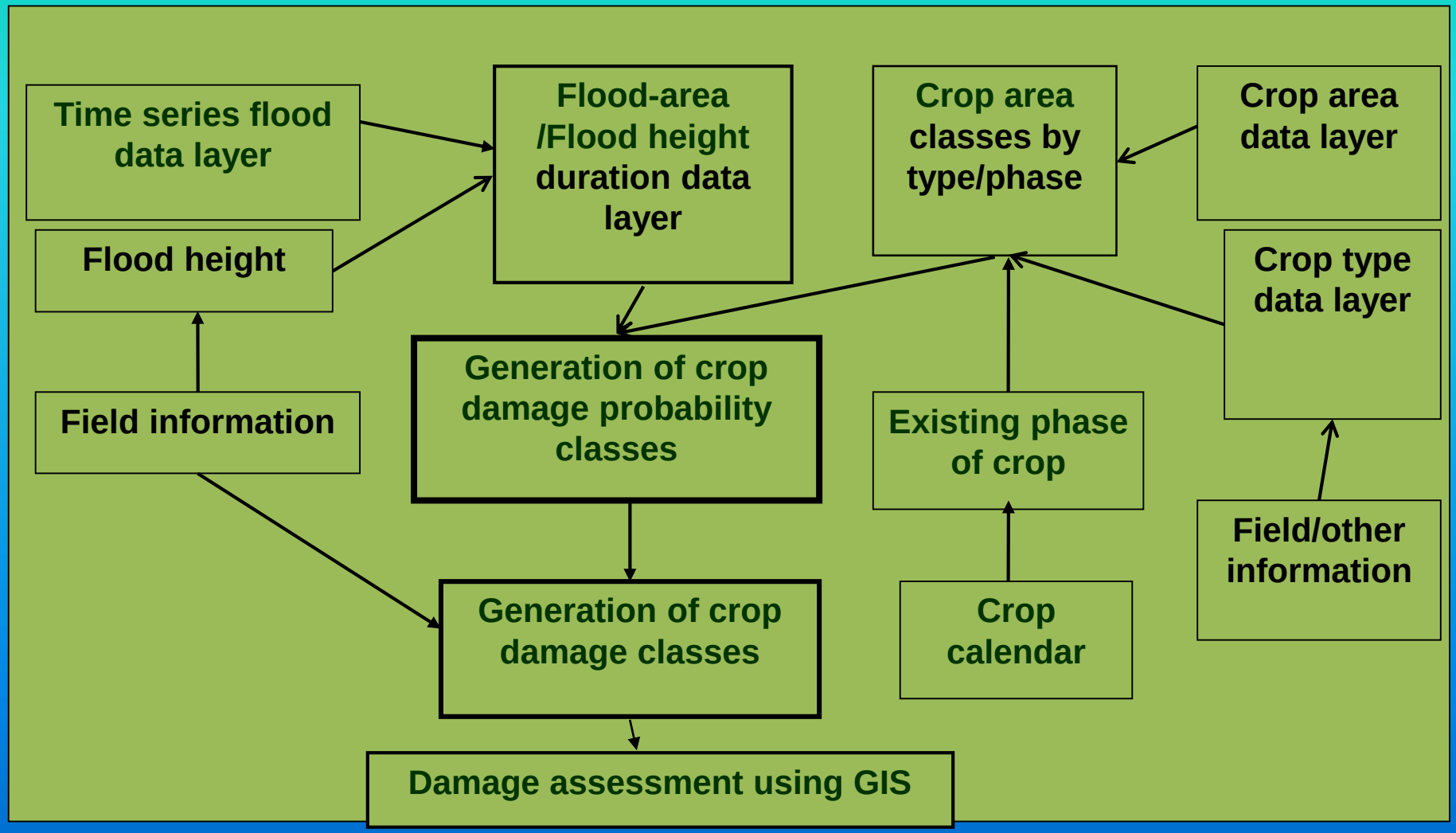
# Extended flood area mapping for 2004 flood

## $NFMS_{RG}$: G1-A

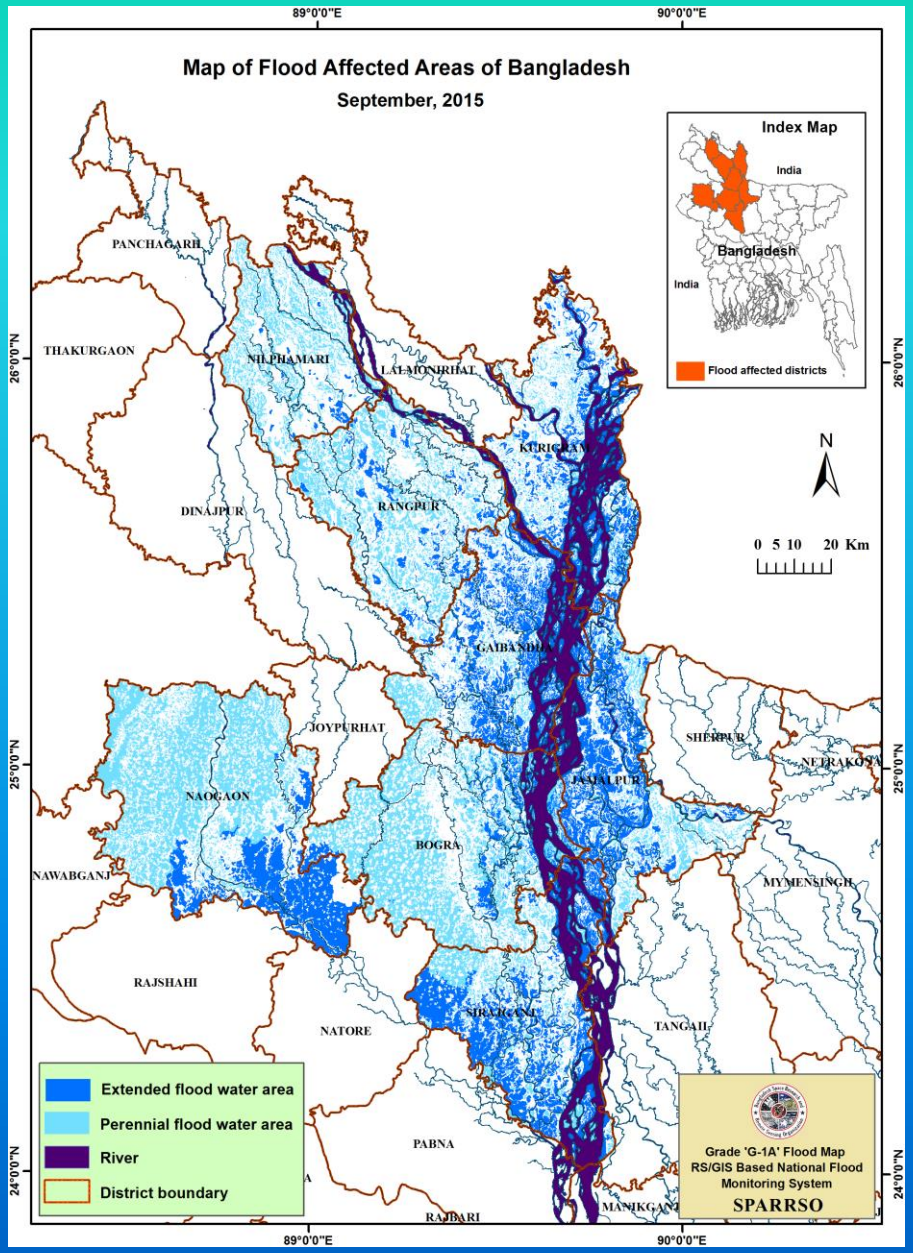
| District | Perennial flood area, Hec. | Gross flood area, Hec. | Extended flood area, Hec. |
|---|---|---|---|
| Sylhet | 1,80,357 | 2,28,859 | 48,502 |
| Sunamganj | 2,99,260 | 3,26,515 | 27,255 |
| Maulavibazar | 67,829 | 92,404 | 24,575 |
| Habiganj | 1,29,577 | 1,74,746 | 45,169 |



# Conceptual Model of Flood Induced Crop Damage

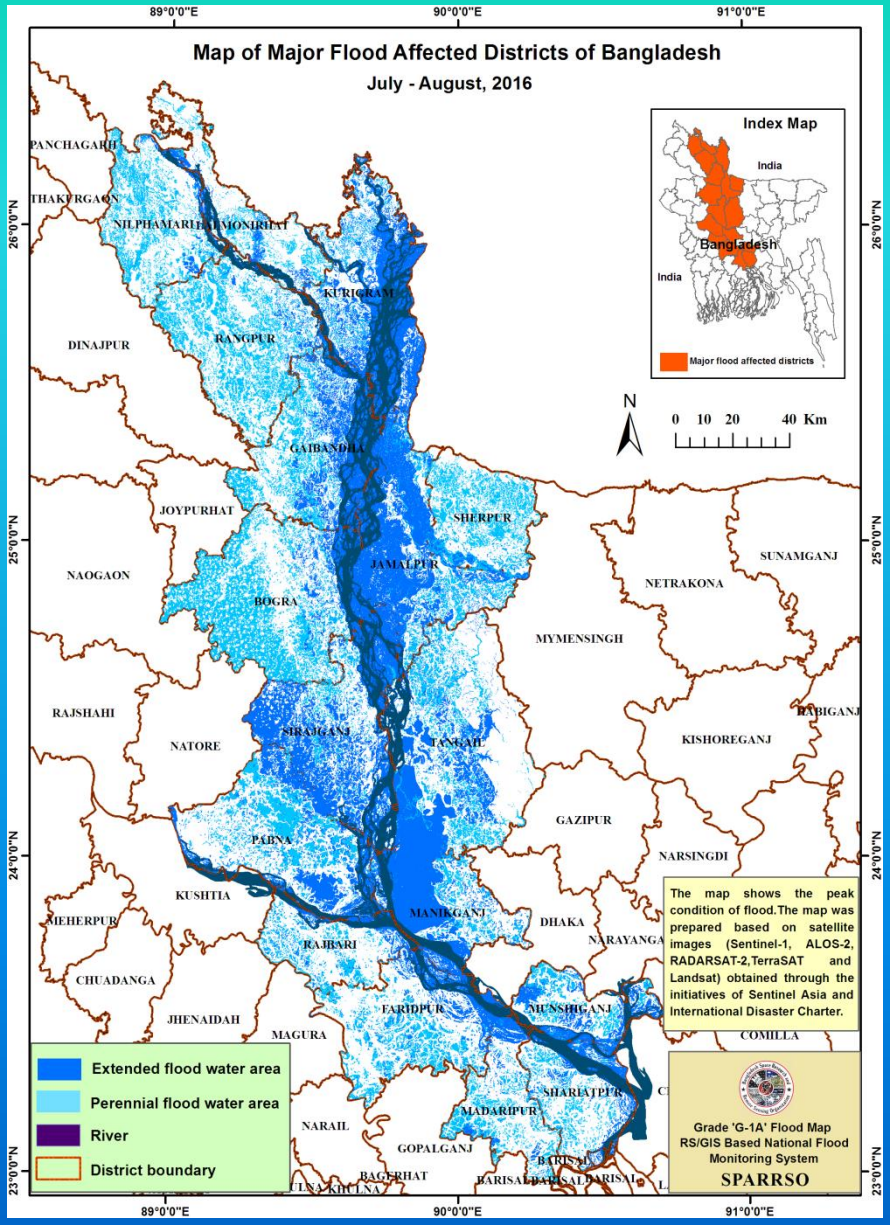


# Application: 2015 Flood




| Sl. No. | District | Area of perennial flood, Hec. | Area of extended flood, Hec. | Total Flood affected crop area, Hec. | Net crop area damaged, Hec. |
|---|---|---|---|---|---|
| 1 | Nilphamari | 52,693 | 3,329 | 2,456 | 403 |
| 2 | Rangpur | 73,112 | 15,892 | 10,748 | 3,364 |
| 3 | Kurigram | 24,661 | 50,434 | 35,397 | 16,518 |
| 4 | Gaibandha | 25,217 | 66,979 | 27,941 | 23,336 |
| 5 | Jamalpur | 30,141 | 72,147 | 10,138 | 2,964 |
| 6 | Sirajganj | 35,596 | 85,136 | 37,166 | 4,815 |
| 7 | Bogra | 1,19,136 | 21,947 | 9,859 | 6,212 |
| 8 | Naogaon | 1,44,424 | 62,190 | 23,212 | 15,647 |
| | Total | 504,980 | 378,054 | 1,07,371 | 73,259 |

# Application: 2016 Flood




| Sl. No. | Districts | Area of perennial flood, Hec. | Area of extended flood, Hec. | Flood affected settlement Area, Hec |
|---|---|---|---|---|
| 1 | BOGRA | 111896 | 29071 | 2806 |
| 2 | FARIDPUR | 39101 | 31071 | 5566 |
| 3 | GAIBANDHA | 48680 | 54530 | 2838 |
| 4 | JAMALPUR | 27325 | 110488 | 14862 |
| 5 | KURIGRAM | 21643 | 80451 | 8440 |
| 6 | LALMONIRHAT | 19629 | 8819 | 16 |
| 7 | MADARIPUR | 26779 | 12903 | 1762 |
| 8 | MANIKGANJ | 15504 | 59735 | 12771 |
| 9 | MUNSHIGANJ | 16792 | 24491 | 4344 |
| 10 | NILPHAMARI | 47397 | 8072 | 1650 |
| 11 | PABNA | 49390 | 58901 | 4286 |
| 12 | RAJBARI | 19357 | 11769 | 5471 |
| 13 | RANGPUR | 82993 | 8723 | 1203 |
| 14 | SHARIATPUR | 19051 | 19475 | 2960 |
| 15 | SHERPUR | 48610 | 8067 | 2084 |
| 16 | SIRAJGANJ | 15970 | 117120 | 8138 |
| 17 | TANGAIL | 47524 | 90101 | 15075 |
| | Total | 6,57,641 | 7,33,787 | 94,272 |


Thank You