BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI
ORIGINAL APPLICATION NO. 341/2022

IN THE MATTER OF:
Deepak Awasthi

Applicant

Versus

State of U.P. &Ors.

Respondents

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THROUGH

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ADDITIONAL AFFIDAVIT IN COMPLIANCE WITH THE HON'BLE NATIONAL GREEN TRIBUNAL'S (NGT) ORDERS DATED 24.04.2024

I, Raghvendra Singh Yadav, aged about 33 years, son of Kamlendra Singh Yadav, presently posted as Assistant Engineer at Barrage Construction Division-2, Irrigation and Water Resources Department, Kanpur, Uttar Pradesh, through principal secretary Irrigation and Water Resources Department do hereby solemnly affirm and state as under: Presently at New Delhi

1. That I am well conversant with the facts of the present case and competent to swear this affidavit before this Hon'ble Tribunal. The contents of this affidavit are true and correct to the best of my knowledge, based on official records, and nothing material has been concealed.

2. That it is most respectfully submitted that the Hon'ble Tribunal, in its order dated 13.07.2017, in Original Application No. 200/2014, directed the constitution of a Joint Committee to identify and demarcate the floodplains of the river Ganga. In compliance with this order, a Special Committee was constituted on 1st August 2017, comprising representatives from the Ministry of Water Resources (MoWR), the Central Water Commission (CWC), the Revenue Department of Uttar Pradesh, and other relevant authorities. The judgment dated 13.07.2017 is annexed herewith as **Annexure 1**.

3. That it is humbly submitted that the Joint Committee held five meetings, and in its fifth meeting, it determined the activities permissible based on the National Disaster Management Authority (NDMA) guidelines. The committee's findings and recommendations were submitted in a comprehensive joint report to the Hon'ble Tribunal by the Central Water Commission. The methodology of demarcation of flood plain zone has been duly explained in this report aswell :-

- FLOOD FREQUENCY ANALYSIS:- The flood frequency analysis was carried out by Hydrology North CWC. Various distribution viz 2-parameter log Normal, 2 Parameter log Gamma, Log Pearson Type-III and Gumble have been used to derive return period flood.
- SATELLITE DATA SELECTION:- Based on CWC records, dates for some high flood events in the recent past were identified for collecting satellite imagery data from NRSC (National Remote Sensing Centre).
- DIGITAL ELEVATION MODEL SELECTION:-SRTM 90 and Cartosat 30 m DEM available in public domain were considered for the study area.
- DEM REFINEMENT:- SRTM DEM 90 was further processed to improve the river profile below the water surface.
- MODELLING METHODOLOGY:- Using SRTM 90 m DEM and outputs of flood frequency analysis, a coupled hydrodynamic model (1D) and two dimensional (2D) was setup. Steady state analysis was performed to work out the extent of floodplain for various return period flood.
- The joint report to the Hon'ble Tribunal by the Central Water Commission is annexed herewith as **Annexure 2**

4. Apart from above, it is also noteworthy that NMCG has submitted a report related to recurrence interval and floodplain identification in compliance with the order dated 22.07.2022 passed in O.A. 200/2014 in the Hon'ble Tribunal. The excerpt from para 3.80 is as follows:

> "Under para 3-Definition sub para (l) 'floodplain' has been defined as such area of River Ganga or its tributaries which comes under water on either side of it due to floods corresponding to its greatest flow or with a flood of frequency once in a hundred years.

The definition doesn't mean to convey that the entire zone corresponding to a flood of recurrence interval of 1 in 100 years is to be declared as a protected zone with no construction being allowed in such a zone. Instead, the zone corresponding to a flood with a 1 in 100 years recurrence interval can be divided into three zones, with the innermost zone being the active floodplain corresponding to a flood of 1 in 5 years recurrence interval with no construction being allowed; the next buffer zone being the regulatory zone corresponding to a flood of 1 in 25 years recurrence interval, and the outermost zone can be a zone in which various other categories of activities can be permitted by mapping their vulnerability such that risk to flood hazards remains minimal" .

5. That it is most respectfully submitted that the Hon'ble Tribunal, in its order dated 13.07.2017, in point no. 182.3 (i) & (iii), specified directions to constitute a Joint Committee consisting of representatives from MoWR, Senior Officer from the Department of Irrigation, State of Uttar Pradesh, Revenue Department of Uttar Pradesh, and Central Water Commission which shall identify and demarcate the floodplains of river Ganga in Segment B of Phase-I on a one-in-twenty-five-year cycle. The special committee also had to identify no development/construction zones, regulatory zones, and the activities that can be/cannot be carried on in the regulatory zone of the floodplain. In compliance, on 1st Aug 2017, a Joint Committee headed by Sh. S. Masood Hussain, member (WP&P), Central Water Commission, and representatives from the Ministry of Water Resources (MoWR), NMCG, NIH & Revenue Dept, UP, was formed. Five meetings were held by this committee, and in the 5th meeting, it was identified which activities were to be permitted based on NDMA guidelines, and a joint report was submitted before the National Green Tribunal by the Central Water Commission.

6. That as per the report, the regulatory zone permits certain construction activities under specific conditions. For instance, construction of residential, institutional, and commercial buildings, schools, dispensaries,

and recreational facilities is allowed with stipulations such as prohibition of basements, construction on stilts (columns), and plinth levels above flood lines. The roof level of single-storey or first-floor levels must be above the 100-year flood level/Highest Flood Level (HFL), preferably using the ground floor for non-residential purposes.

7. That it is most respectfully submitted that the methodology and demarcation align with the River Ganga (Rejuvenation, Protection and Management) Authorities Order, 2016, and its subsequent amendments, including the 2024 amendment. This alignment ensures that the identified floodplain zones are categorized into no-development zones, regulatory zones, and zones for permissible and non-permissible activities.

9. That it is most respectfully submitted that all activities permissible under the no-development zone and regulatory zone are based on the recommendations of the Special Committee constituted under O.A. No. 200/2014, as per the order dated 13.07.2017. The committee's final report, based on the fifth meeting, identifies activities to be permitted in line with NDMA guidelines. All steps have been taken as per the recommendations of the Special Committee, and the methodology has been explained in this affidavit. The final meeting's recommendations are annexed herewith as **Annexure 3**.

10. That it is further humbly submitted that the compliance status as of the order dated 24.04.2024 includes detailed demarcation of the prohibited zone and adherence to guidelines that regulate construction activities. The identified zones and activities are in consonance with the River Ganga (Rejuvenation, Protection and Management) Authorities Order, 2016, ensuring that no unauthorized activities occur in the floodplain zones. The report filed by NMCG details the recurrence interval and floodplain identification in compliance with the order dated 22.07.2022 in O.A. 200/2014. The relevant excerpts are annexed herewith as **Annexure 4**.

11. That any further directions passed by this Hon'ble Tribunal will be complied with promptly.

NOTARY RENU AGARWAL Delhi Regd. No. 17806 GOVT OF INDIA

NOTARY
RENU AGARWAL
Delhi
Regd. No. 17806
GOVT. OF INDIA

DEPONENT

02 AUG 2024

VERIFICATION

Verified on solemn affirmation at New Delhi on this 02 AUG 2024 day of ~~August~~ 2024, that the contents of the foregoing affidavit are true and correct to the best of my knowledge and no part of it is false and nothing material has been concealed there from.

Priyanka
I identified the deponent who has signed in my presence

DEPONENT

02 AUG 2024
ATTESTED
NOTARY PUBLIC
(INDIA)
Presently at New Delhi

BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH
NEW DELHI
.....

ORIGINAL APPLICATION NO. 200 OF 2014

(C.WRIT PETITION No. 3727/1985)

(M.A. No. 594/2017 & 598/2017)

IN THE MATTER OF:

M.C. Mehta

.....Applicant

Versus

Union of India

.....Respondents

AND

ORIGINAL APPLICATION NO. 501 OF 2014
(M.A. No. 404 of 2015)

Anil Kumar Singhal

.....Applicant

Versus

Union of India & Ors.

.....Respondents

AND

ORIGINAL APPLICATION NO. 146 OF 2015

Society for Protection of Environment &
Biodiversity & Anr. .....Applicant

Versus

Union of India & Ors. .....Respondents

AND

APPEAL NO. 63 OF 2015

Confederation of Delhi Industries & CEPT Societies
(An Organisation of CETP Societies) .....Applicant

Versus

D.P.C.C. & Ors. .....Respondents

permission from CGWA. The CGWA should also regulate extraction of groundwater for agriculture and other purposes as per State policy. The permission shall be granted subject to such terms and conditions as may be necessary for the purpose of preventing and controlling the pollution on the one hand and ensuring maintenance of depletion in the groundwater projects as well as ensuring measures for recharging of the groundwater levels.

4. We direct the CGWA to carry out the study and notify the areas in Segment-B of Phase-1 which are Overexploited, Critical, Semi-critical and Safe zone. There shall be complete prohibition on extraction of groundwater in the critical areas. Further, in relation to other two areas, the CGWA shall also publicize the fundamental conditions subject to which the extraction of groundwater would be permitted and the extent thereof and if necessary would require people to fix the flow meters who are using the borewell or tube-well for extraction of the groundwater.

DEMARCATION OF FLOOD PLAINS AND CONNECTED DIRECTONS

182.3 We pass the following directions for compliance:

i) We direct and constitute a Special Committee

consisting of representatives from MoWR, Senior Officer from Department of Irrigation, State of Uttar Pradesh, Revenue Department of Uttar Pradesh and Central Water Commission which shall identify and demarcate the floodplains of river Ganga in Segment B of Phase-I on one in twenty five years cycle.

ii) Till the said identification and demarcation of floodplain is completed, we direct that 100 meters from the edge of the river would be designated as no development/construction zone in Segment B of Phase-I i.e. Haridwar to Unnao, Kanpur.

iii) The Special Committee would also identify no development/construction zone, regulatory zone and the activities that can be/cannot be carried on in the regulatory zone of the floodplain.

iv) There shall be a complete prohibition on disposing of MSW, E-waste or bio-medical waste on the floodplain or in river Ganga or its tributaries falling in Segment B of Phase-I.

v) As directed in our order dated 11th April, 2017, for each default, the defaulter would be liable to pay Environmental Compensation of Rs. 50,000/- per default for such dumping and/or throwing the

all stakeholders will work in tandem and extend full cooperation to each other to implement this judgement. They shall make a concerted effort to achieve the object of this national project of cleaning and rejuvenation of river Gang and its tributaries. There is no scope for waiting any further. Stakeholders have to take both effective and remedial measures to restore the pristine nature of the holy river Ganga and its tributaries, now, atleast.

186. Ergo we dispose of the above applications and appeal to the limited extent with the directions and orders as afore-stated, while leaving the respective parties to bear their own costs.

Swatanter Kumar
Chairperson

Jawad Rahim
Judicial Member

Raghuvendra S. Rathore
Judicial Member

Bikram Singh Sajwan
Expert Member

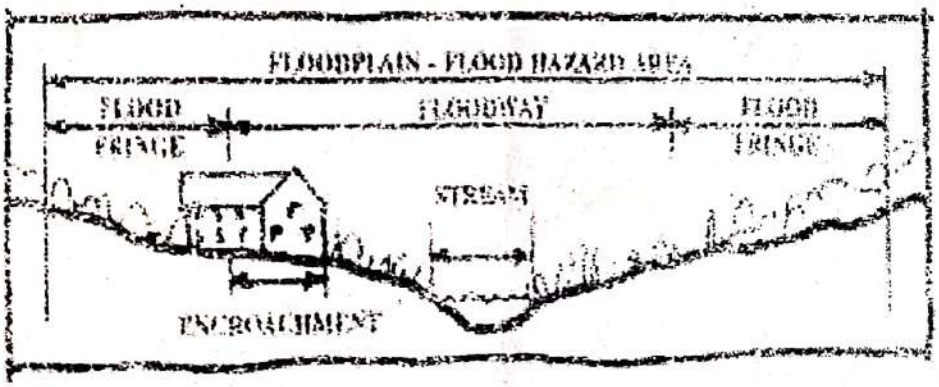
Ajay A Deshpande
Expert Member

Nagin Nanda
Expert Member

New Delhi
13th July, 2017

Final Report

STUDY TO IDENTIFY AND DEMARCATE THE FLOOD PLAINS OF RIVER GANGA IN SEGMENT B OF PHASE I (HARIDWAR TO UNNAO)



Ministry of Jal Shakti

Department of Water resources, River development & Ganga Rejuvenation

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Report on identification and demarcation of the flood plains of river Ganga in segment B of Phase- I (Haridwar to Unnao)

1. INTRODUCTION

Floods constitute one of the major national calamities faced by India almost every year resulting in substantial loss of life, large scale damage to property, disruption of community lifelines besides entailing untold misery to the millions. Concerted efforts have been made over the years to reduce the damage due to floods and mitigate the sufferings of the people. Various structural flood control measures were taken up in the past including construction of reservoirs, embankments, drainage channels, etc. It is, however, now realised that absolute and permanent protection to all flood prone areas and for all magnitudes of floods by structural measures alone is not only impossible but also not economically viable. The emphasis has therefore been rightly shifted to non-structural measures like Flood Plain Zoning and Regulation, Flood Forecasting, etc., to effectively supplement the structural measures for providing sustainable protection to flood affected areas.

The broad concept in flood plain zoning is to regulate the land use in order to mitigate the damage potential. The role of flood plains and need for flood plain zoning was recognised by the Central Water Commission (CWC) as early as 1975. CWC had prepared a Model Floodplain Zoning Bill for adaptation by states but it did not receive due attention of states.

1.1 BACKGROUND

In pursuance to the directions contained in the judgment passed by Hon'ble NGT on 13th July 2017, in respect of Phase-I, Segment 'B' of River Ganga (Haridwar to Unnao), Ministry of Water Resources, River development & Ganga Rejuvenation constituted a special committee vide OM T-12/2017-18/268/NMCG dated 01 August 2017 (copy enclosed as Annexure-1) with following scope:

a) Identify and demarcate the flood plains of river Ganga in segment B of Phase- I on one in twenty five year's cycle or appropriately

b) Identify no development /construction zone, regulatory zone and the activities that can be /cannot be carried on in the regulatory zone of the floodplain.

The first meeting of the committee was held under the chairmanship of Member (WP&P), CWC on 21.09.2017(Annexure-2), wherein it was decided to constitute a core group to carry out following task:

- Data collection and compilation of available information

- Identification of flood event dates corresponding to 2, 5, 10, 25, 50, 100 return period and supplying the same to NRSC for further analysis
- Processing of collected information

Using the available datasets and latest modelling techniques, a presentation on flood plain demarcation for the reach from Haridwar to Unnao was made to the committee during the second meeting held at CWC HQ on 30th January 2018 (Annexure-3). The committee decided to prepare an interim report based on the analysis done so far mentioning the assumption made and/or limitations of the study.

Further on the basis of the discussion held during the third meeting held on 23rd April, 2018 (Annexure-4), it was decided to re-examine the flood frequency analysis and validate the study by incorporating details of embankments, cross-section of river at every 5 Km interval upto 1 m above HFL, to be provided by Irrigation department, Govt. of U.P.

During the 4th meeting held on 22nd April, 2019 (Annexure-5), the core group presented 3 types of flood demarcation analysis viz. Fully based on Satellite, Fully based on Model with DEM reconditioning and Hybrid approach. It was decided to carry out the ground truth verification by Irrigation department, Govt. of U.P. in consultation with core group/ officers in field offices of CWC/ GFCC

In compliance to the decision taken in the 4th meeting, the ground truth verification was done in 3 phases i.e. (from 07.05.2019 to 08.05.2019, 15.05.2019 to 17.05.2019, 11.06.2019). The report of the same is enclosed as Annexure-6.

Subsequent to completion of exercise of ground truth verification, the report was revised on the basis of the recommendations of the joint team constituted for ground truth verification. The report, including the activities that can be/cannot be carried out in the No development / Regulatory zones of the floodplain, was presented during the 5th meeting of the Special Committee held on 29th August 2019 (Annexure 7).

Taking into consideration the findings of ground truth report, embankment data provided by U.P. Govt., other datasets/information and comments of the participants received during the 5th meeting, the report on demarcation of floodplains along with the activities to be carried out in such demarcation zones has been finalized.

2. DATA USED

Following data/information was used:

- 90m Digital elevation model (DEM) from Shuttle Radar Topography Mission (SRTM) of United States.
- Analyzed Satellite datasets of Joint Research Commission- European Commission for the period from (1984-2015)

- Cartosat 30 m DEM from Indian Space Research Organization (ISRO)
- Historical Annual Peak discharge data of CWC sites.
- Satellite images of flood events from National Remote Sensing Centre.
- Embankment data provided by Irrigation Department, Govt. of U.P.

3. SOFTWARE USED

3.1 MIKE FLOOD

It includes a wide selection of specialized 1D and 2D flood simulation engines, enabling to model any flood problem - whether it involves rivers, floodplains, flooding in streets, drainage networks, coastal areas, dams, levee and dike breaches, or any combination of these. MIKE FLOOD is capable to generate dynamic flood depth maps and velocity distribution (spatially) maps of flood water propagation.

There are several advantages of applying models like MIKE FLOOD. It provides more reliable and accurate flood maps and flood hazard maps, than simpler methods like superimposing static water level maps on topographic maps. It simulates water levels accurately taking into account backwater effects from e.g. obstructions on the flood plain, and simulates correctly pathways, which may not necessarily be the shortest and direct distance between e.g. the river and the point of concern.

This technique requires a fine resolution land terrain model. The land terrain model, HD model are dynamically linked in MIKE FLOOD, and generate flood depth map and flood velocity map in every time step of its computation process.

3.2 ARCGIS

It is a geographic information system (GIS) for working with maps and geographic information. It is used for creating and using maps, compiling geographic data, analyzing mapped information, sharing and discovering geographic information, using maps and geographic information in a range of applications, and managing geographic information in a database.

4. METHODOLOGY

All the relevant information were collected from various agencies and then analyzed in the following manner:

4.1 FLOOD FREQUENCY ANALYSIS

The flood frequency analysis was carried out by Hydrology North, CWC. Various distribution viz. 2-Parameter log Normal, 3-Parameter log Normal, 2-Parameters Gamma,

Log Pearson Type-III and Gumble have been used to derive return period flood. The average historical data availability was around 40 years. The results are shown in Table 1.

Table 1: Flood Frequency Analysis

S.No	Station	Distribution	Magnitudes (m^3/s) for different return period flood					
			2 yr	3 yr	10 yr	25 yr	50 yr	100 yr
1	Rishikesh	Gumbel	5240	6286	8914	10763	12135	13497
2	Garhmukteshwar	2-Parameter log Normal	4631	5535	7870	9555	10832	12125
3	Kachla Bridge	Gumbel	6140	7168	9751	11569	12917	14255
4	Fatehgarh	Gumbel	4594	5737	8608	10628	12126	13614
5	Ankinghat	Log Pearson III	7117	8597	11687	13377	14426	15326
6	Kanpur	2- Parameter Gamma	7984	9506	13057	15348	16962	18507

4.2 SATELLITE DATA SELECTION

1. Based on the CWC records, dates for some high flood events in the recent past were identified for collecting satellite imagery data from NRSC.

NRSC provided satellite images for two flood events dated on 18-19 June 2013 and 23rd & 25th September 2010 through their web messaging service (WMS). Using GIS software, outer envelope of flood extent was digitized manually.

2. Joint Research Centre- European Commission have analyzed Landsat multispectral Satellite images of past 31 years (1984-2015) for deriving frequency with which water returns from year to year i.e. recurrence interval. The same has been used in the study through Google Earth Engine platform.

4.3 DIGITAL ELEVATION MODEL SELECTION

SRTM 90 m and Cartosat 30 m DEM available in public domain were considered for the study area. It was noticed that SRTM 90 m DEM was relatively better representing elevation value, more commonly used by scientific community and was therefore selected for use in the model. The comparison of elevation values of few selected stations in the study area is shown in Table 2:

Table 2: Spot Height Analysis

Station	Spot Heights(m)		
	SRTM	Cartosat	Difference
Ankinghat	127	121.6	5.4
Garhmuketshwar	201	199	2
Fatehgarh	138	135.8	2.2
Kachhalabridge	161	164.5	-3.5
Kanpur	115	111.5	3.5
Haridwar	294	293.7	0.3

4.4 DEM REFINEMENT:

SRTM DEM 90 m was further processed to improve the river profile below the water surface, since SRTM does not capture the same. To achieve this, lean season satellite imageries for last 30 years, representing the river portion only was adjusted according to the average mean depth based on the cross section data of CWC at six gauging locations.

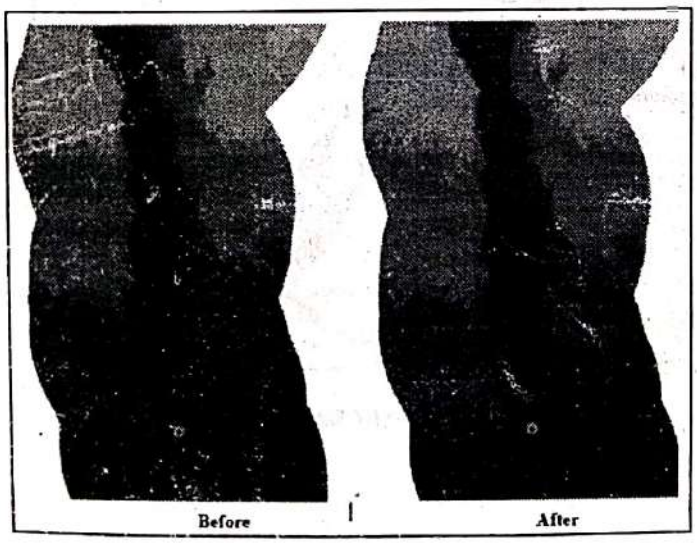

Figure 2: DEM refinement –River Bathymetry

4.5 MODELLING METHODOLOGY

Using the SRTM 90m DEM and the outputs of flood frequency analysis, a coupled hydrodynamic model - one dimensional (1D) and two dimensional (2D) was setup (Figure 1). The details of setup are as under :

- Upstream branch to provide constant flood magnitude equal to the given return period at rishikesh using a 1D model.
- Downstream branch for draining the flow from dalmu using a 1D model.
- Flood plain bathymetry for routing the flows between rishikesh and dalmu using a 2D Hydrodynamic modeling.
- Five flow locations (Garhmukteshwar, Kachla Bridge, Fatehgarh, Ankinghat and Kanpur) in 2D model for maintating constant river flows equal to the given return period flood magnitude.
- 2D domain was represented by finite difference rectangular grid (MIKE 21 "classic")

Steady state analysis was performed to workout the extent of floodplain for various return period flood.

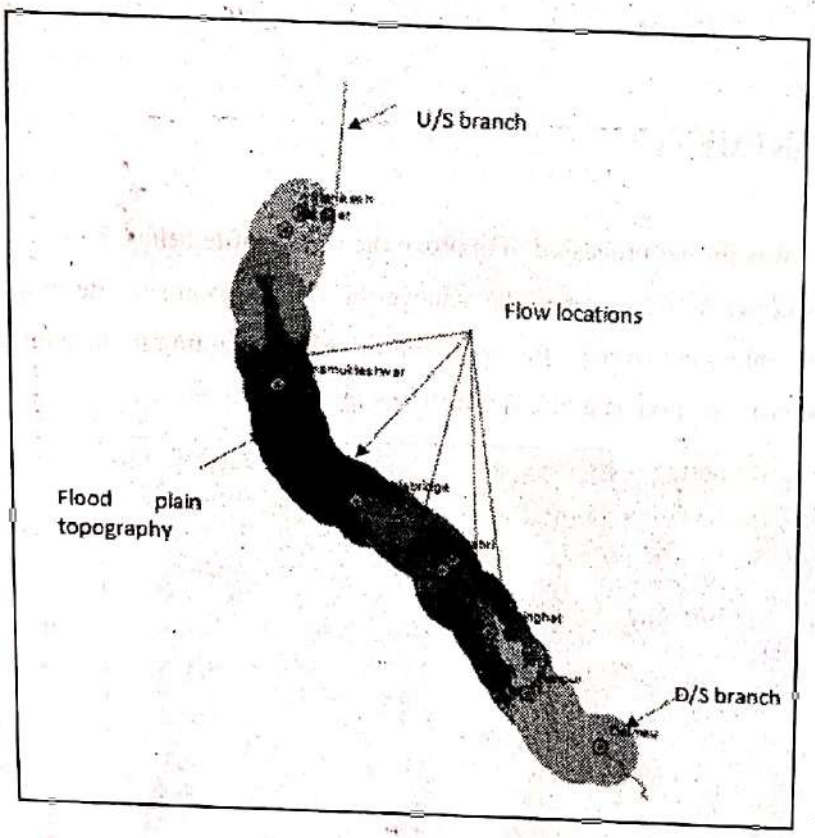

*Figure 3: **Model Setup***

5. Approaches analyzed for flood plain demarcation

5.1 Flood Plain Demarcation based on Satellite Data/Images

5.1.1 No Development Zone

Satellite data of past 31 years (1984-2015) of JRC (Joint Research Centre-European Commission) was taken for study to demarcate flood boundary based on recurrence interval. It was found that the flood extent corresponding to recurrence interval of 2, 3 & 5 years were most frequent with little difference in spatial extent. This was mainly due to presence of embankment and braided nature of the river. It was thus considered most appropriate for No-Development Zone which is also in-line with the NDMA guidelines for *Management of floods, 2008*.

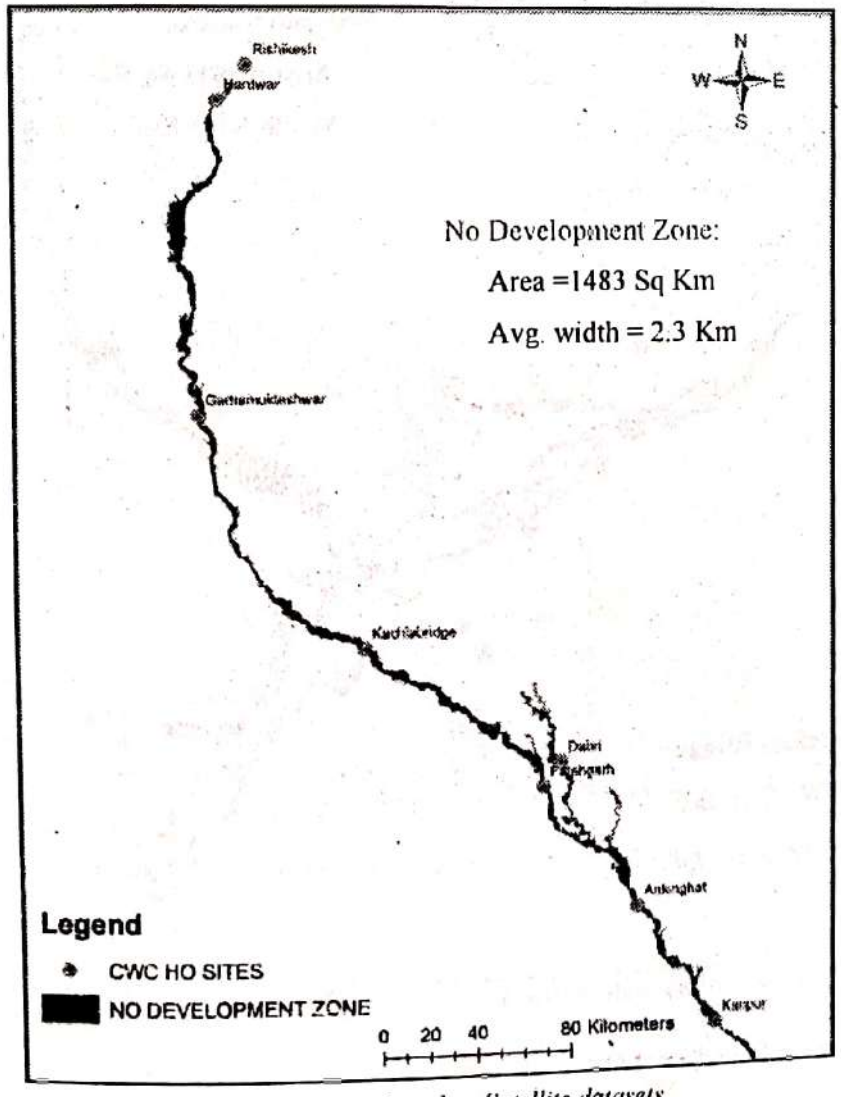

Figure 4: No Development zone based on Satellite datasets

5.1.2 Regulatory Zone

Outer envelope of flood extent on the satellite images provided by NRSC was digitized manually. The outer extent of Satellite images for two flood events dated on **18-19 June 2013** and **23rd & 25th September 2010** which was found to be near to 25 year return flows has been considered for as **Regulatory Zone demarcation**. This accounts for both protected i.e. embanked as well as unprotected flood plain area in the analysed reach.

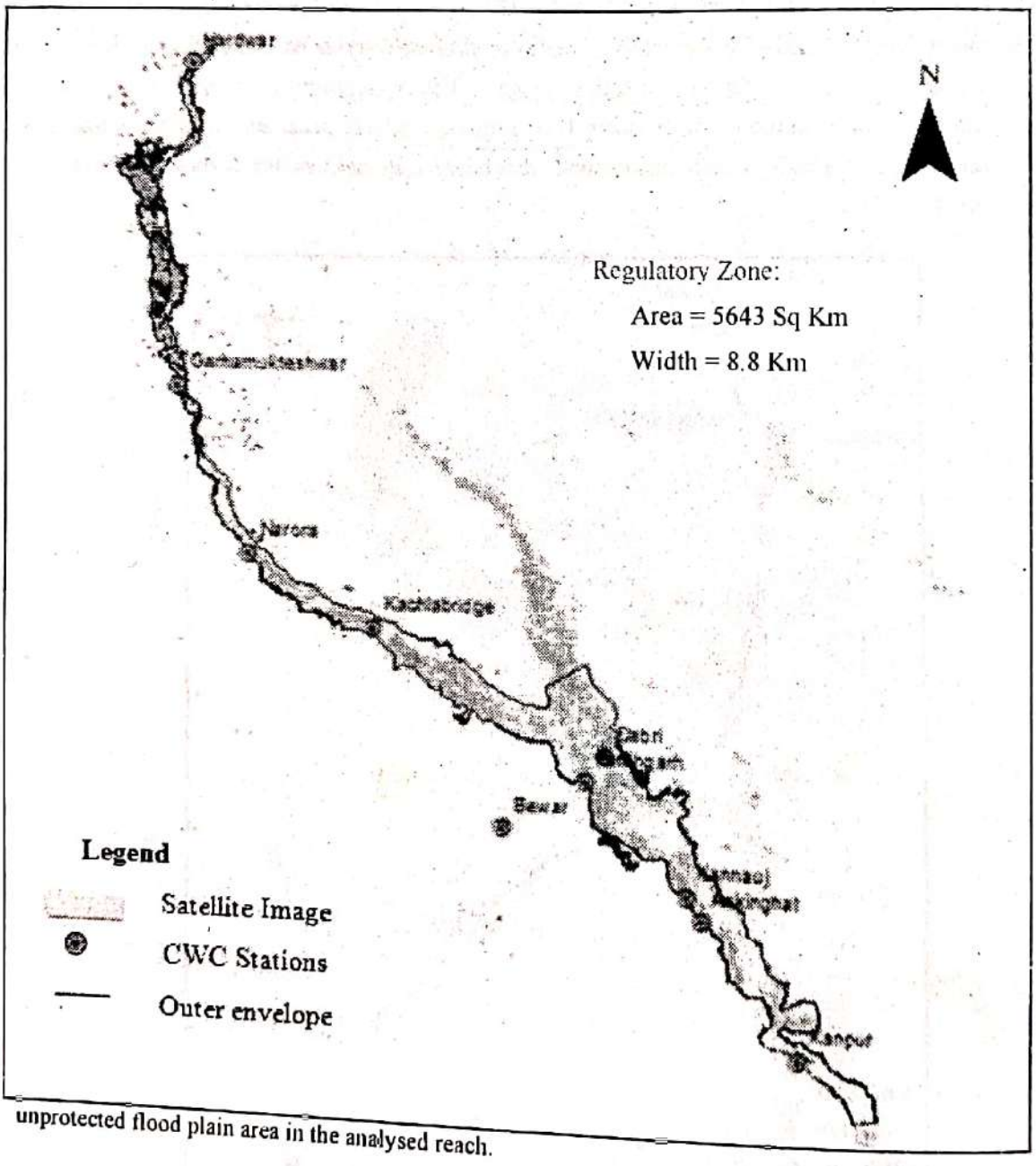

Figure 5: Satellite derived Floodplain- Outer extent of Regulatory Zone

5.2 Model based Flood Plain Demarcation

The SRTM 90m DEM used for modeling was further processed to cater for the sub-surface river bathymetry which was not accounted in the original DEM. The final model results show many small islands within the flood extent causing inundation gaps. These gaps have been filled to get final inundation area.

No Development Zone - Based on **2-Year** Return Period Flood (without Embankment)

Regulatory Zone – Based on **25 Year** Return Period Flood (without Embankment)

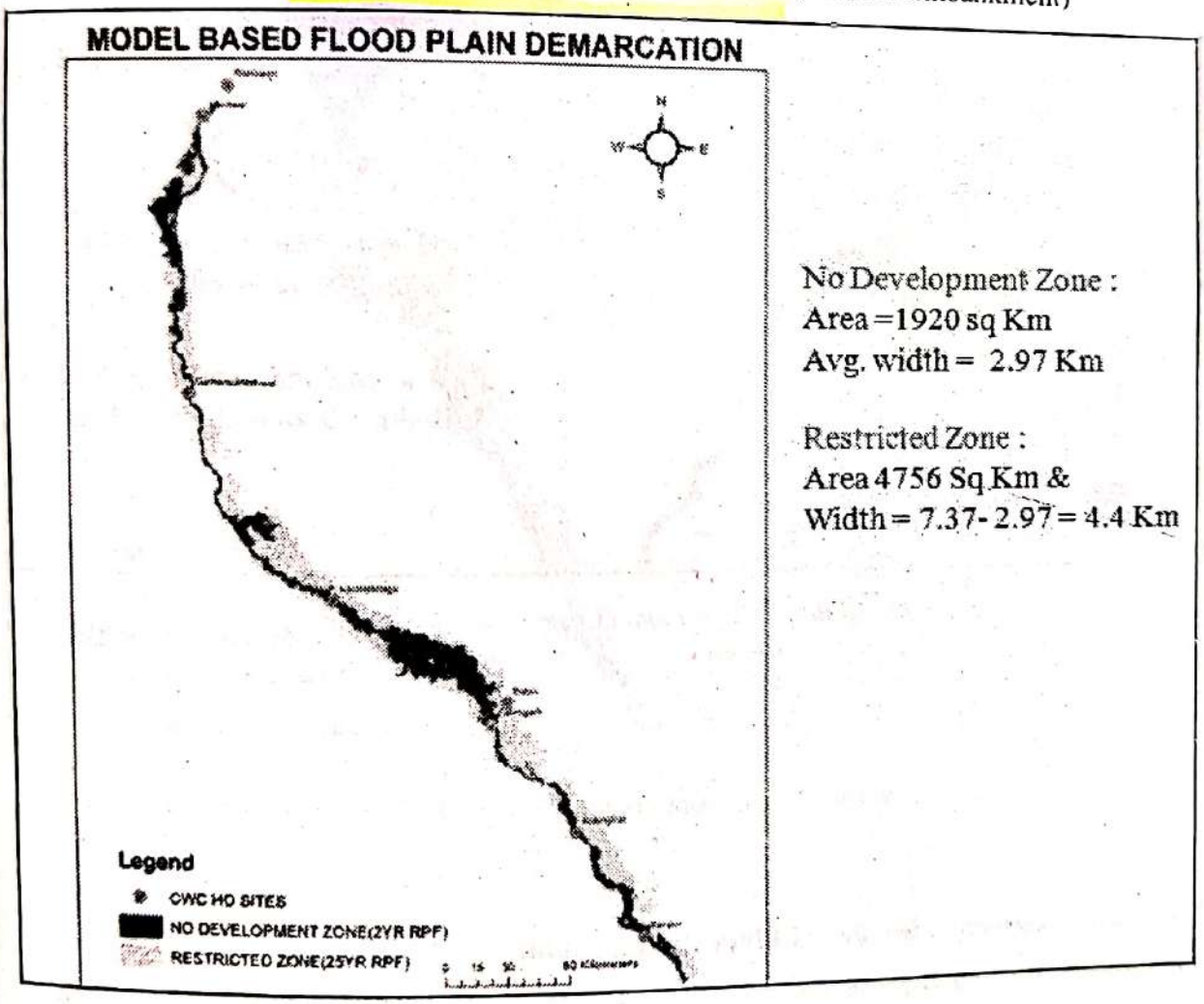

Figure 6: Floodplain Demarcation based on Model Result

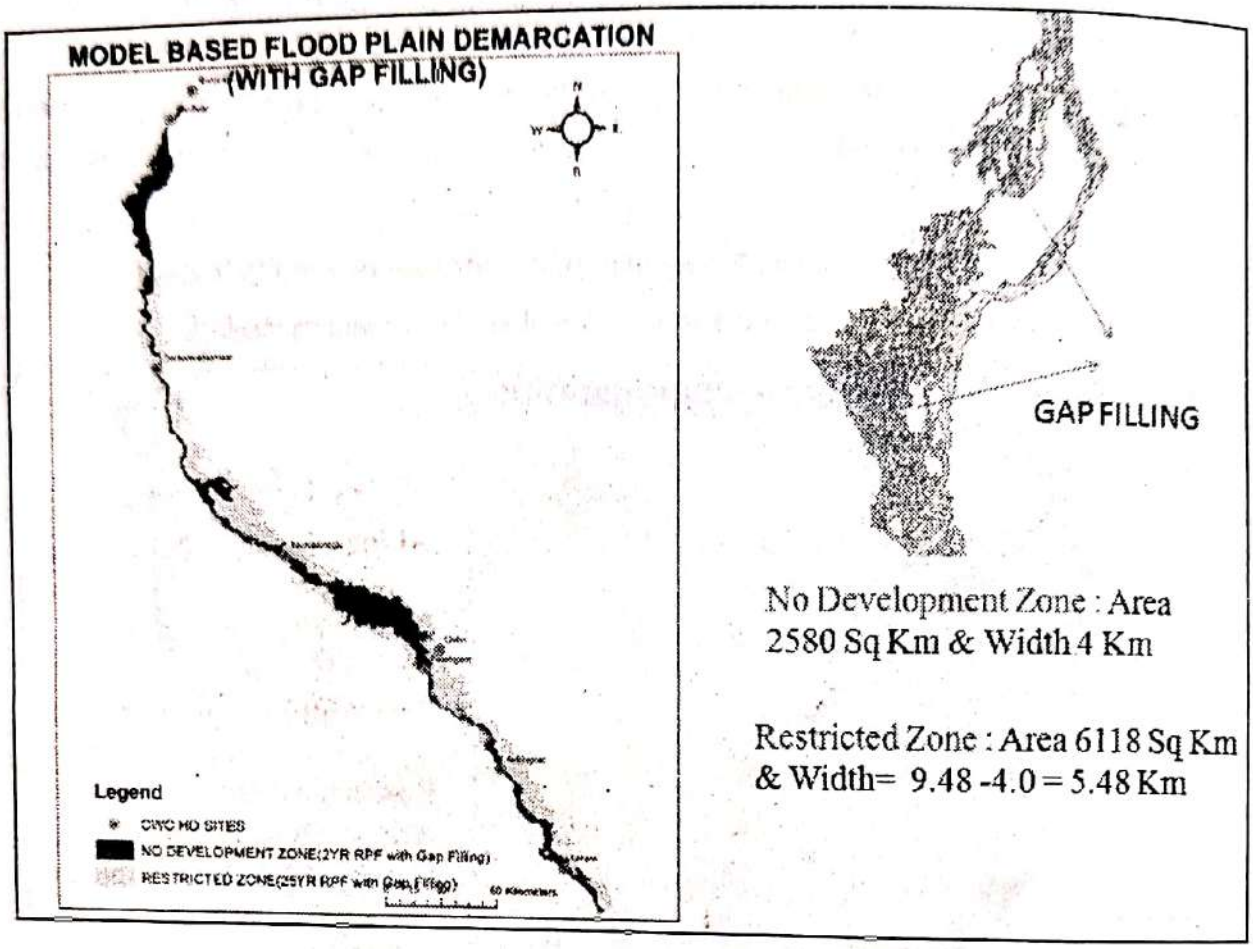

Figure 7: Model Based Flood Plain Demarcation with Gap filling

5.3 Hybrid Approach for Flood Plain Demarcation:

The results of satellite analysis and modelling have their own limitation. Satellite may not cover the full flood event and model results are subjected to DEM quality. Therefore hybrid approach has been adopted by combining both the results by taking union of the areas obtained from both the results.

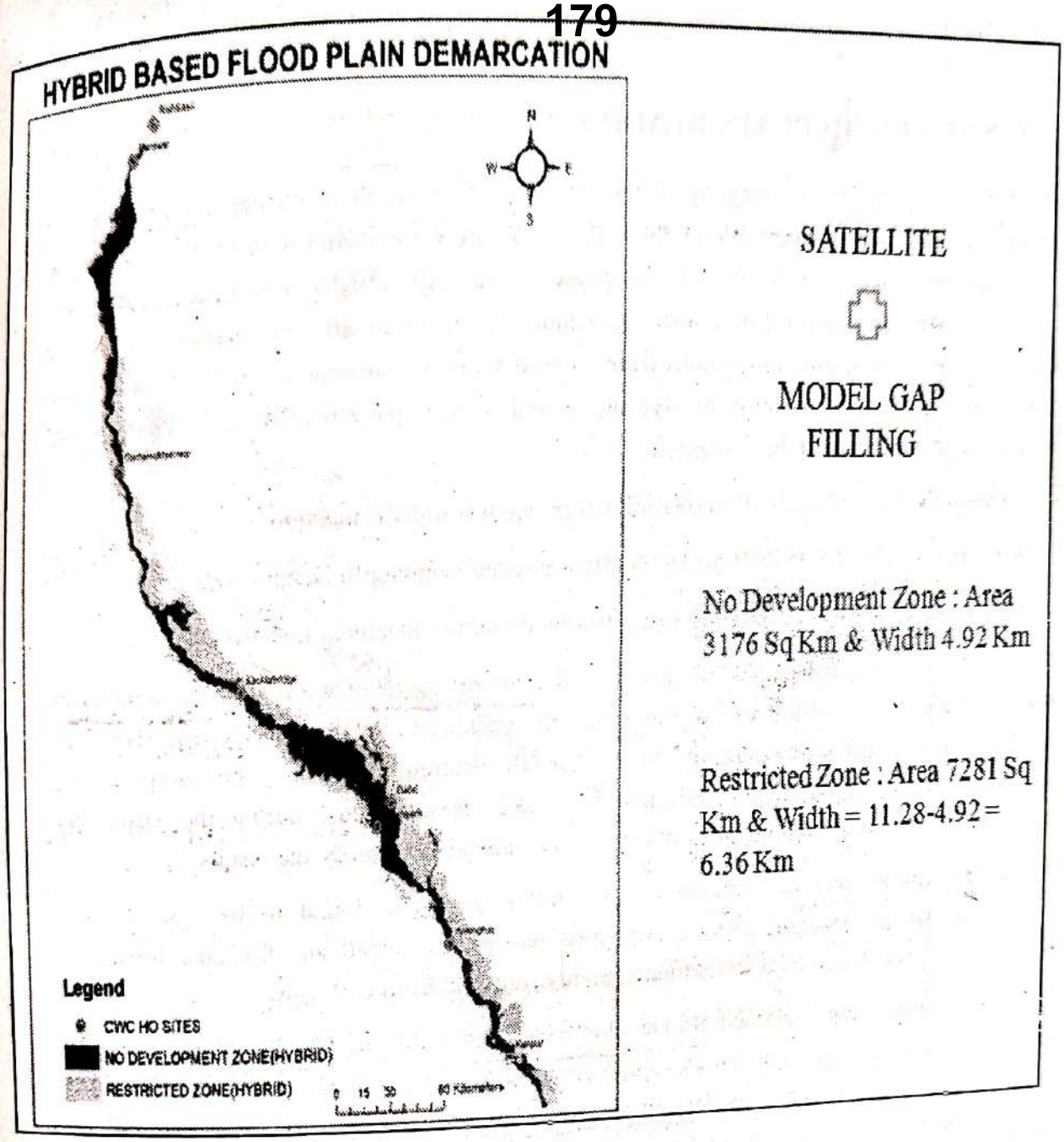

Figure 8: Flood plain Demarcation based on Hybrid Approach

6. FINAL FLOOD PLAIN DEMARCATION

As decided during the 4th meeting, the Hybrid based Flood Plain Demarcation combining results of satellite imageries and model with gap filling were shared with I&WRD, Govt. of UP, regional offices of CWC/GFCC for ground truth verification jointly near all important cities/municipalities/major habitations. Subsequently, ground truth verification was carried out by the team consisting of officials from Central Water Commission, Ganga Flood Control Commission, National Institute of Hydrology ,and State Government of Uttar Pradesh and Uttarakhand in following three segments:

Segment-I from 07.05.2019 to 08.05.2019 in reach Haridwar to Bijnore.

Segment-II from 15.05.2019 to 16.05.2019 in reach Kannauj to Kanpur/ Unnao.

Segment-III from 11.06.2019 in reach Brajghat/Garhmukteshwar to Narora.

During the ground truth verification exercise, the committee members used the Google Earth mobile application platform for overlaying all the results i.e. Satellite, Model and Hybrid in KML format so that they could compare the result location on mobile application with the actual ground location and marks the difference. Besides this, during the visits, the information available from local residents was also gathered to verify the results.

No development zone demarcated using satellite data was found to be more or less confirming to the ground reality. The same has been selected and finalized further by incorporating the details of embankments, bunds collected from U.P. Govt.

The final average satellite based No Development Zone width i.e. 3.15 Km has been arrived through refining the previous No Development zone by incorporating the findings of ground truth verification report such as gap-filling, correcting the bank lines, smoothening the outer edges, and extending the No Development zones upto the embankment line where ever applicable. This resulted in increase of area of No Development Zone from 1483 Sq.Km. to 2032 Sq. Km., consequently, increasing the average width from 2.3 Km to 3.15 Km.

Similarly, the satellite based average Regulatory Zone width i.e. 10.12 Km has been arrived through refining the previous Restricted Zone by taking the union of satellite area provided by NRSC and the newly defined No Development Zone and smoothening the outer edges. This has again resulted in increase of area from 5643 Sq.Km. to 6530 Sq.Km., consequently, increasing the average width from 8.8 Km to 10.12 Km.

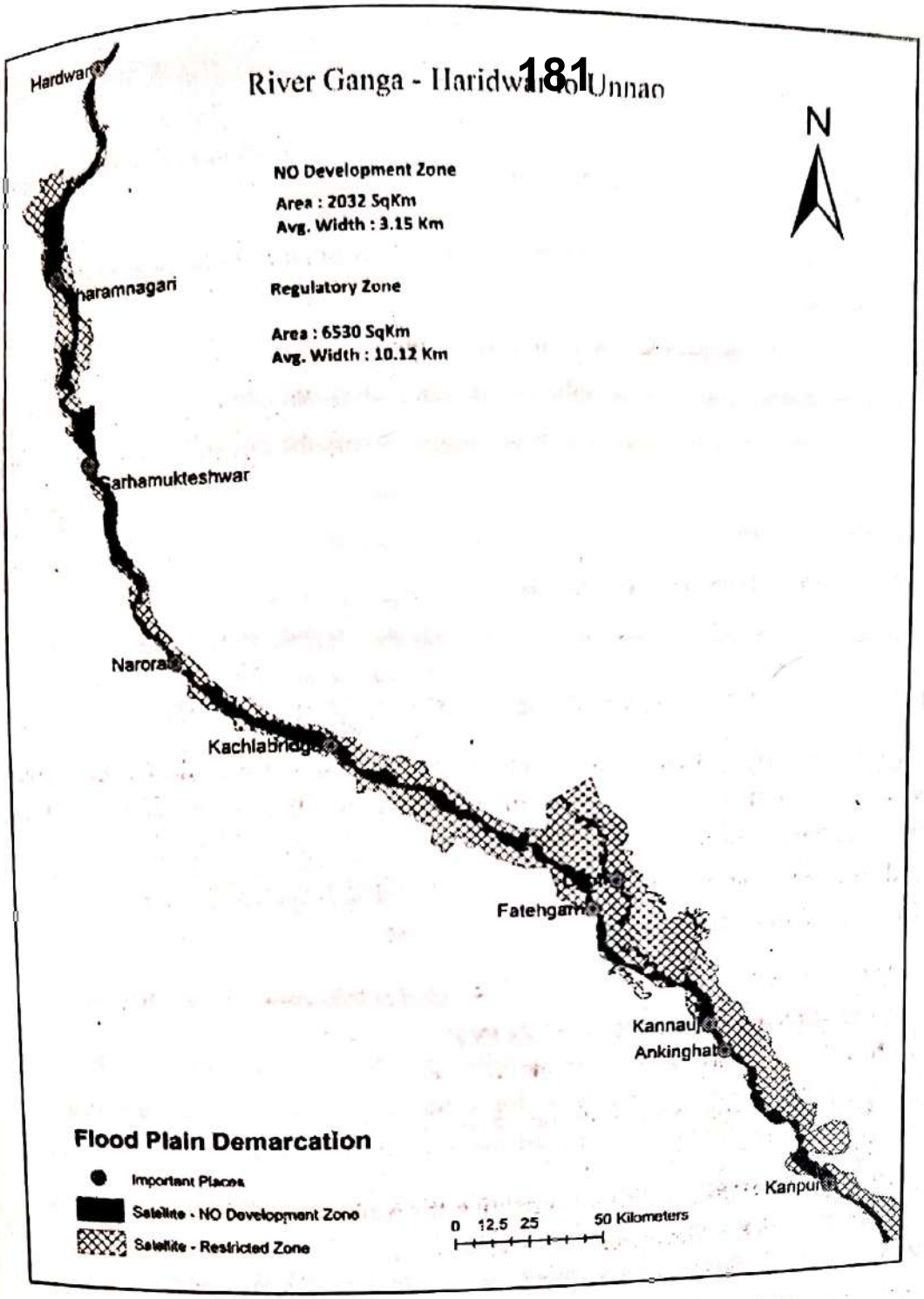

Figure 9: Final Flood Plain based on Ground Truth Verification

7. ASSUMPTIONS AND LIMITATIONS

For Satellite

- Flood extent covered by satellite depeneds upon revisit period, cloud cover, river turbidity, river seasonality etc. & classification algorithms used by space agency.
- image processing algorithms, etc.
- Embankment breach scenerios are not accounted
- Cannot segregate reverine flooding from other types of flooding.

For Model

- Mannings value of 0.04 was adopted uniform throughout the flood plains as well as river channel.
- Limitations of topography i.e. 90m SRTM DEM
- River bathymetry accounted using available cross sections only.
- Effects of flood embankments ,roads, buildings ,hydraulic structures.bridge etc were not considered.
- Scenerios like Dambreak and GLOF are not coinsidered
- Morphological changes not coinsidered
- Flooding due to drainage congestion, water clogging etc not accounted.
- Sudy area is coinfined to Maximum 30 km buffer on either side of river centerline
- Evaporation ,infiltration and diversion losses neglected

For Ground Truth Verification

- Restricted zone could not be verified
- Subject to the accuracy of geo-location services available on mobile
- Only accessible and habituated areas were surveyed

8. ACTIVITIES IN FLOOD PLAIN ZONE

The following literatures were considered for defining activities that can be/cannot be carried out in the No development / Restricted zones of the floodplain.

1. Concept paper on river Conservation Zone prepared by the expert group of Ministry of Environment and Forest & Climate Change
2. National Disaster Management Authority guidelines for flood management
3. Flood Plain Zoning notification of Uttarakhand Irrigation Department
4. NMCG guidelines for Ganga Basin

The above literatures were discussed by the committee during the 5th meeting of the Committee held on 29th August 2019 in firming up the activities that can be/cannot be carried out in the No development / Regulatory zones of the floodplain. Finally following activities were identified and recommended by the committee.

8.1 NO DEVELOPMENT ZONE

Prohibited activities in No Development Zone:

All activities except mentioned under the regulated activities in no-development zone

Regulated Activities in No Development Zone:

i. Temporary constructions, if absolutely necessary, in exceptional circumstances like natural calamities or religious events at traditional locations, with prior permission of the National Mission for Clean Ganga acting through the State Ganga Committee and the District Ganga Committee.

ii. Regulated Sand/ Stone/ sediment/ river borne material mining may be allowed as per MoEF&CC guidelines

iii. Repair/renovation of protected monuments, temples, boating jetties, parks, ghats and crematorium

iv. Existing structure, whether permanent or temporary for residential or commercial or industrial or any other purposes in the River Ganga, Bank of River Ganga or in active flood plain area of River Ganga or its tributaries provided that such construction has already been completed, shall be reviewed by the National Mission for Clean Ganga so as to examine as to whether such constructions are causing interruption in the continuous flow of water or pollution in River Ganga as per provisions under para [6(3)] of Ministry of Water Resources, River Development and Ganga Rejuvenation notification no. S.O. 3187(E), dated the 7th October 2016 (as amended from time to time) (copy enclosed) regarding constitution of an authority, namely, the National Mission for Clean Ganga for Rejuvenation, Protection and Management of River Ganga.

v. Organic farming by owners/lease holders

vi. Plantation of native trees / shrubs (for commercial use)

vii. Measures for control of erosion and floods, maintenance or de-silting of river ways, waterways and channels

viii. Repair of breaches in embankments

ix. Laying of unpaved paths for access to the river for cultural, religious or any other purposes

x. Various activities such as engineered diversion and storage of water in River Ganga, construction of bridges and associated roads and embankments over the River Ganga or at its River Bank or its flood plain area, construction of Ghats or extension of any existing Ghat, construction of jetties, construction of permanent hydraulic structures for storage or diversion or control of waters or channelization of River Ganga, etc., shall be governed as mentioned under para (42) of Ministry of Water Resources, River Development and Ganga Rejuvenation notification no. S.O. 3187(E), dated the 7th October 2016 (as amended from time to time) regarding constitution of an authority, namely, the National Mission for Clean Ganga for Rejuvenation, Protection and Management of River Ganga

xi. Navigation, Water Sports, Water Transport related activities.

8.2 REGULATORY ZONE

Prohibited Activities in Regulatory Zone:

Red category of industries as mentioned in CPCB guidelines (as amended from time to time)

Regulated Activities in Regulatory Zone:

i. Construction of residential/ Institutional/ commercial buildings, school, dispensaries, recreational facilities with certain stipulations as mentioned in NDMA guidelines (as amended from time to time) such as prohibition of basement in buildings, construction on stilts (columns), plinth level above the flood lines, provision of stairway in single storey building, roof level of single storey or first floor level above 100 years flood level/HFL, preferably utilizing ground floor for non-residential purposes.

ii. Various activities such as engineered diversion and storage of water in River Ganga, construction of bridges and associated roads and embankments over the River Ganga or at its River Bank or its flood plain area, construction of Ghats or extension of any existing Ghat, construction of jetties, construction of permanent hydraulic structures for storage or diversion or control of waters or channelization of River Ganga, etc., shall be governed as mentioned under para (42) of Ministry of Water Resources, River Development and Ganga Rejuvenation notification no. S.O. 3187(E), dated the 7th October 2016 (as amended from time to time) regarding constitution of an authority, namely, the National Mission for Clean Ganga for Rejuvenation, Protection and Management of River Ganga

iii. Setting up of non-polluting cottage industries.

iv. Construction / expansion/ modernization of bridges, roads and similar facilities that may affect ND Zone

v. Creation of navigational facilities involving dredging, mechanised ferries, jetties etc.

vi. Green and Orange category of industries as mentioned in CPCB guidelines (as amended from time to time)

vii. Water Sports, Water Transport related activities

viii. Stone crushing plants etc.

9. Concluding Remarks

1. As per the recommendations of the report of ground truth verification (Annexure-6), Satellite based No Development Zone was found to be more or less confirming to the ground reality which was found to be most frequent with respect to recurrence interval of 2-5 years. The same has been selected and finalized further by incorporating the details of embankments, bunds collected from U.P. Govt.

2. The outer extent of Satellite images for two flood events dated on 18-19 June 2013 and 23rd & 25th September 2010 provided by NRSC has been considered as Regulatory / Restricted Zone which was confirming to the 25 years return period flood.

3. The lat/long of demarcating pillars for both left and right side of No Development zone at interval of 200 m is provided in Annexure-8.

4. The lat/long of demarcating pillars for both left and right side of restricted zone at interval of 200 m is provided in Annexure-9.

5. Total flood plain area for No Development Zone is 2032 sq. KM corresponding to the average width of 3.15 KM.

6. Total flood plain area for Restricted/ Regulatory Zone is 6530 sq. KM corresponding to the average width of 10.12 KM.

****

Minutes of 5th meeting of the Special Committee, constituted to identify and demarcate the flood plains of river Ganga in respect of Phase-I, Segment 'B' of River Ganga (Haridwar to Unnao)

The fifth meeting of the Committee constituted to identify and demarcate the flood plains of river Ganga in Segment B of Phase I (Haridwar to Unnao) was held on 29.08.2019 at CWC, Sewa Bhawan, New Delhi. The list of participants of the meeting is enclosed at Annex–I.

2. At the outset, Chairman of the Committee welcomed the participants of the Committee. The member secretary of the Committee intimated that as decided during the 4th meeting, the Hybrid based Flood Plain Demarcation combining results of satellite imageries and model with gap filling were shared with I&WRD, Govt. of UP, regional offices of CWC/GFCC for ground truth verification jointly near all important cities/municipalities/major habitations. Subsequent to completion of exercise of ground truth verification, the team submitted its report in June 2019.

3. The Chief Engineer (UGBO), CWC, who was available during the meeting through video conferencing, briefed the committee about the major recommendations of the team. He intimated that on ground truth verification, no development zone demarcated by satellite data was found to be more accurate compared to the Hybrid approach. Therefore, outer extent of satellite data based zone can be considered for no development zone. At some places, if the outer extent based on satellite data is less than the embankment or vice-versa, the same may be extended to or curtailed at the embankment. The team recommended that it would be appropriate if no development zone is clearly demarcated on the ground using pillars at a suitable interval say at 200 m interval in city/ inhabited area and at 500 m interval in other places. The outer extents of regulatory zones are extending well beyond the river banks and could not be ascertained during the exercise of ground truth verification.

4. Thereafter, Director and Deputy Director (FCA-II), CWC made a presentation on the draft report revised on the basis of the recommendations of the joint team constituted for ground truth verification. The average widths of no-development zone and regulatory zone were worked out to be 3.15 km and 10.12 km respectively. The figure of 3.15 Km has been arrived through refining the previous No-Development zone by incorporating the findings of ground truth verification report such as gap-filling, smoothening the outer edges, and extending the No-Development zones upto the embankment line where ever applicable. This resulted in increase of area from 1483 sq. km to 2032 sq. km., thus, increasing the average width from 2.3 Km to 3.15 Km.

Similarly, the figure of 10.12 Km has been arrived through refining the previous Restricted Zone by taking the union of satellite area provided by NRSC and the newly defined No-Development Zone and smoothening the outer edges. This has again resulted in increase of area from 5643 sq. km. to 6530 sq. km., thus, increasing the average width from 8.8 Km to 10.12 Km.

5. During the meeting, the prohibited & regulated activities in No Development Zone and Regulatory zone were also deliberated in detail. The following prohibited & regulated activities in No Development Zone and Regulatory zone were finalized for incorporation in the report.

(a) **No Development Zone**

Prohibited activities in No Development Zone:

All activities except mentioned under the regulated activities in no-development zone.

Regulated Activities in No Development Zone:

i. Temporary constructions, if absolutely necessary, in exceptional circumstances like natural calamities or religious events at traditional locations, with prior permission of the National Mission for Clean Ganga acting through the State Ganga Committee and the District Ganga Committee

ii. Regulated Sand/ Stone/ sediment/ river borne material mining may be allowed as per MoEF&CC guidelines

iii. Repair/renovation of protected monuments, temples, boating jetties, parks, ghats and crematorium

iv. Existing structure, whether permanent or temporary for residential or commercial or industrial or any other purposes in the River Ganga, Bank of River Ganga or in active flood plain area of River Ganga or its tributaries provided that such construction has already been completed, shall be reviewed by the National Mission for Clean Ganga so as to examine as to whether such constructions are causing interruption in the continuous flow of water or pollution in River Ganga as per provisions under para [6(3)] of Ministry of Water Resources, River Development and Ganga Rejuvenation notification no. S.O. 3187(E), dated the 7th October 2016 (as amended from time to time) (copy enclosed) regarding constitution of an authority, namely, the National Mission for Clean Ganga for Rejuvenation, Protection and Management of River Ganga.

v. Organic farming by owners/lease holders

vi. Plantation of native trees / shrubs (for commercial use)

vii. Measures for control of erosion and floods, maintenance or de-silting of river ways, waterways and channels

viii. Repair of breaches in embankments

ix. Laying of unpaved paths for access to the river for cultural, religious or any other purposes

x. Various activities such as engineered diversion and storage of water in River Ganga, construction of bridges and associated roads and embankments over the River Ganga or at its River Bank or its flood plain area, construction of Ghats or extension of any existing Ghat, construction of jetties, construction of permanent hydraulic structures for storage or diversion or control of waters or channelization of River Ganga, etc., shall be governed as mentioned under para (42) of Ministry of Water Resources, River Development and Ganga Rejuvenation notification no. S.O. 3187(E), dated the 7th October 2016 (as amended from time to time) regarding constitution of an authority, namely, the National Mission for Clean Ganga for Rejuvenation, Protection and Management of River Ganga

xi. Navigation, Water Sports, Water Transport related activities.

(b) **Regulatory Zone**

Prohibited Activities in Regulatory Zone:

Red category of industries as mentioned in CPCB guidelines (as amended from time to time)

Regulated Activities in Regulatory Zone:

- Construction of residential/ Institutional/ commercial buildings, school, dispensaries, recreational facilities with certain stipulations as mentioned in NDMA guidelines (as amended from time to time) such as prohibition of basement in buildings, construction on stilts (columns), plinth level above the flood lines, provision of stairway in single storey building, roof level of single storey or first floor level above 100 years flood level/HFL, preferably utilizing ground floor for non-residential purposes.

- Various activities such as engineered diversion and storage of water in River Ganga, construction of bridges and associated roads and embankments over the River Ganga or at its River Bank or its flood plain area, construction of Ghats or extension of any existing Ghat, construction of jetties, construction of permanent hydraulic structures for storage or diversion or control of waters or channelization of River Ganga, etc., shall be governed as mentioned under para (42) of Ministry of Water Resources, River Development and Ganga Rejuvenation notification no. S.O. 3187(E), dated the 7th October 2016 (as amended from time to time) regarding constitution of an authority, namely, the National Mission for Clean Ganga for Rejuvenation, Protection and Management of River Ganga

- Setting up of non-polluting cottage industries.

- Construction / expansion/ modernization of bridges, roads and similar facilities that may affect ND Zone

- Creation of navigational facilities involving dredging, mechanised ferries, jetties etc.

- Green and Orange category of industries as mentioned in CPCB guidelines (as amended from time to time)

- Water Sports, Water Transport related activities

- Stone crushing plants etc.

6. After the detailed discussion, it was decided that the final draft report may be prepared on the basis of the discussion held during the meeting and circulated to committee members for comments, if any. Considering the urgency of submission of the report to NGT, it was decided that the committee member may convey their comments, if any, within 5 days of circulation of the report.

7. The meeting ended with a vote of thanks to the Chair.

Annex-I

5th meeting of the Special Committee constituted to identify and demarcate flood plains of River Ganga in Segment B of Phase I (Haridwar to Unnao) held on 29th August, 2019

List of Participants

1. Shri S.K. Haldar, Member (WP&P), CWC – in Chair
2. Shri C.K.L. Das, Chairman, GFCC, Patna
3. Shri Radhey Shyam Mishra, Special Secretary, Revenue Deptt., Govt. of U.P.
4. Dr. V. M. Chowdary, Scientist 'SG' RRSC-North, NRSC, New Delhi
5. Shri T.C. Sharma, Chief Engineer (Ganga), UP Irrigation & WR Deptt., Meerut
6. Shri Anil Kumar, Chief Engineer, UP Irrigation & WR Deptt.
7. Shri Vinod Kumar Mishra, Supdt. Engineer, UP Irrigation & WR Deptt, Meerut
8. Shri Sanjay Kumar, Scientist-E, National Institute of Hydrology, Roorkee
9. Shri Bhopal Singh, Chief Engineer, UGBO, CWC, Lucknow
10. Shri Ravi Shankar, Chief Engineer (P&D), CWC, New Delhi
11. Shri Bhupesh Kumar, SJC (PP), MoWR, RD & GR, New Delhi
12. Shri R. R. Sambharia, Sr. Joint Commissioner (FM), MoWR, New Delhi
13. Shri Ritesh Khattar, Director (FCA-2), CWC, New Delhi
14. Shri A. K. Sinha, Director (Morphology), CWC, New Delhi
15. Shri Abhay Kumar, Director, GFCC, Lucknow
16. Shri Mohd. Faiz Syed, Dy. Director (FCA-2), CWC, New Delhi
17. Shri Nikol, Assistant Director (FCA-2), CWC, New Delhi

BEFORE THE NATIONAL GREEN TRIBUNALPRINCIPAL BENCH, NEW DELHI

O.A. No. 200/ 2014

IN THE MATTER OF:

M.C. Mehta

...Petitioner

// Versus //

Union of India & Ors .....Respondents

Report by the National Mission for Clean Ganga (NMCG) in the matter of OA NO 200 /2014- M.C. Mehta vs Union of India & ORS in Compliance to Hon'ble NGT's order dated 22.07.2022

NATIONAL MISSION FOR CLEAN GANGA

DEPT. OF WATER RESOURCES, RIVER DEVELOPMENT &GANGA REJUVENATION,

MINISTRY OF JAL SHAKTI, GOVERNMENT OF INDIA, NEW DELHI

L-25011(13)/5/2022-LME NMCG

National Mission for Clean Ganga
Department of Water Resources, River Development
& Ganga Rejuvenation
Ministry of Jal Shakti

Major Dhyanchand National Stadium,
Near India Gate, New Delhi-110002
Dated: 14.08. 2023

Subject: Report of the National Mission for Clean Ganga (NMCG), DoWR, RD& GR, Ministry of Jal Shakti in the Hon'ble NGT's Order dated 22.07.2022, in the matter of OA No 200 /2014- M.C. Mehta Vs Union of India & Ors.

***

Sir,

This is with reference to the Hon'ble NGT's Order dated 22.07.2022 in the above cited subject matter and to say that the Report of the National Mission for Clean Ganga(NMCG), DoWR, RD&GR, Ministry of Jal Shakti in the said matter is attached. The same may kindly be placed before the Hon'ble NGT for consideration in the matter.

2. This issues with the approval of the competent authority.

14.8.2023

D.P. Mathuria
Executive Director(Tech),

Encl: As above

To

The Registrar, Hon'ble National Green Tribunal, Faridkot House, Copernicus Marg New Delhi.

Copy for information to:

(1).PPS to the Secretary, DoWR, RD&GR, Ministry of Jal Shakti, Shram Shakti Bhawan, New Delhi
(2). PS to the DG, NMCG,
(3). Director (Co-ordination), NMCG

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NATIONAL MISSION FOR CLEAN GANGA

DEPARTMENT OF WATER RESOURCES RIVER DEVELOPMENT & GANGA REJUVENATION,

MINISTRY OF JAL SHAKTI

REPORT BY THE NATIONAL MISSION FOR CLEAN GANGA (NMCG) IN THE MATTER OF OA NO 200 /2014- M.C. MEHTA Vs UNION OF INDIA & ORS IN COMPLIANCE TO HON'BLE NGT'S ORDER DATED 22.07.2022

1. BACKGROUND

1.1 That in the aforesaid matter, the Hon'ble NGT is monitoring the measures taken/ being taken, by the Central Government, State Governments concerned and other authorities at the Central and State level, for prevention, control and abatement of pollution in river Ganga and its tributaries. The reports being submitted, periodically as per the directions of the Hon'ble NGT, by the Central Government, National Mission for Clean Ganga (NMCG), State Governments/ CPCB/ SPCBs and other authorities are duly considered.

1.2 That the Hon'ble NGT, vide its order dated 22.07.2022, has inter-alia suggested that "*the Member Secretary, National Ganga Council (NGC) i.e. Director General, National Mission for Clean Ganga (NMCG) may place the agenda of reviewing the existing mechanism for executing the work of setting up and maintaining requisite treatment systems to ensure prevention of pollution of Ganga in the next meeting of the National Ganga Council(NGC), preferably within one month or as early as possible thereafter. The alternative agency to be identified must be credible in terms of performance - Governmental, Private or Hybrid and may be called Special Purpose Vehicle (SPV) or otherwise".*

1.3 That in the above context, it is submitted that the National Mission for Clean Ganga (NMCG), Department of Water Resources River Development & Ganga Rejuvenation, Ministry of Jal Shakti has filed an Interlocutory Application (IA) against the order dated 22.07.2022, passed by the Hon'ble NGT. The matter has been adjourned from time to time.

1.4 That in furtherance of the above order dated 22.07.2022, passed by the Hon'ble NGT, it is submitted to give, briefly, the genesis and background of the constitution of the various authorities and their mandate for prevention, control and abatement of water pollution.

2. EXISTING STATUTORY MECHANISM

(a) The *Water (Prevention and Control of Pollution) Act, 1974*. (herein after refer to as *Water Act*) enacted by the Parliament, mandates for the prevention, control and abatement of water pollution and maintaining or restoring of wholesomeness of water. The Water Act provides for the establishment of Central and State Pollution Control

Boards, at the central and state level, to take necessary measures and ensure prevention, control and abatement of water pollution. With the objective in view, to carry out inspection of outlets for the discharge of sewage or trade effluents, State Pollution Control Boards are mandated to ensure the compliance of discharge parameters form the plants (ETPS/ STPs/ CETPs) established for the treatment of sewage and trade effluents etc. As per the provisions of section 25 of the *Water Act, 1974*, without the previous consent of the State Board, no person can establish or take any steps for the construction of the disposal system or any extension or addition thereto, which is likely to discharge sewage or trade effluent into a stream or well or sewer or on land. The term "pollution", "Sewage effluent", "Sullage", "Sewer" and "Stream" are well defined in the *Water Act' 1974* and it is mandated by these SPCBs to ensure that water pollution is not caused in rivers/ water bodies.

(b) In the year 1986, Parliament enacted a comprehensive legislation; namely the *Environment (Protection) Act, 1986* [*EP Act*] for the protection and improvement of environment. The term "environment" is well defined in the *EP Act*. The Central Government, in exercise of its power under sub section 3 of section 3 of the said *EP Act* had earlier constituted, *National River Ganga Basin Authority (NGRBA)*, vide notification no S.O 521(E) dated 20.02.2009, to ensure effective abatement of pollution and conservation of river Ganga. In the year 2014-15, the Government of India launched the "*Namami Gange Programme (NGP)*", an Integrated River Conservation Programme, based on Ganga River Basin Management Plan with a view to ensure effective abatement of pollution and rejuvenation of the River Ganga, to promote inter-State and inter-sectorial co-ordination for comprehensive planning and management; (b) to maintain ecological flows in the River Ganga with the aim of ensuring continuous flows throughout its length so as to restore its ecological integrity **(c)** for imposing restrictions in areas abutting the River Ganga in which industries, operations or processes, or class of industries, operations or processes shall not be carried out or shall be carried out subject to certain safeguards; (d) to make provision for inspection of any premises, plants, equipment, machineries, manufacturing or other processes, materials or substances and giving direction to the authorities, officers and persons as may be necessary to take steps, for prevention, control and abatement of environmental pollution in the River Ganga; (e) for carrying out and sponsoring investigations and research relating to problems of environmental pollution in the River Ganga and examination of such manufacturing processes, material and substance as are likely to cause environmental pollution; (f) for collection and dissemination of information in respect of matters relating to environmental pollution in the River Ganga and preparation of manual, codes or guide relating to the prevention, control and abatement of environmental pollution.

(c) Accordingly in the year 2016, the Central Government, in supersession of the earlier notification, constituted authorities, at Central, State and district level, vide *River Ganga (Rejuvenation, Protection and Management) Authorities Order, 2016*, [herein after referred to as *Authority's Order, 2016*] through, Notification No S.O 3187 (E) dated 7.10.2016, published in the Gazette of India, invoking powers vested under sub- section 3 of section 3 of the Environment (Protection)Act, 1986. While *National*

Council for Rejuvenation, Protection and Management of River Ganga (herein after called the *National Ganga Council (NGC)* is an apex authority headed by the Hon'ble Prime Minister, as the Chairperson of the Authority, the other members are the Chief Ministers of the Ganga Basin States and those specified, under paragraph 11 of the Authority's Order, 2016. The NGC may co-opt one or more Chief Ministers from the States not represented in the NGC having major tributaries of River Ganga, which are likely to affect the water quality in the River Ganga, as Member. Further NGC is also empowered to co-opt one or more Union Ministers, if it considers necessary, as Member. The NGC may also consult experts and expert organizations or institutions in the field of river rejuvenation, river ecology and river management, hydrology, environmental engineering, social mobilization and other relevant fields.

(d) The *NGC*, notwithstanding anything contained in the *River Ganga Authority's Order, 2016*, is overall responsible for the superintendence, direction, development and control of River Ganga and the entire River Basin for the protection, prevention, control and abatement of environmental pollution in River Ganga and its rejuvenation to its natural and pristine condition and to ensure continuous adequate flow of water in the River Ganga and for matters connected therewith following principles as enshrined in para 4 of *Authority's Order, 2016*.

(e) The Authority' Order 2016 also provides for the constitution of the Empowered Task Force on River Ganga(referred to as Empowered Task Force), headed by the Minister in charge of the Ministry of Jal Shakti to co-ordinate and advise on matters relating to rejuvenation, protection and management of River Ganga and its tributaries. and in particular ensuring that the Ministries, Departments and State Governments concerned have - (i) an action plan with specific activities, milestones, and timelines for achievement of the objective of rejuvenation and protection of River Ganga; (ii) a mechanism for monitoring implementation of its action plans; (b) co-ordination amongst the Ministries and Departments and State Governments concerned for implementation of its action plans in a time bound manner; (c) to monitor the implementation process, address bottlenecks, suggest and take such decisions as may be necessary to ensure speedy implementation; (d) all projects under the ambit of "Namami Gange" including ongoing projects funded domestically and through external assistance; (e) discharge of such other functions or exercise of such powers as may be considered necessary for achievement of the objective of rejuvenation, protection and management of River Ganga or as may be assigned to it by the Central Government or specified by the NGC.

(f) Further it is submitted that the *National Mission for Clean Ganga (NMCG)* is the nodal authority at Central level and acts as Secretariat to NGC. The State Mission for Clean Ganga (SMCG) and District Ganga Committees (DGC) are established at State level and district levels respectively headed by the Programe Director and District Magistrate at the State and District Level to ensure the implementation of the requisite measures for rejuvenation, protection and management of River Ganga.

(g) That as regards *National Mission for Clean Ganga (NMCG)*, being the apex and nodal agency at the Central level, coordinates in ensuring that the decisions of the

NGC to implement the Ganga Basin Management Plan as well as all activities for rejuvenation and protection of River Ganga are implemented. It is mandated to take such other measures and acts which are necessary for rejuvenation and protection of River Ganga and its tributaries. Thus National Mission for Clean Ganga (NMCG) is the apex authority at Central level to ensure the implementation of the action plan, by the State Governments and other authorities, for rejuvenation, protection and management of river Ganga and its tributaries.

(h) That on 19th January 2022, the Union Cabinet approved, the *Namami Gange Mission-II (NGM-II)* with an outlay of Rs.22,500 Cr for a period up to 31st March 2026. The approved outlay includes committed liabilities up to March 2026, as also new initiatives taken up under the *NGM-II*. The focus is now proposed to be on sewerage infrastructure creation in Ganga tributaries, scaling up of public-private partnership efforts, circular water economy model and fecal sludge and septage management. Under *Namami Gange Programme (NGP)*, the Government of India is supplementing the efforts of the State Governments by providing 100% funds for dealing with the task of abatement of pollution and rejuvenation of river Ganga and its tributaries and also the technical assistance.

3. INITIATIVES UNDERWAY

3.1 District Ganga Committees (DGCs): The authorities order under Environment (Protection) Act, 1986 by the Government of India dated 7th October 2016, creates mechanisms at the State and District Level (State Ganga Committees- SCGs, District Ganga Committees-DGCs) for addressing the challenge of pollution abatement and rejuvenation of river Ganga. The SCGs and the DGCs have been constituted for all the 52 districts on the Ganga Main Stem Districts and 87 on the tributaries. In total, 139 DGCs have been notified. The details of the state wise distribution of DGCs are as follows:

State	No. of Districts		
	Main Stem	Tributaries	Total
Uttarakhand	7	6	13
Uttar Pradesh	25	50	75
Bihar	12	26	38
Jharkhand	1	3	4
West Bengal	7	2	9
Total	**52**	**87**	**139**

3.2 DGCs are conducting regular 4M meetings - (Monthly, Mandated, Monitored and Minuted) under the chairmanship of the respective District Magistrates/ Deputy

Commissioners on matters relating to various aspects of Ganga Rejuvenation. Since April 2022, 1,689 DGC meetings have been conducted.

3.3 NMCG is closely associating DGCs in river rejuvenation activities directly addressing bottlenecks on the ground and playing a greater coordination role with Central Departments as well as with state level agencies to resolve the issues.

3.4 Industrial Pollution: To cater to the industrial pollution abatement in the Ganga stretch, all the Grossly Polluting Industries (GPIs) are identified, and regular assessments and monitoring of these GPIs is done under the mission for enforcing regulatory framework on the polluting industries. Stringent action is taken by Central Pollution Control Board (CPCB)/State Pollution Control Boards (SPCBs) against the GPIs discharging polluted untreated water into main stem of Ganga River & its tributaries which are non-complying with respect to the prescribed norms.

3.5 After inventorization exercise carried out by Central Pollution Control Board (CPCB) in 2022-23, a total of 3194 GPIs have been identified in main stem Ganga basin States. In main stem, 1230 GPIs including 8 CETPs are operating in 5 Ganga main stem States; 1964 GPIs are located in the Yamuna basin including 34 CETPs. The sixth round of GPI inspections has commenced with effect from 9th February, 2023. In 2021-22, fifth round of annual inspections has been completed through 24 third party technical institutes (TPIs). Action against violations has been completed by the respective SPCBs/PCC.

3.6 Industries are also facilitated through Charter based participatory approach for reduction in water consumption, effluent generation and pollution load by adoption of cleaner technologies & waste minimization practices. Charters have been implemented for Pulp & Paper, Sugar, Distillery and Textile sectors. Expert Institutions, Industry Associations and State Government Departments are involved in effective implementation of these Charters. To cut down pollution from tanneries, NMCG has awarded 20 MLD CETP for Jajmau Tannery Cluster at Kanpur. Similarly, upgradation of existing CETPs has been undertaken at Mathura, Banthar Tannery Cluster, and Unnao Industrial Area. Upgradation of CETP for textile cluster at Mathura and Pilkhuwa has also been undertaken and upgraded CETPs have been commissioned.

3.7 E Flow: The Government of India vide Gazette Notification dated 9th October, 2018 notified the minimum environmental flows for River Ganga that needs to be maintained at various locations on the river. The order applies to the Upper Ganga River Basin starting from originating glaciers and through respective confluences of its head tributaries finally meeting at Devprayag up to Haridwar and the main stem of River Ganga up to Unnao district of Uttar Pradesh.

The notified eflow details are as below.

For Upper Ganga river basin (origin to Haridwar):

S.No.	Seasons	Months	(%) Percentage of Monthly Average Flow Observed during each of preceding 10-daily period
1	Dry	November-March	20
2	Lean	October, April & May	25
3	High Flow	June to September	30

For river Ganga below Haridwar upto Unnao:

S.No.	Location of Barrage	Minimum flow releases immediately downstream of barrages (In Cumecs) Non-Monsoon (October to May)	Minimum flow releases immediately downstream of barrages (In Cumecs) Monsoon (June to September)
1	Bhimgoda	36	57
2	Bijnor	24	48
3	Narora	24	48
4	Kanpur	24	48

- The notified environmental flow regime is applicable to all existing, under-construction and future projects. However, mini and micro projects which do not alter the flow characteristics of the river or stream significantly are exempted from these environmental flows.
- Central Water Commission has been designated as authority and the custodian of the data and responsible for supervision, monitoring, regulation of flows and reporting of necessary information to the appropriate authority as and when required and also authorised to take emergent decisions about the water storage norms in case of any emergency. The Central Water Commission is the designated authority to submit flow monitoring-cum-compliance report on quarterly basis to National Mission for Clean Ganga.
- As per notification, monitoring of e-flows is being carried out Central Water Commission (CWC) since 1st January, 2019. CWC is monitoring 11 projects (listed

below) and is submitting quarterly progress reports to NMCG. So far 16 reports of e-flow have been received from CWC. For obtaining hands free data from the projects from both upstream and downstream locations of the projects, project authorities are installing sensor-based system for monitoring. All the project authorities except Kanpur barrage have installed automatic sensors for inflow and outflow data collection.

List of Projects being monitored

Sl. No.	Name of the Project	Agency
1	Maneri Bhali Stage –I	UJVNL
2	Maneri Bhali Stage –II	UJVNL
3	Tehri Dam	THDC
4	Koteshwar Dam	THDC
5	Vishnuprayag HEP	JPVL
6	Srinagar HEP	GVK
7	Pashulok barrage/ Chilla HEP	UJVNL
8	Bhimgoda barrage	UP irrigation
9	BIjnor barrage	UP irrigation
10	Narora barrage	UP irrigation
11	Kanpur barrage	UP irrigation

- The Standard Operating Procedures (SOP) for implementation/ monitoring of minimum environmental flows in River Ganga has been approved by National Mission for Clean Ganga (NMCG) vide letter F. No. 5/46/2017-Hyd (NE) dated 24.01.2020. The same is implemented for monitoring the e-flow.

- As per the latest monitoring report (Jan to March, 2023) received from CWC all the projects except one have installed real time data acquisition system and remaining one project authority is being requested for installation of SCADA/RTDAS and their integration with CWC Data server at the earliest for real time availability of hourly data.

- Based on the data supplied by project authorities, all of the projects were in compliance with the e-flow norms during the period except for Srinagar HEP which was in non-compliance during the whole quarter.

3.8 Floodplain demarcation

The Flood Plain demarcation/ Zoning is required to be done by the State Governments concerned. In this regard the provisions of the Authority's Order, 2016 also mandate the State Government to identify and demarcate the flood plains in the concerned State. This Hon'ble Tribunal in its various orders has also directed that till the action is taken by the State Government, the criterion of 1 in 25 years HLF shall be taken into consideration for flood plain demarcation/zoning.

It is to be submitted that Final Report of Special Committee constituted to (a) identify and demarcate the flood plains of river Ganga in segment B pf Phase-I (Haridwar to Unnao) on 1 in 25 year cycle or appropriately, (b) identify no-development/ construction zones, regulatory zones and the activities that can be/ cannot be carried on in the regulatory zone of the floodplain, have been forwarded to State of Uttar Pradesh for identification and demarcation of flood plain in the reach as recommended by the Committee. As informed, the Irrigation and Water Resources Department of Uttar Pradesh has prepared a plan for protection and management of flood plain zones (FPZ). The Department has issued notification dated 4.9.2020 for Ganga river segment B Phase-I (Bijnore to Kanpur). As per the latest compliance report, out of the total 15293 pillars to be constructed, only 12648 flood plain zone boundary pillars have been fixed till June, 2022.

In the 5th Quarterly Report of the NMCG dated 15.7.2022, on the issue of scientific report of State of Bihar concluding that flood plain zoning is not feasible in the State it was submitted that Inter-departmental Joint Committee of Ministry of Jal Shakti is examining the scientific report to recommend on specific issues pertaining to demarcation and protection of floodplains in the State of Bihar. The Report of Inter Department Joint Committee on River Flood Demarcation and Protection in Bihar has been finalized and circulated to Water Resources Department of Govt of Bihar, CWC, CPCB, Ganga Flood Control Commission and National Remote Sensing Centre. The Committee observed that scientific study needs to be completed by State by using Digital Elevation Model (DEM) data and thereafter carry out demarcation of flood plains using . It inter-alia recommended the following.

- The State of Bihar should assemble and collate city-wise data for flood frequency of river Ganga and its tributaries, cross-section of the river and cross-section of the river required for safe discharge of the floods the in river. Thereafter,

the requirement would be for identification and delineation of river area required to be reserved as flood plain zone devoid of any kind of news civic constructions.

- In city/ town areas, where there is pressure on land in floodplain, the State Government can honour whatever Hon'ble NGT has prescribed in its directions/ orders and /or what has been provided under State bye-laws. But in rural areas with relatively low pressure on flood plain, the flood plain area should be protected in true spirit of Authority Order, 2016.
- Finally, as soon as DEMs would be available through the study being underway, the State should complete the scientific study.
- Under para 6(3) of River Ganga (Rejuvenation, Protection and Management) Authorities Order, of Oct-2016, no person shall construct any structure, whether permanent or temporary for residential or commercial or industrial or any other purposes in the River Ganga, Bank of River Ganga or its tributaries or active flood plain area of River Ganga or its tributaries. Further that in case any such construction has been completed, before the commencement of this Order, in the River Bank of River Ganga or its tributaries or active flood plain area of River Ganga or its tributaries, the National Mission for Clean Ganga shall review such constructions so as to examine as to whether such constructions are causing interruption in the continuous flow of water or pollution in River Ganga or its tributaries, and if that be so, it shall cause for removing them. Further under para 3-Definition sub para (l) "*flood plain*" have been defined as such area of River Ganga or its tributaries which comes under water on either side of it due to floods corresponding to its greatest flow or with a flood of frequency once in hundred years. The definition doesn't mean to convey that entire zone corresponding to flood of recurrence interval of 1 in 100 years is to be declared as protected zone with no construction being allowed in such a zone. Instead the zone corresponding to flood with 1 in 100 years recurrence interval can be divided into three zones, with inner most zone as being active flood plain corresponding to flood of 1 in 5 year recurrence interval with no construction being allowed; next buffer zone as being regulatory zone corresponding to flood of 1 in 25 year recurrence interval and outermost zone can be zone in which various other category of activities

can be permitted by mapping their vulnerability such that risk to flood hazards remain minimal. This eventually will help the States in minimizing the damages due to floods.

During such period till a detailed scientific study on specific issues pertaining to demarcation and protection of floodplains in the state is completed and decision on the same is taken by inter Departmental Joint Committee, the State Government of Bihar may be directed to ensure that an interim demarcation of flood plain (with clearly delineated Prohibitory and Regulatory Zone) of the river Ganga stretch falling in Bihar is notified. The interim demarcation may be reviewed on the basis of observation/ recommendations of inter Departmental Committee.

A copy of Report of Inter Department Joint Committee on River Flood Demarcation and Protection in Bihar is at **Annexure-I**.

4. MEASURES TAKEN TO CONTROL, ABATE POLLUTION AND REJUVENATION OF RIVER GANGA:

4.1 Under the NGP, diverse activities have been taken up for cleaning and rejuvenation of river Ganga and its tributaries viz., laying of sewerage network, construction of the Sewage Treatment Plants (STPs)/ Common Effluent Treatment Plants (CETPs) and other related infrastructure for waste water treatment, river front developments (ghats and crematoria), rural sanitation, afforestation, biodiversity conservation, encouraging public participation and continuous monitoring for ensuring e-flows etc.

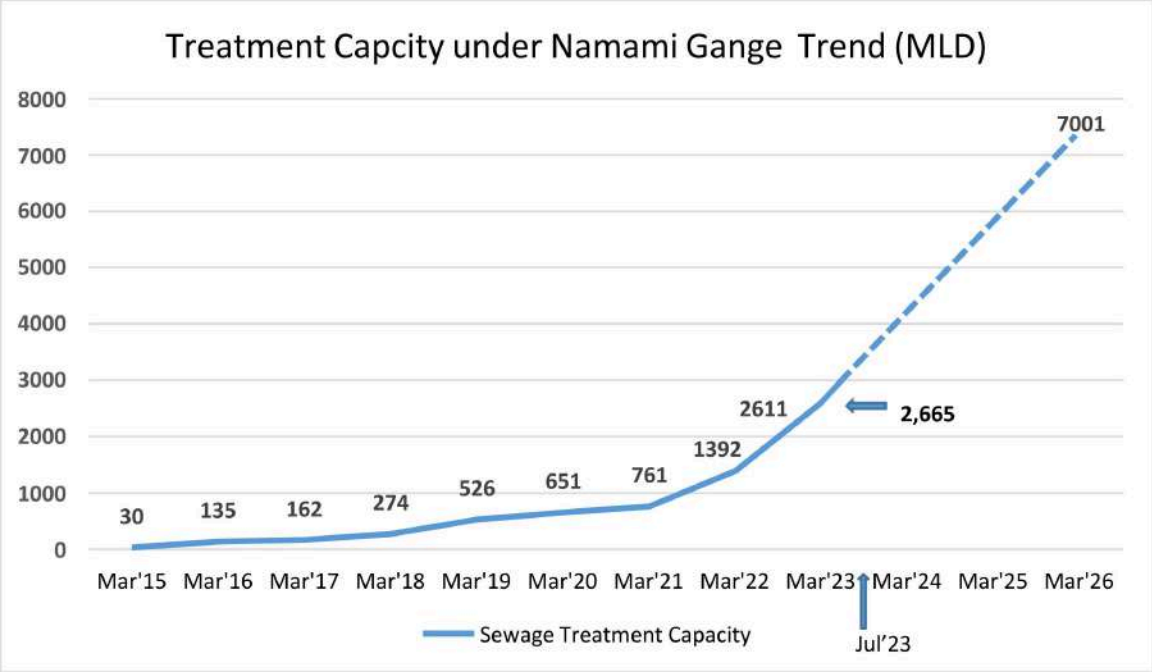
4.2 The summary status of the sewerage infrastructure projects as on 31st July, 2023 is as under

Status of Namami Gange Programme projects as on July 2023					
Sl	**Projects Scheme**	**Nos. of Projects**	**Nos. of Projects Completed**	**Nos. of Projects Under Implementation**	**Nos. of Projects Under Tendering**
1.	Sewerage infrastructure	191	106	45	40
2.	Common Effluent treatment plant (CETP)	7	3	2	2
Total		**198**	**109**	**47**	**42**

4.3 Under Namami Gange Programme, a total of 192 (191 STP+ 1 DSTP) sewerage infrastructure projects have so far been sanctioned for development of sewerage infrastructure to provide a total treatment capacity of 6017 MLD and laying of

sewerage network of 5,254 km at an estimated cost of Rs. 30,348 Cr. These projects are in Uttarakhand, Uttar Pradesh, Bihar, Jharkhand, West Bengal, Haryana, Delhi, Rajasthan, Madhya Pradesh and Himachal Pradesh. Out of these, 106 projects have been completed with a treatment capacity of 2,665 MLD. NMCG further plans to create cumulative treatment capacity of 7001 MLD by March 2026.

A graphical presentation of creation of treatment capacity in Ganga basin States under *Namami Gange* programme is given below.



4.4 The List containing the details of sewerage and industrial Projects (State – wise) completed as on 31st July. 2023 and under implementation is given in **Annexure-II, Annexure-III** and **Annexure-IV** respectively.

4. MONITORING MECHANISM:

4.1 In order to monitor the compliance of the directions, passed by the courts including this Hon'ble Tribunal, and even otherwise, to ensure prevention, control and abetment of water pollution in river Ganga, its tributaries and other rivers, a well-founded monitoring mechanism has been established at the central and state level.

4.2 At the central level, periodical meetings are held under the chairmanship of the Central Monitoring Committee (CMC), headed by the Secretary, Department of Water Resources, River Development and Ganga Rejuvenation Ministry of Jal Shakti, Government of India along with the Director General, National Mission for Clean Ganga, with the Chief Secretaries of the States/ UTs and other concerned officials of the departments/ authorities, to monitor the compliance of the "Action Plan" prepared for improvement of water quality of rivers and other measures.

4.3 Similarly at the state level, the River Rejuvenation Committee(RRCs), have been established, headed by the Chief Secretary of the respective States and the Union territories, for ensuring improvement in water quality and other measures including solid waste management, protection and identification of flood plain zone etc.

4.4 The status of the compliance of the "Action Plan" on various identified parameters for rejuvenation & improvement of water quality of rivers and other measures along with the minutes of the meetings are submitted before this Hon'ble Tribunal. Thus a well-founded and coordinated monitoring mechanism has been established to monitor the compliance of the "action plan" and other measures for improving the water quality in rivers. This monitoring mechanism has paved way for securing better results.

4. CONCLUSIONS

4.1 There is better coordination through the mechanism of the State Mission for Clean Ganga and the District Ganga Committees, at the State/ district level. The River Rejuvenation Committees (RRCs), under the chairmanship of the concerned Chief Secretaries of the State Governments/ CPCB/ SPCBs and other technical institutions are coordinating the implementation program. At the Central level, the Central Monitoring Committee (CMC), under the Chairmanship of the Secretary, Department of Water Resources River Development and Ganga Rejuvenation, Ministry of Jal Shakti, is monitoring the progress and pace of work on monthly basis.

4.2. Under the *River Ganga Authorities, Order, 2016*, the authorities at Central level including NMCG are vested with adequate powers, administrative, financial and regulatory to remove the bottlenecks, if any, and also to issue directions statutorily to secure implementation of the action plans for prevention, control and abatement of pollution in river Ganga and its tributaries. The provisions of the Acts/ rules and notifications, under the *Environment (Protection) Act, 1986*, vested with the NMCG shall be invoked, if need be, wherever necessary, for rigorous implementation and enforcement. With the pace of the establishment of the STPs/ CETPs and other infrastructural developments, due periodical monitoring thereof along with the intensive coordination with the State authorities and the Central government's financial mechanism, significant progress has been achieved in reduction of pollution in river Ganga and its tributaries. Any change and /or variation of institutional mechanism, at this stage, will upset the momentum already gained in Namai Gange Programme in rejuvenation of river Ganga and its tributaries.

In view of the foregoing, any new alternative agency/institutional mechanism is neither envisaged nor warranted

Annexure-I

राष्ट्रीय स्वच्छ गंगा मिशन
National Mission for Clean Ganga

No.: TE-16019/3/2020-O/o AD (RD Tech/NMCG/895 **Date: 24th February 2023**

Subject: Report of the Inter Departmental Joint Committee on River Flood demarcation and Protection in Bihar (constituted in NGT matter O. A. No. 200 of 2014) – reg.

Please find enclosed Report of the Inter Departmental Joint Committee on River Flood demarcation and Protection in Bihar (constituted in NGT matter O. A. No. 200 of 2014) for information and necessary action.

Yours faithfully,

24.2.2023

(D. P. Mathuria)
Executive Director-Technical, NMCG
& Member-Convener of Inter Departmental Joint Committee
e-mail address: ed-technical.nmcg@nic.in

Encl.: As above

To,

1. The Secretary, Water Resources Department, Government of Bihar, Ist Floor, Sinchai Bhawan, Old Secretariat, Patna – 800 015
2. Member (P), Ganga Flood Control Commission, 3rd Floor, Sinchai Bhawan, Patna, Bihar – 800 015
3. Shri Ajay Kumar, Director Morphology & Climate Change Directorate, Central Water Commission, Wing – I, First Floor, West Block – II, R. K. Puram, New Delhi – 110 066
4. Dr. A. K. Vidyarathi, Additional Director and DH- WQM-II, Central pollution Control Board, Parivesh Bhawan, East Arjun Nagar, New Delhi – 110 032
5. Shri B V Rao, Group Head, Water Resource Division, National Remote Sensing Center, Indian Space Research Organization, Bala Nagar, Hyderabad – 500 037

Copy for kind information to:

1. PS to Secretary, DoWR,RD&GR, Ministry of Jal Shakti, Govt. of India
2. PS to DG, NMCG
3. PS to Commissioner – Flood Management, DoWR,RD&GR. Ministry of Jal Shakti, Govt. of India
4. PS to Chief Secretary, State Govt. of Bihar, Main Secretariat, Patna – 800 015

Report of the Inter-Departmental Joint Committee (constituted in O. A. No. 200 of 2014) in compliance of order dated 13.08.2020 and dated 08.02.2021 passed by the Hon'ble NGT.

Dated: 24th February, 2023

NATIONAL MISSION FOR CLEAN GANGA
DEPT. OF WATER RESOURCES, RIVER DEVELOPMENT & GANGA REJUVENATION,
MINISTRY OF JAL SHAKTI,
GOVERNMENT OF INDIA, NEW DELHI

Index

A- Background:

1. The Government of India notified the River Ganga (Rejuvenation, Protection and Management) Authorities Order, dated 07.10.2016 for abatement of pollution, protection and conservation of River Ganga and its tributaries and constituted NMCG as an Authority for effective implementation of provisions of the said Order.

2. Para 4 of the Authorities Order, 2016 inter-alia provides certain principles for rejuvenation, protection and management of River Ganga and taking measures for the rejuvenation, protection and management of River Ganga, including that the bank of River Ganga and its flood plain shall be construction free zone to reduce pollution ingress into the river and to maintain its natural ground water recharge functions. In terms of para 3 (I) of the said order, "*flood plain*" means such area of River Ganga or its tributaries which comes under water on either side of it due to floods corresponding to its greatest flow or with a flood of frequency 1 in 100 years. Further, the order also mandated that the respective State Governments to identify and demarcate river flood plains in the concerned State.

3. Vide judgment dated 13.07.2017 in the matter of O. A. No. 200/2014, the Hon'ble NGT directed the State Governments for identification and demarcation of flood plain in river Ganga, based on 1 in 25 years cycle of Highest Flood Level (HFL). Till the said identification is completed, 100 meters from the edge of the river would be designated as *No Development/ Construction Zone*. The NGT in other matters has also been reiterating the compliance of direction by the State Governments with regard to identification, demarcation and protection of flood plain.

4. The State Government of Bihar approached NMCG on 13.09.2019, 04.05.2020 and 09.10. 2020 and sought exemption from compliance of the provisions of identification and demarcation of flood plain in terms of the Authorities Order, 2016 on grounds mainly stating that the land/areas in Bihar is extremely plain terrain and densely populated and further that all the major rivers are embanked. Therefore, the Government of Bihar requested for amendment in the Authorities Order, 2016 for a special provision applicable to the State of Bihar.

5. NMCG interregnum asked the State Government of Bihar on 31.07.2020,

10.12.2020, 06.01.2021 requesting for Scientific Study Report in terms of flood for different return period. Further it requested that extent of impact of inundation and designating a buffer zone of 500 -1000 meters as protective flood Zone till the time such study is completed may be done.

6. The State Government of Bihar, however, flagged the issues related to flood plain demarcation & protection in Bihar before the Hon'ble NGT on 13.08.2020 seeking relief/ exemption from compliance of directions related to flood plain demarcation & protection and claimed relaxation in respect of the definition of '*flood plain*' as described in the Authorities Order, 2016. A Report on Scientific Study on Feasibility of Flood Plain Zoning in the State of Bihar was also submitted by the Government of Bihar to the Hon'ble NGT with copy endorsed to NMCG on 10.08.2021 (Copy enclosed as **Annexure-I**). In its order dated 13.08.2020 passed in the matter, the Hon'ble NGT observed that

> *36. ... the State of Bihar has stated that there cannot be demarcation of flood plains of river Ganga in the Bihar as the State is over populated. Learned Senior Counsel for the NMCG submits that Bihar is not exempt from the statutory mandate requiring maintenance of minimum flow for which identification and protection of flood plains cannot be wished away. We find it difficult to accept the stand of State of Bihar. Demarcation of flood plains is absolutely necessary to maintain e-flow to which Bihar can be no exception. Moreover, the State of Bihar is frequently faced with floods, affecting lives and safety of the citizens. One of the remedies for handling floods is identification of the flood plains and their protection. Protection of flood plains may require control of unregulated construction activities, encroachments and unregulated mining.*

7. Thus, vide order dated 13.08.2020, the Hon'ble NGT constituted a Joint Committee of NMCG, MoJS and CPCB to look into the issue of floodplains demarcation and protection in the State of Bihar. Further, Hon'ble Tribunal in its order Dt. 08.02.2021 has observed as below:

> *"...(c) Bihar: That the State of Bihar in its report has submitted that considering the densely populated northern plain terrain and embanked river in the State, the directions pertaining to flood plain zonation is not applicable in case of Bihar and the State Government is contemplating to approach the Hon'ble NGT in this regard. That*

Hon'ble NGT in its order dated 13.08.2020 has passed direction for constitution of a Joint Committee of members from NMCG, MoJS and CPCB to look into the issue of river flood plains demarcation and protection in the State of Bihar. In this regard, this Hon'ble Tribunal is to be apprised that the State Govt. of Bihar requested for modification in the definition of flood plain as described in the Gazette Notification S. 0. 3187(E) dated 07.10.2016. The State Govt. of Bihar was asked to carry out a scientific study and report action taken based on such study and accordingly, letters dated 31.07.2020, 10.12.2020 and 06.01.2021 was issued to the Secretary, Water Resource Department Govt. of Bihar. Copies of aforesaid mentioned letters are placed at Annexure - II. No information in this respect has been furnished by the State Govt. of Bihar till date. The Joint Committee could look into issues pertaining to demarcation and protection of floodplains in State of Bihar once this study is in place and the requisite data is provided for examination."

8. In pursuance thereof, an Inter-Departmental Joint Committee was constituted on 18.10.2021 comprising of members as below:

i. Commissioner (Flood Management), MoJS:	Chairman
ii. Representative from CWC:	Member
ii. Executive Director(Technical), NMCG:	Member Convener
iv. Representative from CPCB:	Member
v. Representative from GFCC:	Member
vi. Representative from NRSC:	Member

9. The scope of work for the Joint Committee was as following:

(a) Review the '*Report on Scientific Study on Feasibility of Flood Plain Zoning in State of Bihar*' furnished by the Govt. of Bihar as well as any other report(s) made available to the Committee, in connection thereof.

(b) Examine the request of State of Bihar as regards their claim that (i) demarcation of floodplains of river Ganga in Bihar cannot be done, and (ii) Provisions of Flood Plain Zoning in *subsection (1)(I) of section 3* and *subsection (3) of section 6 of River Ganga (Rejuvenation, Protection and Management) Authority Order, 2016* needs revisiting

and amended thereof, for having special provisions for Bihar State,

(c) Provide recommendations on the request(s) of State Government of Bihar.

B- Details of Meetings held by the Inter Departmental Joint Committee Three rounds of meeting were held on 23.11.2021, 15.12.2021 and 25.01.2022. During the meetings, the report submitted by the State Government of Bihar was examined by the Committee members/Experts and for further deliberations, the State was asked to furnish information as following:

1- The State Government of Bihar through its agencies shall present extent of area liable to flooding during floods of 100-year return period from center of Ganga River as well as same for floods of different return periods as well. Satellite imagery for pre or post-monsoon for different years may also be presented. Imageries used for different years should be consistent for similar periods viz., either pre-monsoon or post-monsoon. It was also observed that large areas are depicted to be under inundation which may be due to rains and internal flooding because of low lying terrain of the State.

2- State shall also present figures indicating percentage of low lying areas that will be inundated due to floods of certain return periods. Ground-truth verification of imageries sent by NRSC as per advise of *Expert Committee for Scientific Assessment of Flood Prone Area* is still pending with State of Bihar. If the same is available, it may assist in flood plain zoning issue of Bihar.

3- As per NGT order in OA No. 200/2014, main objective is to protect geology and ecology of the River which is missing in the presentation made by State of Bihar. River system has different physical structures such as channels and other existing uplands, with each having different functions. As per ecology, flood plain zoning are of two types, Hydrological (Riparian) Flood plain and Topographical Flood plain.

i. Hydrological (Riparian) flood plain is missing from discussion and presentation.
ii. Assessment of such flood plain zoning could be worked upon stretch-wise. State shall also consult ecologist or ecological scientist for the same.

4 - *Para 6 (3) of the Authorities order, 2016* also provided for inventorization of already existing construction in flood plains and their review by *National Mission for Clean Ganga* so as to examine as to whether such constructions are causing

interruption in the continuous flow of water or pollution in River Ganga or its tributaries, and if that be so, it shall cause for removing them. Extent of inundation caused by floods of different return periods for river Ganga and its tributaries, therefore, needs to be identified and furnished to the Committee, on GIS or appropriate platform.

5- A blanket exemption that identification or notification of floodplain and its regulation is not possible due to peculiar settings in State may not be acceptable as requisite information has not been provided by State. Certain regulations should be there so that a baseline status for riverine right-of-way can be maintained especially in areas with high population pressure.

6- It is responsibility of State to inventorize the existing construction/ structures in flood plains and take appropriate view on such constructions. There are court cases for appropriate jurisprudence before Supreme Court also wherein brick-klins etc. and similar commercial structures, which are encroachments in the floodplains, have been constructed in the flood plains due to absence of any regulatory framework. Pending identification of flood plains and its zonation for regulatory purposes, it is also essential that State immediately brings in a regulatory framework for regulating certain buffer area along the river banks to avoid further encroachment and indemnify the river from avoidable anthropogenic activities.

9- As most of river in State are embanked, it may also segregate extent of flooding, river-wise and river stretch-wise, within embankments and that outside the embankments in years which did not have large areas under flooding.

10- Further studies required for scientific assessment utilizing the high resolution DEM is to be carried out by State as per timeframe following directions of Hon'ble NGT.

11- State may well consider carrying such studies river-wise and river stretch wise identifying those stretches, in first phase, where dense settlements exists. Results of such study may help in extrapolating the same in other stretches also.

C-Submission made by State of Bihar during Discussion in meetings:

1. Presentation was made by the State Government on "*Scientific study on: the feasibility of Flood Plain Regulatory Zoning in the State of Bihar*" covering various aspects related to satellite imageries based studies towards identification of low-lying and flood prone areas, their geographical extent and annual maximum inundation during historical years. State presented that terrain in the State is

2. markedly different from that in Uttar Pradesh or other States as rivers in Bihar have comparatively high terraces immediately along the river channels followed by low lying areas further away from channel supporting unique settlement patterns along the river banks and in their flood plains. Besides, the rivers happen to be largely embanked.

3. State Government of Bihar was requested to use high resolution DEM for scientific assessment and to provide results of such study both river wise and river-stretch wise and identifying those stretches, in first phase, where dense settlements exist. The Government of Bihar vide their letter dated 21.01.2022 provided list of 23 structures located on banks of River Ganga at Buxar, Patna, Barh, Gaya and Sultanganj identifying type of structures as administrative building, defence establishment, educational institutes, commercial and security considerations etc.

4. Further, it was submitted that as high resolution Digital Elevation Model (DEM) for said river flood plain and adjoining area are not available with the State of Bihar, hence, it is not possible to assess extent of inundation corresponding to flood of different flood frequency. It was also mentioned that Bihar Government in past had tried to obtain DEM for Kosi and Baghmati rivers in the State but effort was futile. However, they have identified list of 23 important structures which are within 100meters, 200meters and 500meters distance from banks of active river channel.

5. Bihar Government responded that the present study has been completed using data obtained from NRSC under *Disaster Management Programme*. As SRTM data have variations of 1-2 meters, therefore it is not possible to demarcate extent of inundation using SRTM DEM. For assessment of such extent of inundation, DEM (Digital Elevation Model) of specific higher resolution would be required. Therefore, for further study using DEM of high resolution, further time period would be required.

D-Committee's Observations:

1. The Committee observed that the Government of Bihar expressed their difficulty in identification of floodplain of rivers as they don't have maps or high resolution DEMs. The Joint Committee was apprised that in *1st Quarterly Report of Bihar* submitted to the *Central Monitoring Committee (constituted in O. A. No. 673/2018)* the State of Bihar had submitted as following:

a. The buffer zone at 100meters, 200meters and 500meters on either side from central line of the main stream of river Ganga was assessed and demarcated on GIS map and the area, including river portion was assessed as 183.89 Km2, 363.12 km2 and 875.31 km2 respectively.

b. The buffer zone at 100meters, 200meters and 500meters on either side from the central line of the main stream of river Gandak in Bihar was demarcated on GIS map and the area, including river portion has been assessed as 71.11 Km2, 139.28 km2 and 321.12 km2 respectively while for Ghagra in Bihar, it has been assessed as 15.76 Km2, 36 km2 and 71.00 km^2.

c. Based on HFL at Gandhi ghat, Patna; an inundation map of river Ganga (in Bihar) was prepared on GIS using satellite imagery of river Ganga. The map shows that 2126 villages in 13 districts spanning over 4830.70 km2 excluding the active river channel is affected.

d. Buffer zone for other tributaries of Ganga like Koshi and Mahananda is under progress.

The submissions made before the Hon'ble NGT by the State Government of Bihar in form of Quarterly Report(s) were not found to be consistent with their views before the Joint Committee. The State of Bihar has made assessment of extent of inundation based on Satellite imageries only without accounting for these figures scientifically from floods corresponding to different return periods and their impact thereof on flood plain zoning. However, it emerges that State Government of Bihar is in position to make a scientific assessment of inundated area due to flooding by carrying out studies.

2. As per data provided by NRSC to *FMISC (Flood Management Improvement Support Centre*) of the State contains those areas which are very low lying and completely inundated not only due to *fluvial flooding* due to river but also due to *pluvial flooding* due to rains in different years.

3. The Committee expressed that there have been examples of adoption of varied criteria for delineation of floodplain. For e.g.

(a) In case of Krishna River, flood plain of river is defined as zone betweenflood protection bunds of the river.

(b) For Yamuna River in Delhi, flood plains are corresponding to zone ofinundation for 1 in 25 years flood frequency.

c) For Yamuna River in Agra, flood level taken in year 2010 is taken as extent of flood plains.

While as per Authorities Order, 2016, the flood plain of the river Ganga is to be considered invariably on the basis of one in 100 years cycle of flood return period which warrants further study/data to prove rationality and practicability.

4. Moreover, NRSC has made *Flood Hazard Atlas* which are covering flood hazard for flood frequency of 1 in 2 years or 4 years. However, it is not possible to separate *fluvial* and *pluvial* flooding. A quick study can be undertaken by taking discharge data for period of 25 years and it was opined that modelling should not take much time provided data is available.

5. The mandate of Committee is to examine the submission made by Govt. of Bihar in form of Scientific Studies and made recommendations as regards relaxation in *Authority Notification, 2016*. Committee may not independently get into studies as such studies may be carried out by Government of Bihar and result presented to the Committee.

6. The Committee further observed that State Government of Bihar should take further study with objective of assessing extent of area under respective flood frequency and taking into consideration river cross-section required for safe passage of floods.

E-Recommendations:

- The basis of Floodplain Zonation could be using frequency of occurrence of flood events integrated with engineering criteria as well as perspective of ecological integrity.
- Floodplains area may be sub-categorized based on *frequency of occurrence of flood events* (one in 25 years/one in 50 years/ one in 100 years) as **old flood plains** that are disconnected from river channel, elevated, cannot be inundated except once in 100 years flood and no longer contribute to the ecological integrity of the river system, in Urban Centers used for human settlements and in villages used for agriculture-plantation-orchards. Similarly, **young flood plains** that are disconnected from older floodplains, connected withcurrent flow-regime of river, frequently inundated, have geomorphic units like abandoned channels, meanders, ox-bow lakes, wetlands, low vegetation cover and high moisture content, thereby contributing to the ecological integrity.

Therefore, criteria may be worked out for zonation that may be applicable

stretch-wise to ensure maximum integrity of floodplains using geo-morphological approach *i.e.* demarcation of younger floodplains as they are ecologically more active.

- Even in younger floodplains, the Land-Use Land-Cover may be considered while developing the criteria. If the protective bunds demarcate younger floodplains from the older floodplains, it can be used for zonation of floodplains but if it is located within younger floodplains it should be relocated close to the older floodplains.
- The existing SRTM Digital Elevation Model may not give exact results as the relief in floodplains in stretch of River Ganga in Bihar requires high resolution DEM data. Therefore, high resolution Digital Terrain Modelling is required for floodplain demarcation using simulation under different return periods.
- NRSC has prepared *Flood Hazard Atlas* of Bihar State using multi-mission satellite imagery data acquired during 1998 to 2019. This covers, recent extreme floods also. Upstream and downstream historic discharges of the said river stretch may be analyzed to compute flood magnitudes corresponding to 25 years return period. Recent Satellite based flood map nearest to correspond to computed 25-year flood discharge may be considered as 25 years return period map.
- As floodplains in the specified stretch is more than 300m wide, identifying structures within the buffer of 100m, 200m, 250m, 300m is not scientific.
- The area within the protective embankment is the river space where no development activity should be permitted. If the protective embankment is close to (100 meter) from river channel bank, the protective embankment should be relocated close to older floodplains.
- Identification of encroachments/unauthorized and illegal constructions in floodplain may be done using UAV/HRSI imagery for the flood plains of entire river network of Bihar.
- A comparative analysis between the cost incurred on the annual maintenance of flood protection works and the cost involved for relocation, rehabilitation of infrastructures and annual flood relief for area lying within the demarcated flood plain boundaries, as obtained from encroachment survey needs to be done.
- The satellite images provided do not separate the *fluvial* flooding from other types of flooding such as *pluvial*, drainage congestion etc. Also, instead of showing maximum flooding in a year, it will be better to indicate flood extent and depth separately for each river system based on range of flood exceedance probabilities i.e. return period from 2 to 100 years with overlay of all critical infrastructure & demography. Thereafter, damages against each return period may be derived.

- Vast wetland areas are available near various rivers and in different location in the State of Bihar which acts as detention basin to regulate flood and silt. The surveys of these areas are also required to be carried out by the State Government for restoration to its natural condition. The views of Bihar State Wetland Authority may also be taken.
- The State should assemble and collate city-wise data for flood frequency of river Ganga and its tributaries, cross-section of the river and cross-section of the river required for safe discharge of the floods the in river. thereafter, the requirement would be for identification and delineation of river area required to be reserved as flood plain zone devoid of any kind of news civic constructions.
- In City/town areas where there is pressure on land in floodplain, the State Government can honour whatever Hon'ble NGT has prescribed in its directions/orders and /or what has been provided under State bye-laws. But in rural areas with relatively low pressure on flood plain, the flood plain area should be protected in true spirit of *Authority Order, 2016.*
- Finally, as soon as DEMs would be available through the study, the State should complete the survey study.
- The process of LIDAR survey by Survey of India on stretch of Ganga for generation of high resolution Digital Elevation Model (DEM) for about 93000 sq.km. area in buffer of 10 km on both banks of river Ganga and its tributaries (Yamuna, Ghagra, Ram-ganga, Gomti and others) is in progress under Namami Gange Programme and National Hydrology Programme. DEM data so made available would be shared with concerned States for effective management of floods. Further that this DEM data would be available in different phases starting with effect from July-2023 after the validation of same by Survey of India is completed. This DEM data will help States to demarcate extent of inundation due to floods of various recurrence periods.
- The States must have computational facility in form of hardware and software for viewing the DEM data, various query tools and facilities for analysis of high resolution data.
- Under para 6(3) of River Ganga (Rejuvenation, Protection and Management) Authorities Order, of Oct-2016, *no person shall construct any structure, whether permanent or temporary for residential or commercial or industrial or any other purposes in the River Ganga, Bank of River Ganga or its tributaries or active flood plain area of River Ganga or its tributaries.* Further that *in case any such construction has been completed, before the commencement of this Order, in the River Bank of River Ganga or its tributaries or active flood plain area of River Ganga or its tributaries, the National Mission for Clean Ganga shall review such*

constructions so as to examine as to whether such constructions are causing interruption in the continuous flow of water or pollution in River Ganga or its tributaries, and if that be so, it shall cause for removing them. Further under para 3-Definition sub para (l) *"flood plain" have been defined as such area of River Ganga or its tributaries which comes under water on either side of it due to floods corresponding to its greatest flow or with a flood of frequency once in hundred years.* The definition doesn't mean to convey that entire zone corresponding to flood of recurrence interval of 1 in 100 years is to be declared as protected zone with no construction being allowed in such a zone. Instead the zone corresponding to flood with 1 in 100 years recurrence interval can be divided into three zones, with inner most zone as being active flood plain corresponding to flood of 1 in 5 year recurrence interval with no construction being allowed; next buffer zone as being regulatory zone corresponding to flood of 1 in 25 year recurrence interval and outermost zone can be zone in which various other category of activities can be permitted by mapping their vulnerability such thatrisk to flood hazards remain minimal. This eventually will help the States in minimizing the damages due to floods.

- Through various directions of NGT, States have been directed that till such time States scientifically demarcate flood plains, as an interim measure certain buffer zone (defined specifically in the NGT directions) shall be notified respectively as no construction zone and regulatory zone to prevent encroachments into riverine flood plains and maintain a baseline. This interim measure shall cease upon scientific demarcation and notification thereof of floodplains by the States.

****

Letter No.YoMo–04(Vividh) 07–372/2020– 296
Government of Bihar
Water Resources Department

From,

Arun Kumar Dwivedi
Joint Secretary (Engg.)

O/o ED (T), NMCG
Dy. No...2615.....
Date...10/08/2021

To,

The Executive Director (Technical),
National Mission for Clean Ganga
Dept of Water Resources, RD & GR
Ministry of Jal Shakti, GoI
1st Floor, Major Dhyanchand National Stadium
India Gate, New Delhi-110002
E-mail:- ed-technical@nmcg.nic.in

)(RD Tech) NMCG-NATIONAL MISSION FOR CLEAN GANGA-Part(1) (Computer No. 260330)

Patna, dated :- 02/08/2021

Sub:- Reoprt on Scientific Study of Flood Plain Zoning in the State of Bihar regarding.

Ref:- NMCG letter no. TF-16019/3/2020/NMCG Part (I)/765 dated-29.07.2021.

Sir,

In reference to the above mentioned subject, I am directed to convey that the report on Scientific Study of Flood Plain Zoning in the State of Bihar is hereby enclosed for your kind information and necessary action.

Encl: As above

Your faithfully
02/08/2021
(Arun Kumar Dwivedi)
Joint Secretary (Engg.)

Memo No. 296 /Patna, dated 02/08/2021

Copy to Member Secretary, Bihar State Pollution Control Board, Bihar, Patna/Principal Secretary, Urban Development and Housing Department, Bihar for information and necessary action.

02/08/2021
(Arun Kumar Dwivedi)
Joint Secretary (Engg.)

Report

on

)(RD Tech) NMCG-NATIONAL MISSION FOR CLEAN GANGA-Part(1) (Computer No. 260330)

Scientific study on the feasibility of Flood Plain Zoning in the State of Bihar

Prepared By:

Flood Management Improvement Support Centre (FMISC), WRD

Patna-800002

INDEX

List of Figures:

Acronyms:

DEM:	Digital Elevation Model
DMSP:	Disaster Management Support Program
ESA:	European Space Agency
FMISC:	Flood Management Improvement Support Centre
LANDSAT:	Land Satellite
NRSC:	National Remote Sensing Centre
RADAR:	Radio Detection and Ranging
SRTM:	Shuttle Radar Topography Mission
USGS:	United State Geological Survey
WRD:	Water Resources Department

A REPORT ON SCIENTIFIC STUDY ON THE FEASIBILITY OF FLOOD PLAIN ZONING IN THE STATE OF BIHAR

1. OBJECTIVE

Flood Management Improvement Support Centre (FMISC) under Water Resources Department (WRD), Government of Bihar is a pioneer organization having a Mathematical Modelling Centre (Research & Development wing) is entrusted to carry out a scientific study on Flood Plain Zoning in the state of Bihar vide letter no-यो0मो0-4 (विविध)7-372/2020-528 Patna, dated 30/12/2020 of Engineer-in-Chief (Headquarter), Water Resources Department, Patna. The main objective of this scientific study is to find out whether the Flood Plain Zoning in the state of Bihar is feasible or not.

2. INTRODUCTION

Floods have caused devastation and acute human sufferings too frequently since the dawn of civilization and the man has had to live with floods since his existence. The impact of flood was not perhaps felt to the same extent in the past as is felt now. This was due to the fact that much small number of people were living and pressure of industrial activities and other development works in the flood plains was far less compared to the present day.

Bihar is India's most flood-prone State, with 76 percent of the population, in the North Bihar living under the recurring threat of flood devastation. About 68,800 Sq. Km. out of total geographical area of 94,163 Sq. Km. comprising 73.06 percent is flooding prone. Bihar is also one of the States having lowest per capita income in India. It has shown signs of improvement in recent years. Recurrent floods are proving to be stumbling block in the resource generation/improvement efforts. Floods not only affect lives, livelihoods, productivity and security of existing investments, but are also a disincentive for additional investments in Bihar.

Bihar accounts for about 17% of the flood-prone area and 22% of the flood-prone population in India. 28 out of 38 districts of Bihar are flood prone. Bihar's vulnerability to floods is due to its very flat topography just downstream of the steep Himalayas, intense monsoonal rains (more than 2,500mm/year in the upstream catchment in Nepal and about 1,200 mm/year in the State; 80% rainfall occurs during the months of June to September), high sediment loads due to fragmented rocks of Himalayas, high population density (1102 per Sq.km., Census 2011), low-socio-economic development, inadequate water infrastructure to regulate flow (e.g., storage in Nepal or designated detention areas in upper catchments).

The plains of North Bihar, adjoining Nepal, are drained by a number of rivers that have their catchments in the steep and geologically recent Himalayas. About 65% of catchments area of these rivers falls in Nepal/Tibet and only 35% of catchments area lies in Bihar (*Figure-2.1*). The rivers that cause much of the flooding include the Ganges and its tributaries (BurhiGandak, Gandak, Bagmati-Adhwara Group, Kamla, Kosi and Mahananda from the Himalayas on its left bank and the lower reaches of the Sone, Punpun, Chandan and Badua rivers on its right bank). It is important to point out that only BurhiGandak originates from low hills of outer Himalaya or Shivalik in West-Champaran.

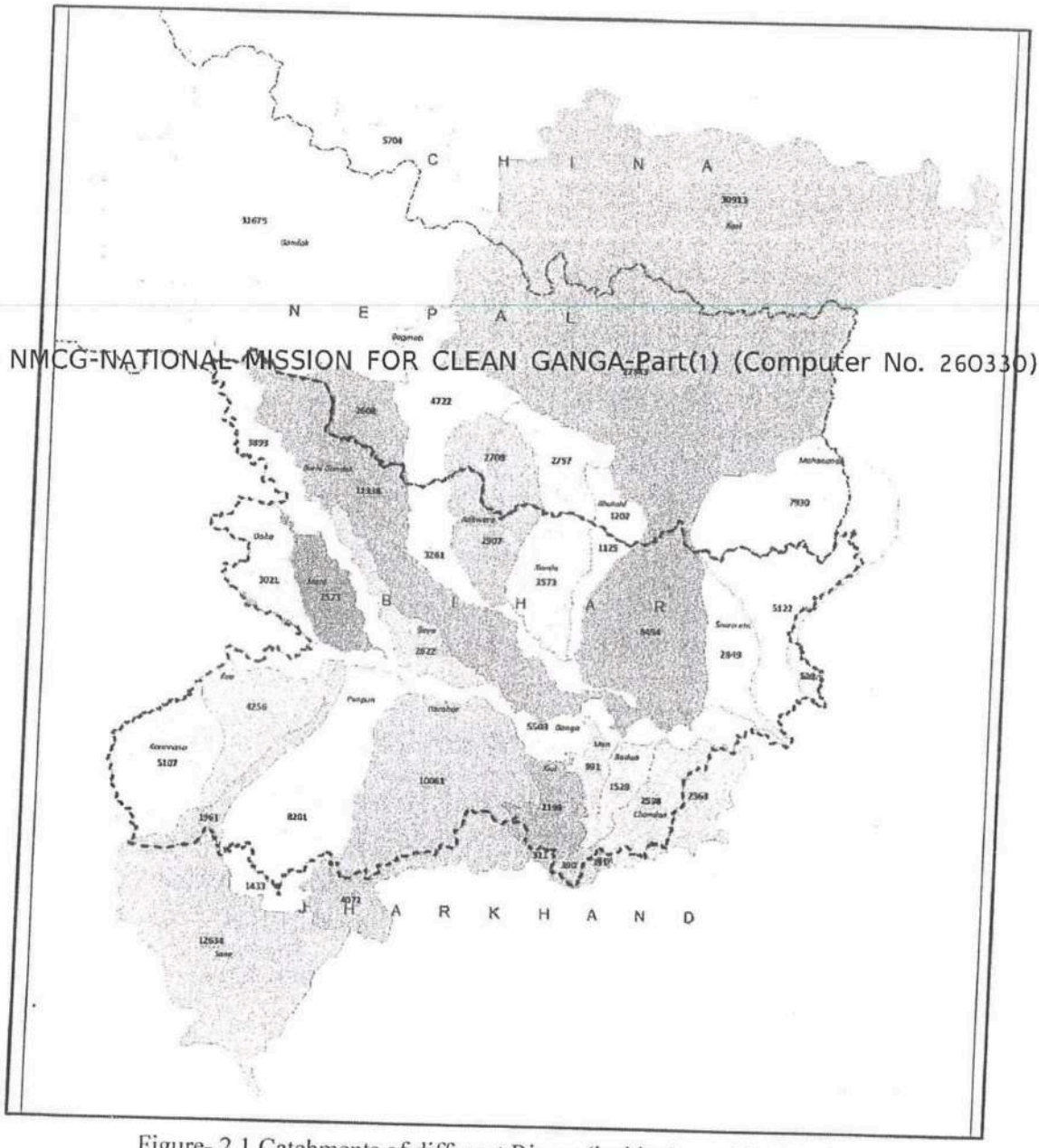


Figure- 2.1 Catchments of different Rivers (inside & outside Bihar)

The flood problem was accentuated due to ever increasing encroachments on the flood plains by the growing population to meet its requirements of shelter, food and fibre. The destruction of forests, reclaiming areas for occupation and fuel for their domestic requirements had also caused changes in river regime. All these have resulted in an anomalous situation where, in spite of protection measures carried out so far in the State with a substantial investment on flood management works, flood damages have gone on increasing instead of decreasing.

The plains of North Bihar are some of the most susceptible areas in India, prone to flooding. A review by Kale (1997) indicated that the plains of North Bihar have recorded the highest number of floods during the last 30 years. The total area affected by floods has also increased during these years. Drained by the two major rivers like the Kosi and Gandak and several smaller systems, such as Burhi Gandak, Baghmati and Kamla Balan, the plains of North Bihar have experienced extensive and frequent loss of life and property over the last several decades (Sinha and Jain,1998). The Kosi River (The Sorrow of Bihar) is well known in India for rapid and frequent avulsions of its course and the extensive flood damages it causes almost every year.

The Kosi is one of the major tributaries of the Ganga river, and rises in the Nepal Himalayas. After traversing through the Nepal Himalayas, it enters India near Bhimnagar. Thereafter, it flows through the plains of North Bihar and joins the Ganga River near Kursela, after traversing for 320 Km from Chatra. The river has been causing a lot of destruction by lateral movement and extensive flooding. As its waters carry heavy silt load and the river has a steep gradient, the river has a tendency to move sideways. Thus, in about 200 years the river has moved laterally by about 150 Km (Gole and Chitale, 1966; Wells and Dorr, 1987). To check the lateral movement as well as for flood control, embankments on both sides of the river were constructed, five to sixteen Km apart. Although this has confined the lateral shift of the river within the embankments, but the problem of flooding is still a challenge in this area. The problem of river flooding is getting more and more acute due to human intervention in the flood plain at an ever-increasing scale. Total length of embankment (flood protection works) till the end of ninth five-year plan (1997-02) was 3435 Km & now it is 3780 km (*Figure-2.2*).

River Kosi remains at the central stage as far as history of floods in Bihar is concerned. The oscillation of the river Kosi bed below Chatra (Nepal) can well be compared with that of a pendulum of a clock having a fixed point at Chatra and oscillating between the district of Purnia on the east and district of Darbhanga on the west. Dr. B. Hamilton about 165 years ago formed an impression that the Kosi during the remote past possibly flowed more towards the south east than towards the east and joined the Brahmaputra.

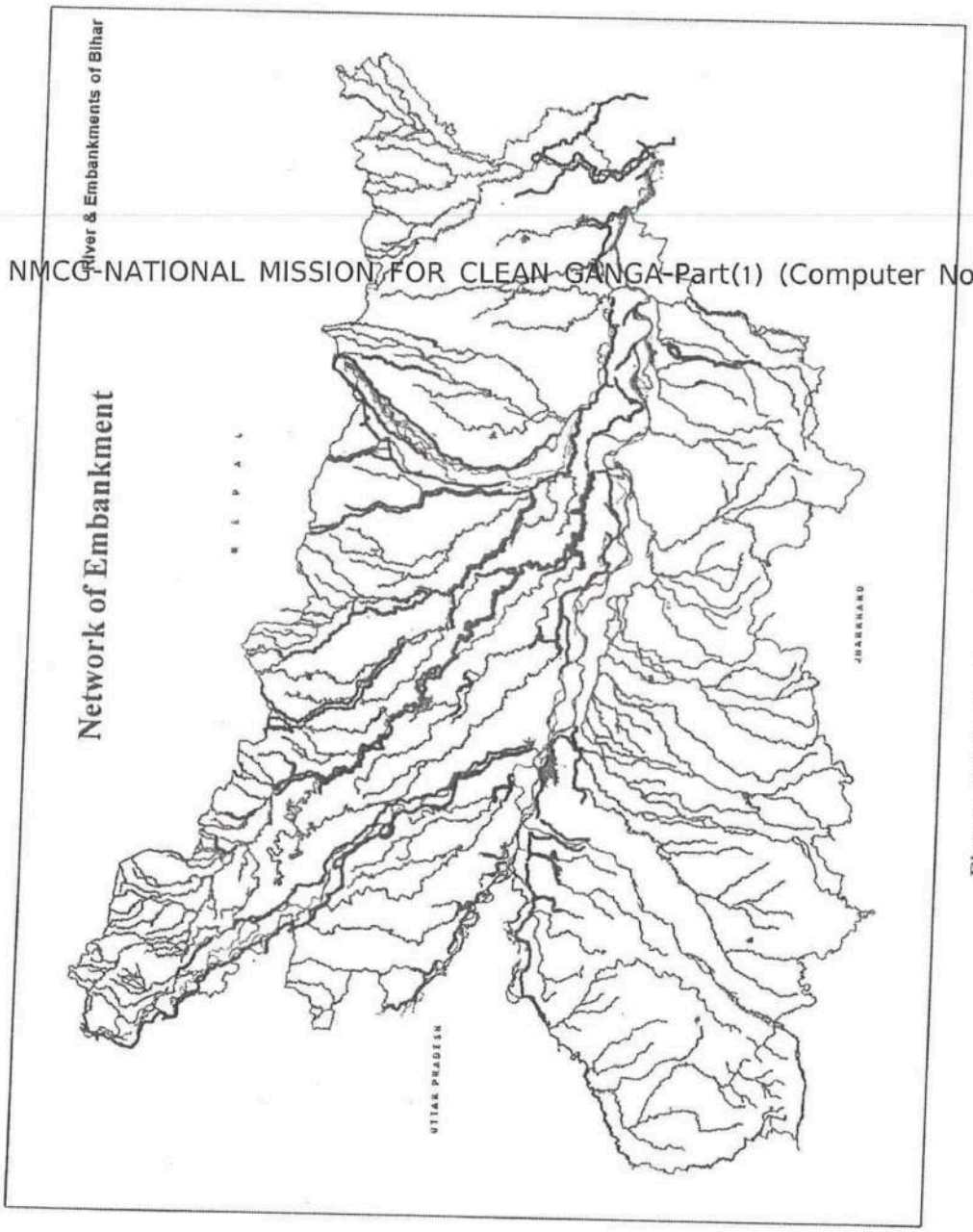


Figure –2.2 Embankment Networks of Bihar

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The views of M/S Leopold and Maddocks Jr. of United States Technical Co-operation Mission was sought by Govt. of India and the state of Bihar in connection with the finalization of the 1953 Kosi project. Dr. Kanwar Sain &Dr.Chitale gave reports about Kosi and its possible remedies which are based on sound logic. The history of past floods as available from the records of the district gazetteers of Saharsa and Purnia summarized by 2nd Bihar State Irrigation Commission.

Kamla Balan river basin is bounded by the Adhwara group of rivers on the west, the Kosi basin on the east, the Kareh river on the south and Mahabharat range of hills in Nepal on the north. The River Kamla and its tributaries used to cause flooding mainly in the districts of Madhubani and Darbhanga. The construction of embankment on its both banks from Jainagar to Jhanjharpur in 1958, Jhanjharpur to Darjia in 1962 and its subsequent extension up to Kotharam (1980) has checked flooding to a great extent in the middle reach of the river.

3. FLOOD MAPPING USING SATELLITE IMAGES

For the past 35 years satellite imaging has been used to map various earth resources as well as geographical features for better understanding of human nature interaction and its bearing on future of humanity. Natural disasters have been an integral part of our life and mankind has been trying to overpower natural forces wherever they find a chance to win.Flood seems to be the most damaging one as human settlement and their activities are found close to water bodies and rivers. Rivers which receive more water in the form of rain support more population density but have a greater risk in the event of a flood.

3.1 ADVANTAGES OF REMOTE SENSING AND ITS LIMITATIONS

In the beginning optical imaging cameras mounted on satellites used to capture astonishing pictures of the surface of the earth along with patterns of cloud. But the limitation of optical imaging during cloudy days; which is usual scenario during monsoon; hampered capturing most of the events. The advent of Radio Detection And ranging (RADAR) imaging during late 80's helped us in capturing a greater number of events as cloudiness was no limitation. These images, however were quite expensive and limited by availability due to orbit cycle design. Still, better and more numbers of RADAR imaging platforms were continuously providing pictures of flood events all over the world.

3.2 DATA SOURCE

For flood mapping of Bihar State, we are depending on processed extracts of RADARSAT images provided by NRSC under DMSP (Disaster Management Support Program). Besides we also purchase optical images from NRSC. Freely available sources like USGS (U.S. Geological Survey) and ESA (European Space Agency) also provide various images through their portal.

4. MAPPING METHODOLOGY

FMISC has procured and generated various thematic GIS datasets such as Administrative layer, Road, Rail, River systems, embankments and Canal. These layers are used to prepare a framework of study area under consideration. Satellite image or its extract is place in the background to generate a user-friendly map for use in field for decision making. Area of flood is generated on classified layer and is geo-processed to aggregate on District or Block level. It is to be noted that these images are available for a small area at a time. Satellite revisit period varies from 7 to 26 days. Since RADAR imaging satellites are steerable, their view can be changed on instructions from the operator. These advance multipurpose satellites are placed in various orbits from the time of launch their availability is not guaranteed. However, by employing a combination of various sensors and platforms a large number of flood events can be captured.

We have an archive of flood layers provided by NRSC. Every year's layers are put together on the state map to generate a mosaic, which sufficiently depicts maximum flood extent covered by satellites during that monsoon season. A composite map of Bihar based on satellite images from year 2007 to 2020 is prepared at FMISC *(Figure 4.0)*.

Here this also must be kept in mind that all the flood events and all flooded areas have not been covered on a particular date. ***The maximum flood extent may miss some major flood event due to non-availability of any satellite over that region. The image of the region might have been captured on a later date; but by that time flood water may have receded from a large area.***

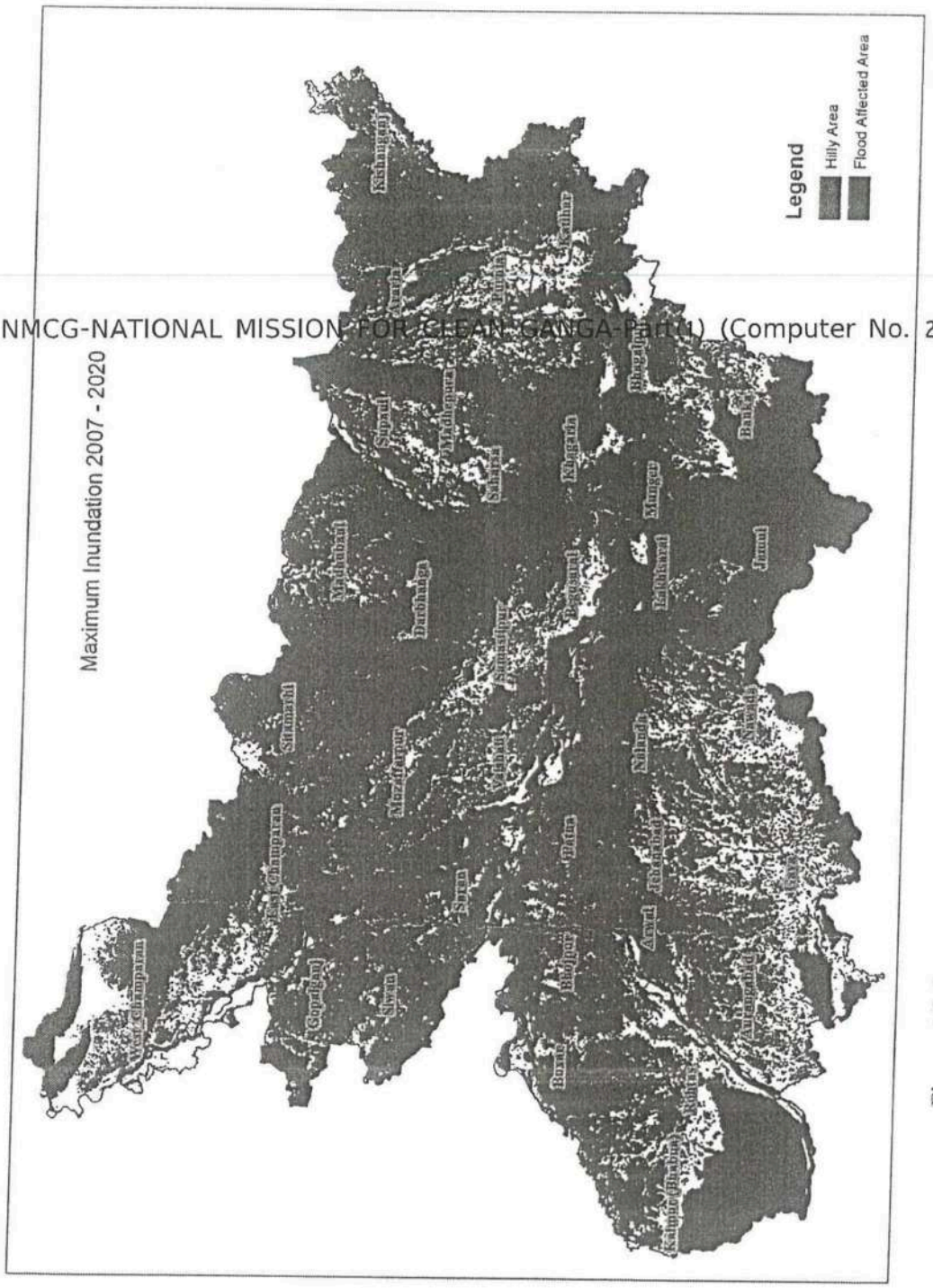

Figure-4.0 Composite Inundation Map of Bihar based on satellite images (2007-2020

5. HYDRO-METEOROLOGICAL FACTORS AND THE FLUVIAL PROCESS

Much has been said about the ferocity of Rivers of Bihar and the resultant flood devastation and economic miseries caused to State. Blame has always been placed on the rivers of North Bihar, mainly Kosi, Bagmati, Kamla and Mahananda. It is always said that these rivers carry a lot of water and sediment from Himalayan region and spread across plains of North Bihar. Pattern of rain during monsoon is such that rivers themselves find insufficient time and space to accommodate such a vast quantity of water in such a short time that too at close intervals. Due to insufficient capacity of the river to carry the discharge hence the surplus must find its way on its own causing either spill-over or breaches of embankment which ultimately causes loss of life and property. We must not forget that this insufficiency of capacity of river has resulted in formation of vast alluvial plains which has supported civilization since time immemorial.

The problem is further aggregated by the fact that Bihar plain lies near the lower end of the great Indo-Gangetic plains hence every bit of water received in upper and middle catchment must pass through this State with rivers having very gentle slope. It is wrong to consider flood and plain as separate contexts; rather treat it as ***flood plain*** with benefit of fertile land and miseries of flood.

Kosi has been considered as "Sorrow of Bihar" but in fact this river has created the biggest deposit of alluvium which forms a large part of Indo-Gangetic plain. The fan shaped convex dump created by this single river system is still undergoing development with the help of shifting channels from East to West and from West to East, spreading vast amount of sediment obtained from destruction of massive Himalayan mountains. Notably this fan is known as "Maize bowl" of Bihar.

6. FACTORS AFFECTING PATTERN AND INTENSITY OF FLOODS IN BIHAR

6.1 TOPOGRAPHICAL FACTORS – *LOCATION IN CATCHMENT*

While dealing with flood problem of Bihar we talk about rivers of Bihar and somehow ignore other big and small river systems of upper part of the great Indo-Gangetic plain. A catchment is an area over which rainwater is collected and directed towards downstream i.e., lower elevation in the form of river network, which merge together to form an axial drainage leading to final outlet i.e., Ocean. This means that the areas at lower elevation keep receiving water from upper part of the catchment even if there is no direct input in the form of rain. This causes a pile-up of water to be transported to sea. Notably the upper part of the catchment also has greater gradient hence rainwater moves faster on the land as well as in the channel. The velocity slows down as we move downstream in the catchment (*Figure- 6.1*). Moreover, sediments coming from upper catchment settles down in the channel itself due to drop in velocity as well as nears the sea. This seemingly slow process; over the years; has contributed a lot to upheaval of river beds resulting in increased submergence of Ganga Khadar even if the intensity of monsoon remains the same.

6.2 TOPOGRAPHICAL FACTORS – *LOCAL RELIEF FEATURES*

Flood plains are formed due to predominantly aggradation action of river systems. In course of transporting water and sediment the river tries to establish equilibrium between energy it has at its disposal and load it has to carry down to the sea. When energy is surplus the river etches out its edges to create more waterways and when load exceeds carrying capacity, it is deposited on the way. This action creates many shapes on the surface it has created, hardly perceptible to an untrained eye but visible during floods.

The SRTM Digital Elevation model clearly shows that the flood plain is entrenched in the plains and interfluvial areas are raised much above the flood plain (*Figure-6.2.1*). Thus, River flood prone areas lie at lower elevation in the form of a relatively narrow river play zone. The picture is just reversed in case of Bihar, it shows raised strip all along the River while areas lying away from Rivers are flooded. The elevated areas are natural levees (*Figure-6.2.2*).

This low relief feature is created in rivers carrying huge sediment load and episodic large volume of water; causing spill over. The heaviest material is deposited soon after the spill, on the edges while finer material is carried further from the river. This repeated action raises edges of rivers creating a raised bank all along. A satellite image acquired during monsoon months shows these features clearly in a part of North Bihar plains (*Figure – 6.2.3*).

Natural levee is one such feature which is hardly visible due to its subtlety (low relief) but these low ridges along the rivers are high enough that many ancient settlements have thrived on it, being protected from frequent floods. Many towns and cities serve as examples in our study area which are proven to be of great antiquity and find place in oldest Hindu scriptures. Many important cities and towns such as Buxar, Chapra Patna, Munger, Hajipur, Begusarai, Bhagalpur and Kahalgaon are situated on the bank of Ganga which is treated as Holy River from ancient times. ***This settlement pattern is strictly guided by topography (Figure- 6.2.4).***

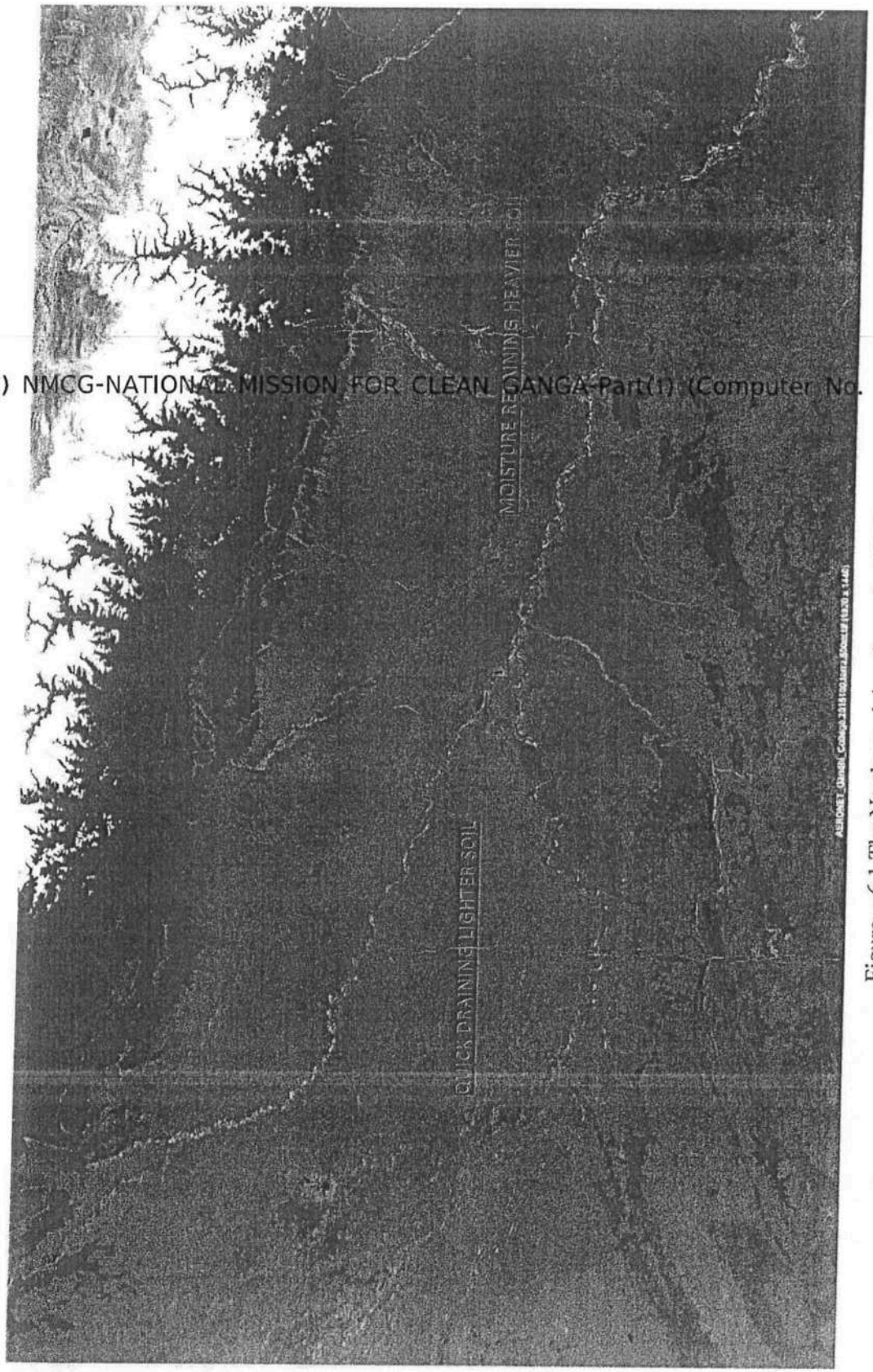

Figure – 6.1 The Northern plains shown by MODIS satellite

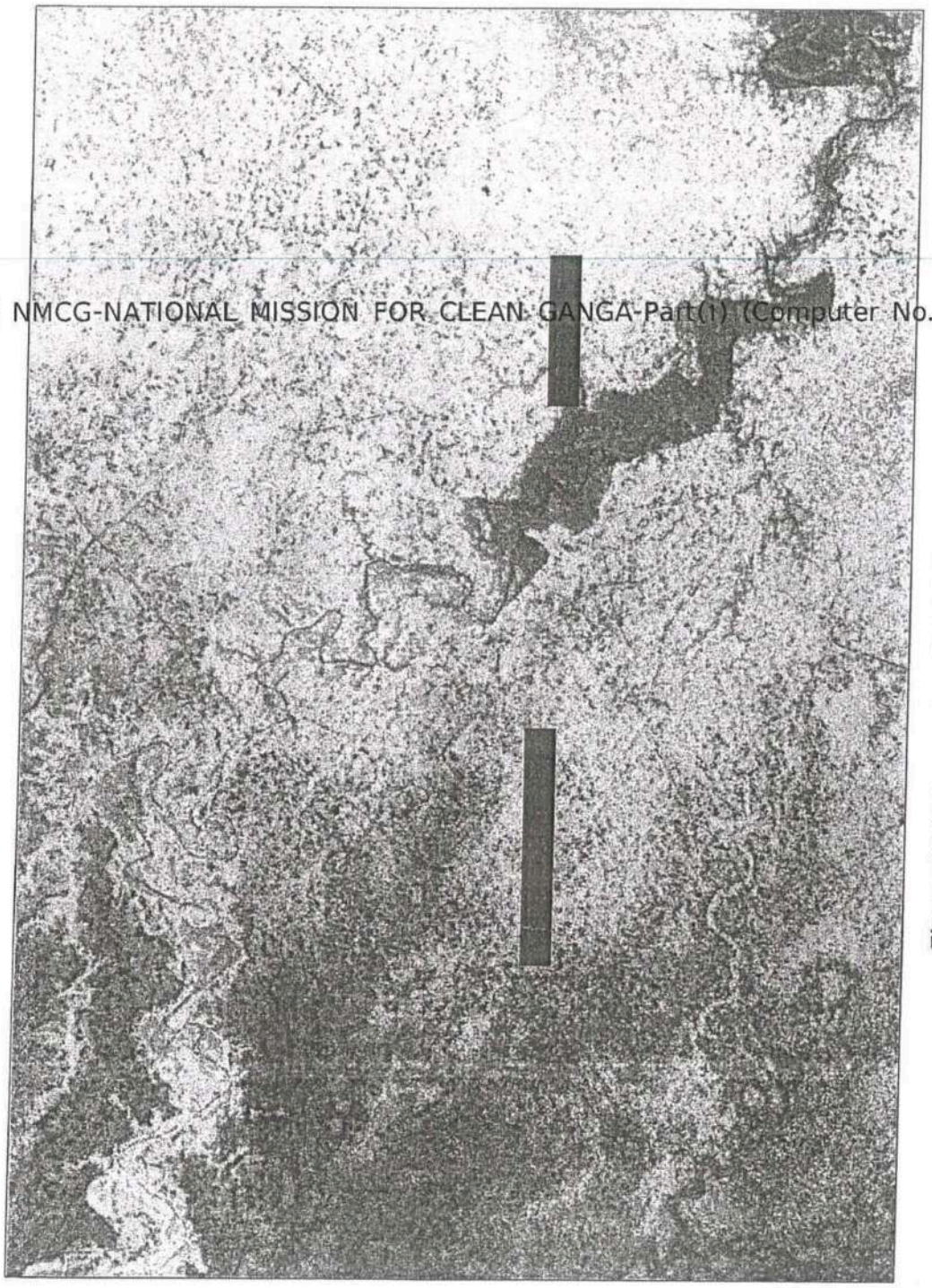

Figure- 6.2.1 Topography of U.P Plains*(Source SRTM. DEM)*

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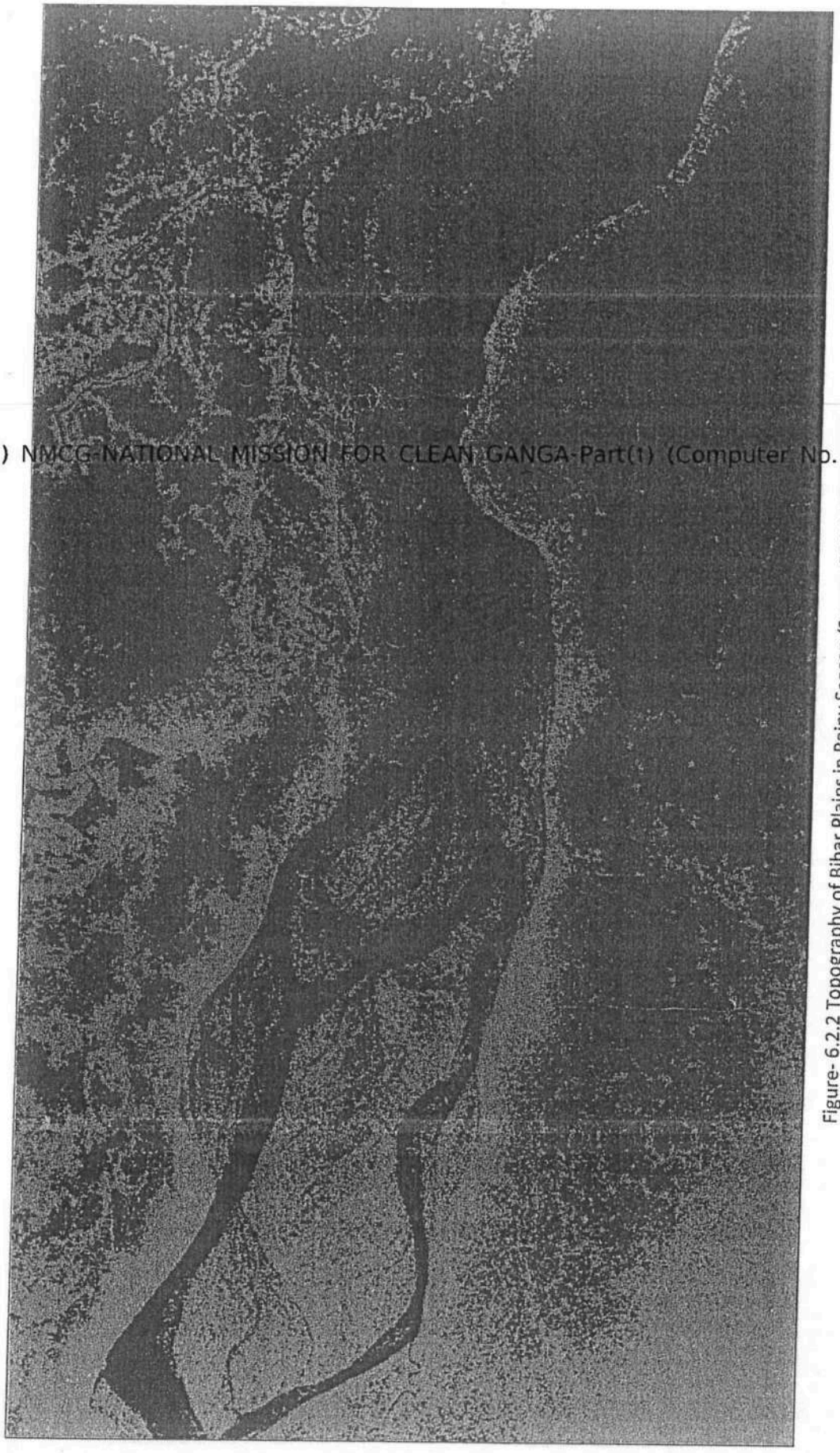

Figure- 6.2.2 Topography of Bihar Plains in Rainy Season *(Source: SRTM, DEM, USGS)*

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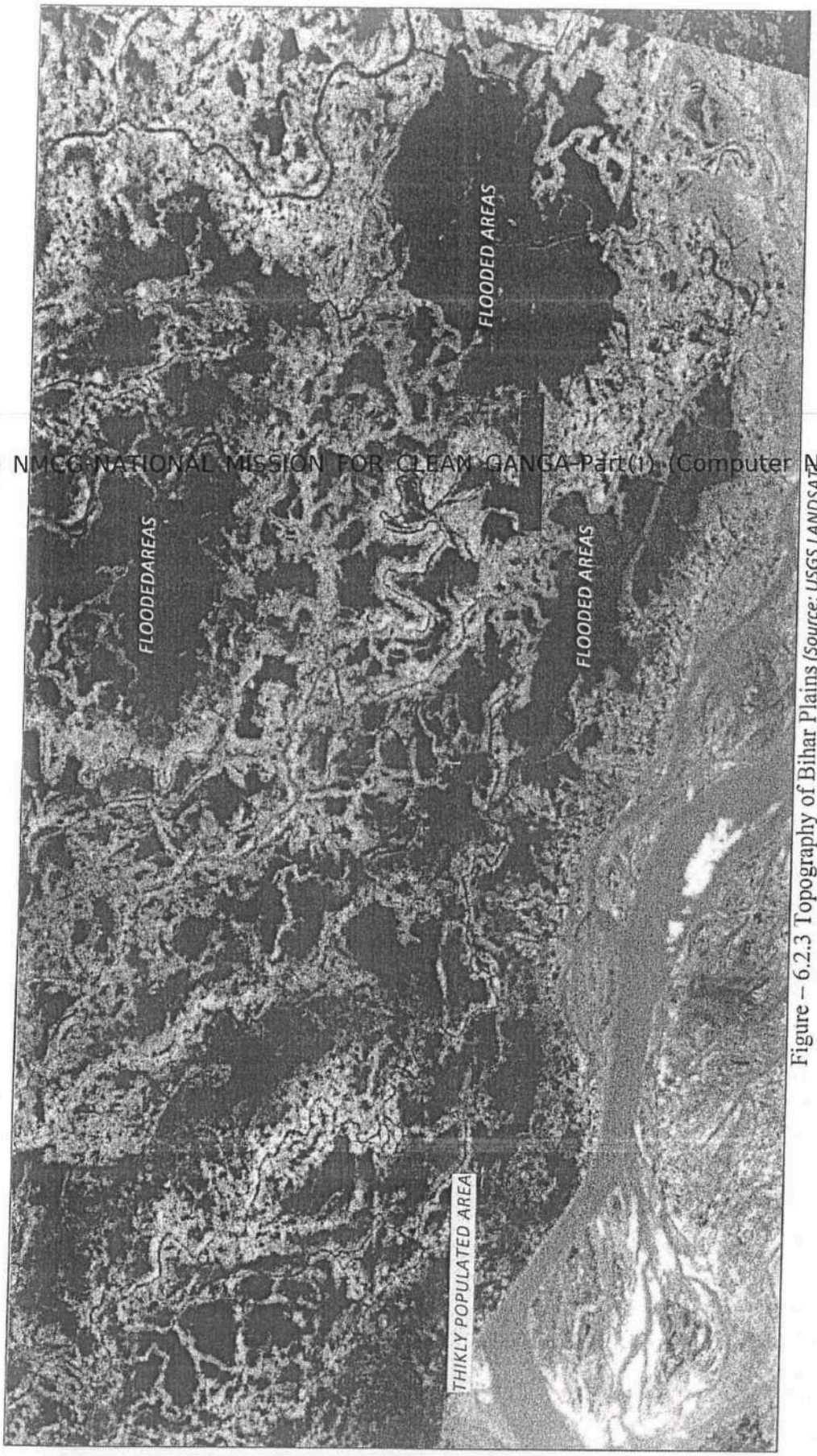

Figure – 6.2.3 Topography of Bihar Plains *(Source: USGS LANDSAT*

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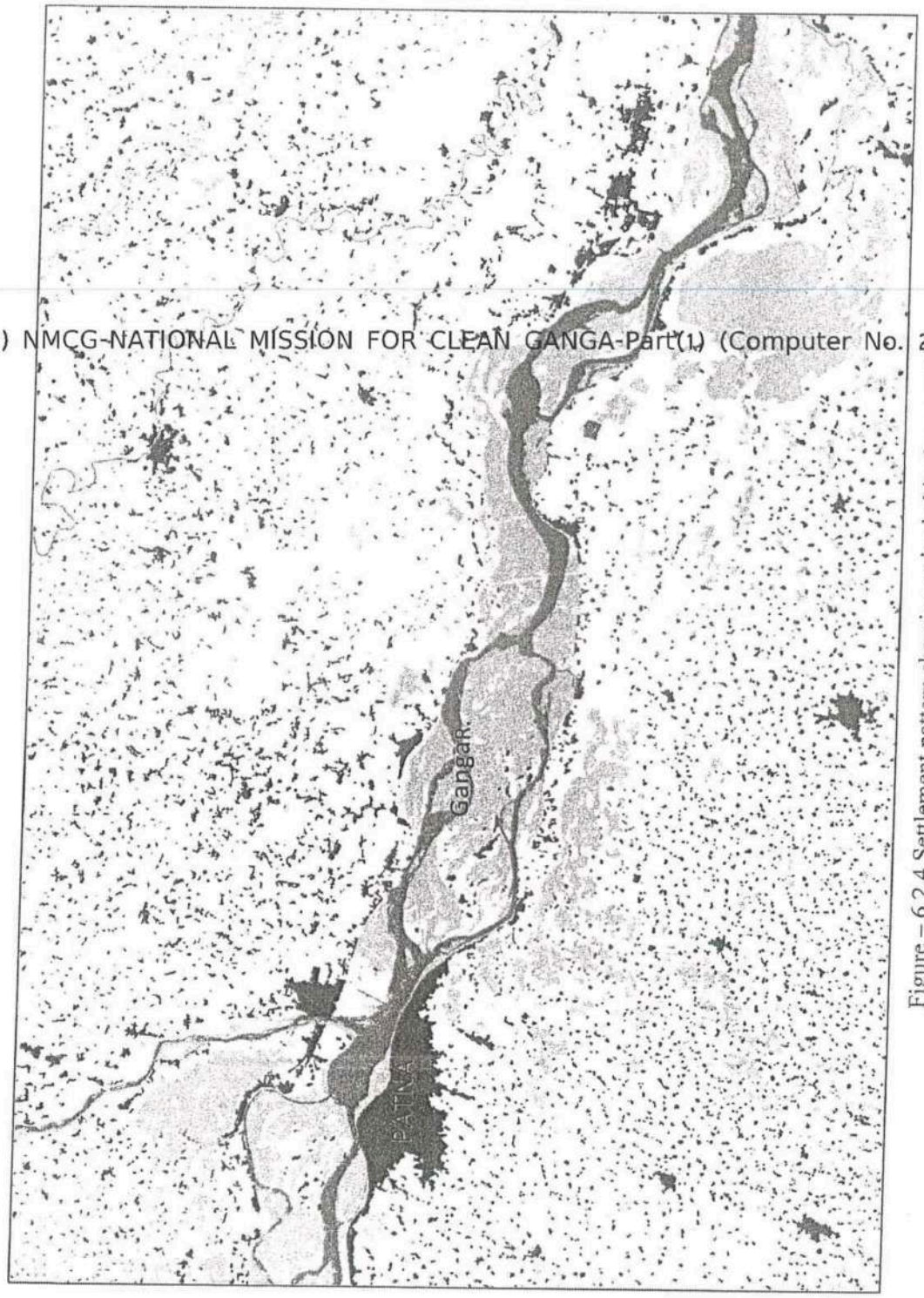

Figure – 6.2.4 Settlement pattern showingmajor habitation near River

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7.0 LAYOUT OF MAJOR CIVIL INFRASTRUCTURES

A look at drainage pattern of Bihar plains clearly shows a southerly slope in the North Bihar plain and a northerly slope in South Bihar plains, both leading to Ganga; the axial drainage of Bihar plains. While south Bihar rivers have a South to North orientation; North Bihar rivers show a tilt towards South East e.g., Gandaki, Bagmati, BurhiGandak etc. Kosi is an exception to this pattern as it has its own self-built terrain over which it has been wandering. The westerly bulge is due to a convex surface of the great alluvial fan formed just below Chatra in Nepal Himalaya. The river flows along the western edge of this massive alluvial fan. Supaul, Saharsa, Madhepura, Araria, Purnea, part of Kishanganj and Katihar districts lies over this alluvial fan.

Despite a well-defined natural topography favouring faster removal of flood water and lesser damage to life and property, the state suffers a lot of losses frequently on a routine basis. Fertile nature of soil and a favourable weather system has supported civilization since known long history. The region has witnessed rise and fall of many kingdoms and dynasties, all adding to infrastructural development across the plain. Ever increasing population and economic activities to support their livelihood has resulted in construction of Roads, Canals, Bridges and railway lines.

As the area is flood prone, most of these infrastructures have been developedconsidering flood hazards. This has resulted in a network of criss-crossing raised lines of "bunds", dividing a gently sloping plain in compartments of various sizes and "depth". Flood water, now has to negotiate through these ***compartments*** on its way down the plain. In most of the cases outlets provided in these "barriers" fall far short of requirement resulting in impeded drainage. Therefore, the flood has to wait longer to find passage, leading to longer duration of inundation. Many towns and cities are exposed to this problem and have constructed *Town Protection Bunds* to stay protected from flood water ingress in town areas.

Construction of a large number of bridges across the rivers has also affected transportation of sediment in traction (along River beds especially during non-monsoon months). Due to construction of these bridges, clear waterway gets obstructed impeding the free flow of water. All our efforts and engineering endeavours have given boost to our standard of living but now the adverse effects are being felt with more imposing vigour. Facing challenging nature head-on has taught us many lessons in the form of large-scale damage to life and property whenever nature sets its course right. For a short duration we have relished the feeling of *winning over* power of nature, now is the time to learn to live within the space provided by nature.

Rivers have always been lifeline of human as well as animal kingdom, hence we must begin to share only legitimate part of natural wealth, be it land, water or air.

Bihar is predominantly an agrarian economy, depending on its land and water. Long-time experience has supported agriculture till date and pleasantly we have not damaged our soil to the extent "progressive farmers" of the west have done. But the flip side is that we have failed to reduce pressure on land due to high population growth rate. Majority of farmers have small to very small holding which falls far less than sufficient to support livelihood. They are now

turning to intensive cultivation which require more of artificial irrigation, generating high demand of water from underground reserves. Farmland away from Rivers are more dependent on Ground Water for irrigation compared to those living close by Rivers.

It is pertinent to notice that civilization has begun from rivers. Large inhabitations lie onnearby the rivers or its tributaries because of large availability of alluvial plains and water suitable for agricultural food crops. Almost all-important towns of Bihar lie on the bank of either Ganga, Gandak, BurhiGandak, Bagmati,Kamla, Kosi, Mahananda and Sone. So, it is very difficult to demarcate flood zone on these rivers as this will affect the present scenario even though these towns are frequently affected by recurring floods.

Since the most towns of the State of Bihar are situated on/ near by the banks of rivers/ tributaries, a large population inhabit in the river adjoining area called flood plain. As population is also increasing very fast so the displacement of [illegible] population from these areas is not possible. On the other hand, the land available in non-flood plain are highly productive and the cost of land is high so practically not possible to do resettlement of these large population which are inhabiting since long period of time in the flood plain.

Almost all inhabitants of the State of Bihar are dependent on groundwater rather than surface water. The groundwater availability nearby river is higher and as we move away from rivers the ground water level lowers, which results in scarcity of drinking water. Therefore, in case of resettlement from flood plain will also create a great problem of drinking water availability. This will result in ecological imbalance.

8.0 YEARWISE FLOODING PATTERN MAPPED FROM 2007-2020

Year wise flooding pattern as captured by satellites on various dates during monsoon season have been assembled to generate year wise composite maps. These images have been provided by NRSC Hyderabad under Disaster Management Support Programme (DMSP) of Govt. of India. These maps can be seen from *Figure- 8.1 to 8.14.*

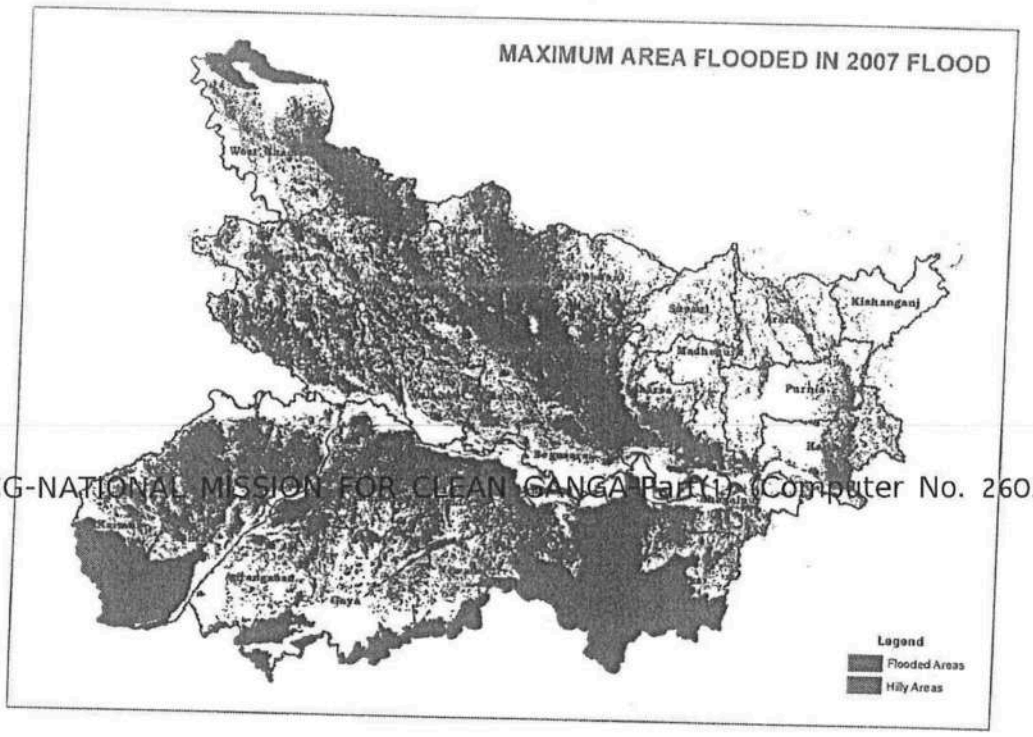

Figure - 8.1 Composite Inundation Map for 2007

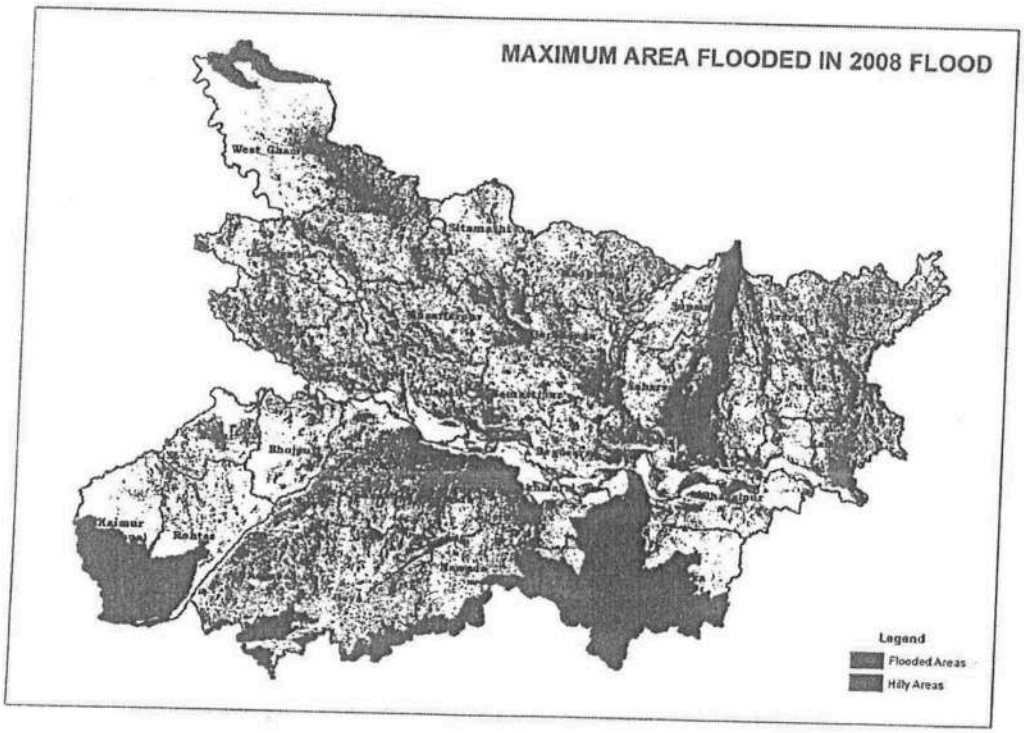

Figure - 8.2Composite Inundation Map for 2008

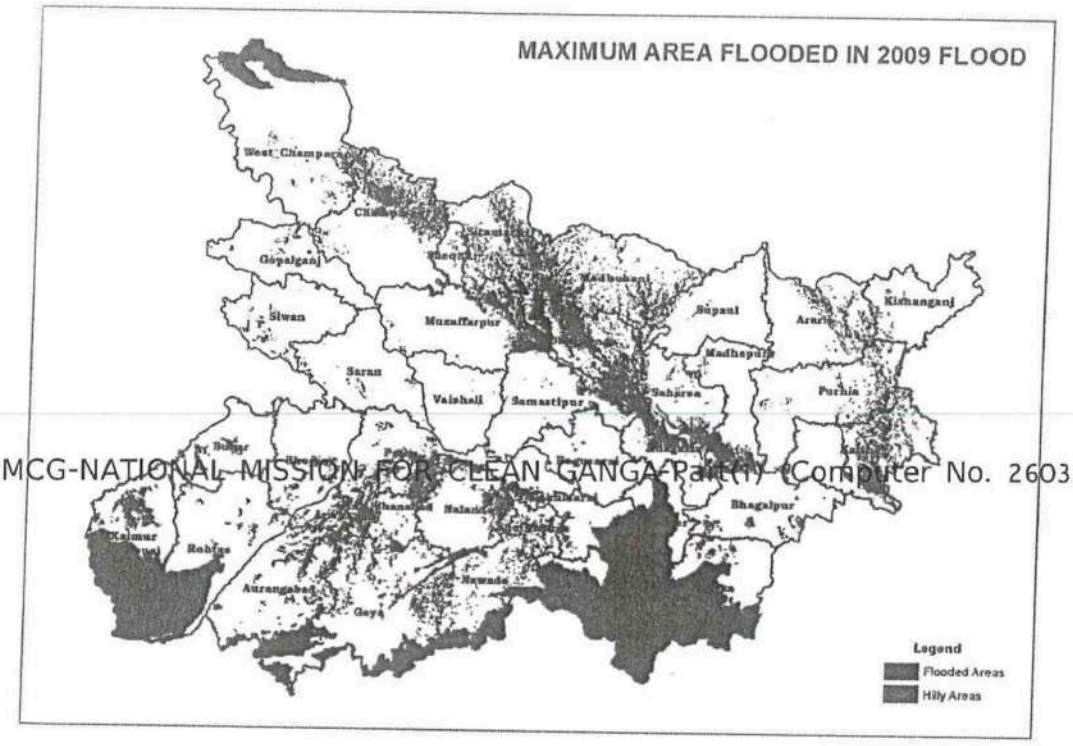

Figure- 8.3Composite Inundation Map for 2009

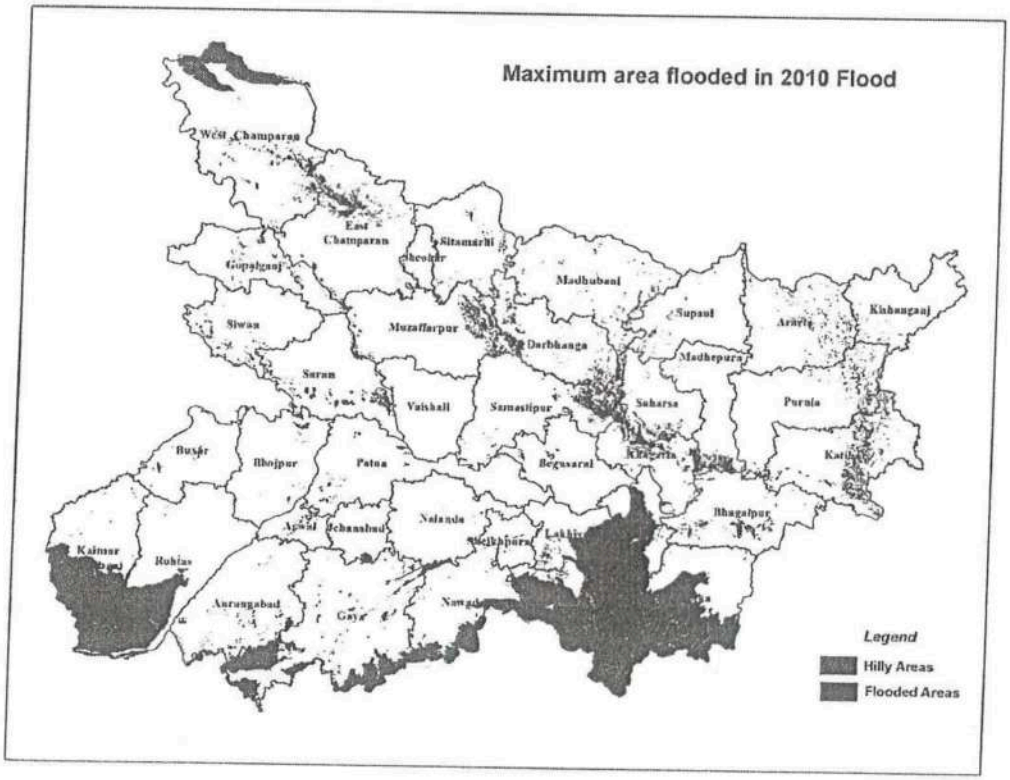

Figure - 8.4Composite Inundation Map for 2010

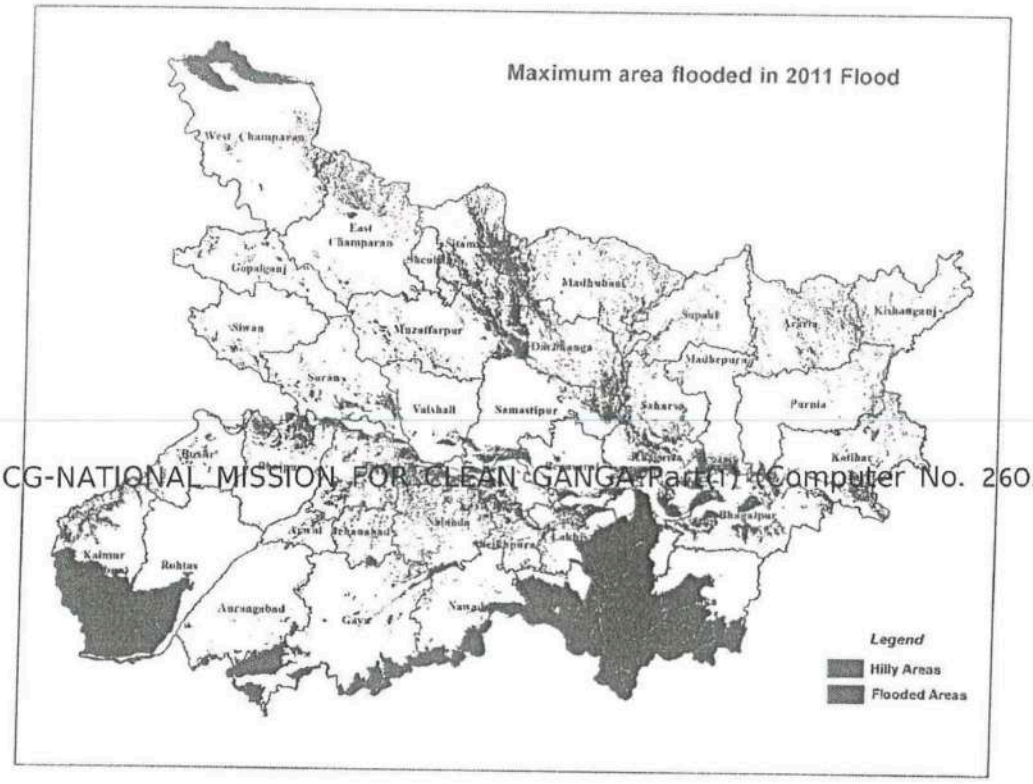

Figure - 8.5Composite Inundation Map for 2011

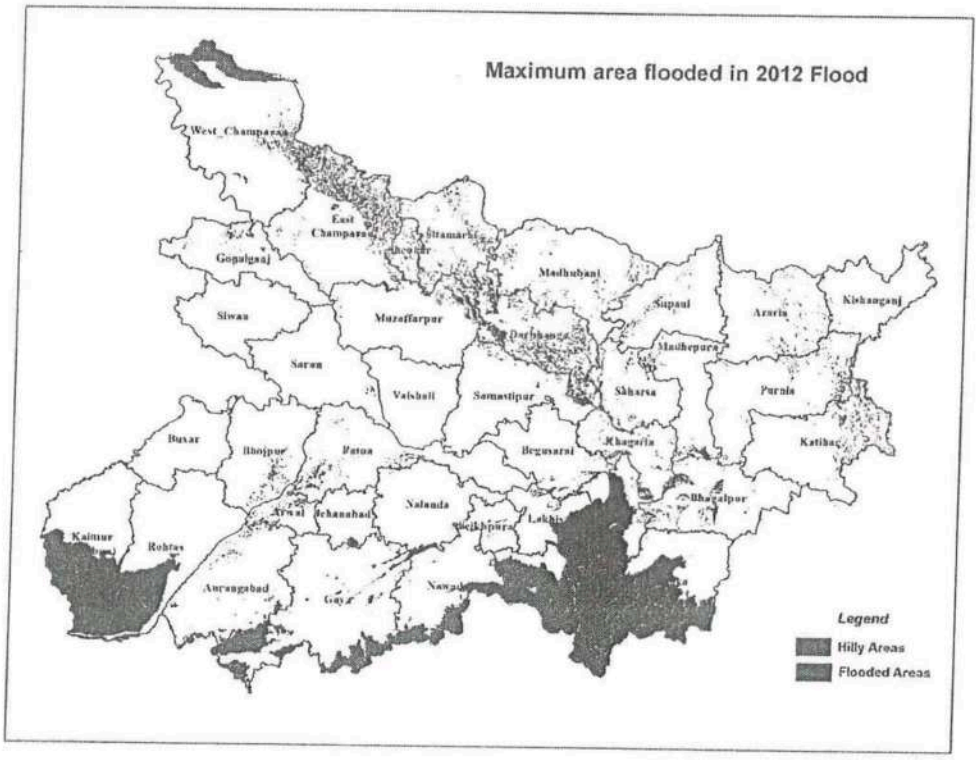

Figure - 8.6Composite Inundation Map for 2012

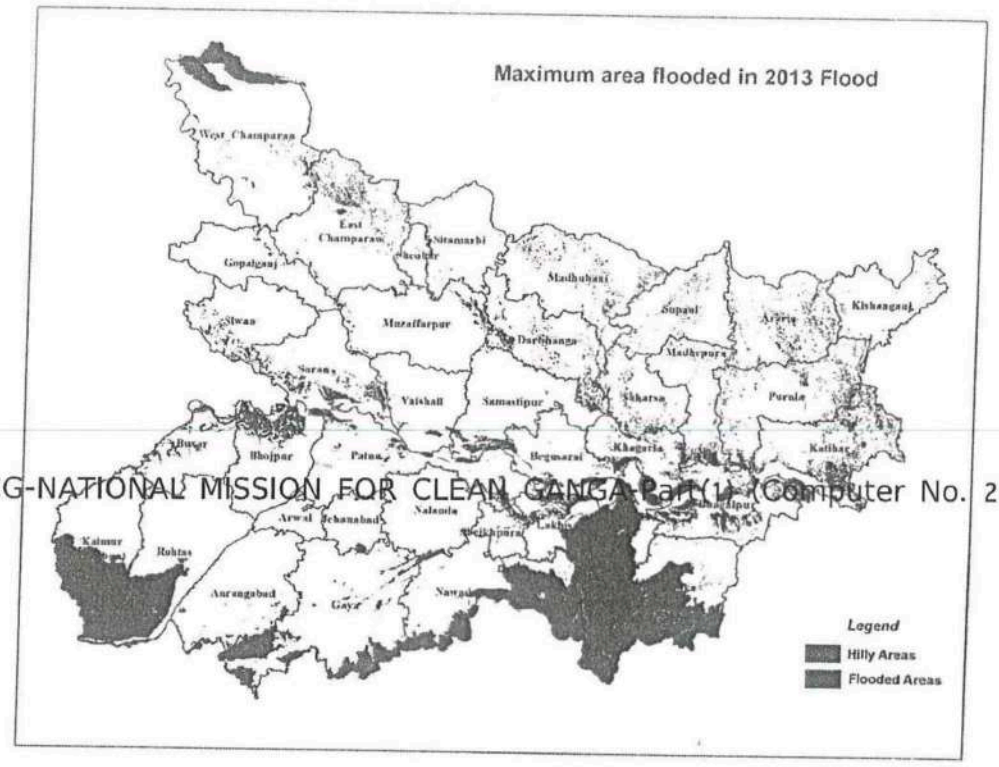

Figure - 8.7Composite Inundation Map for 2013

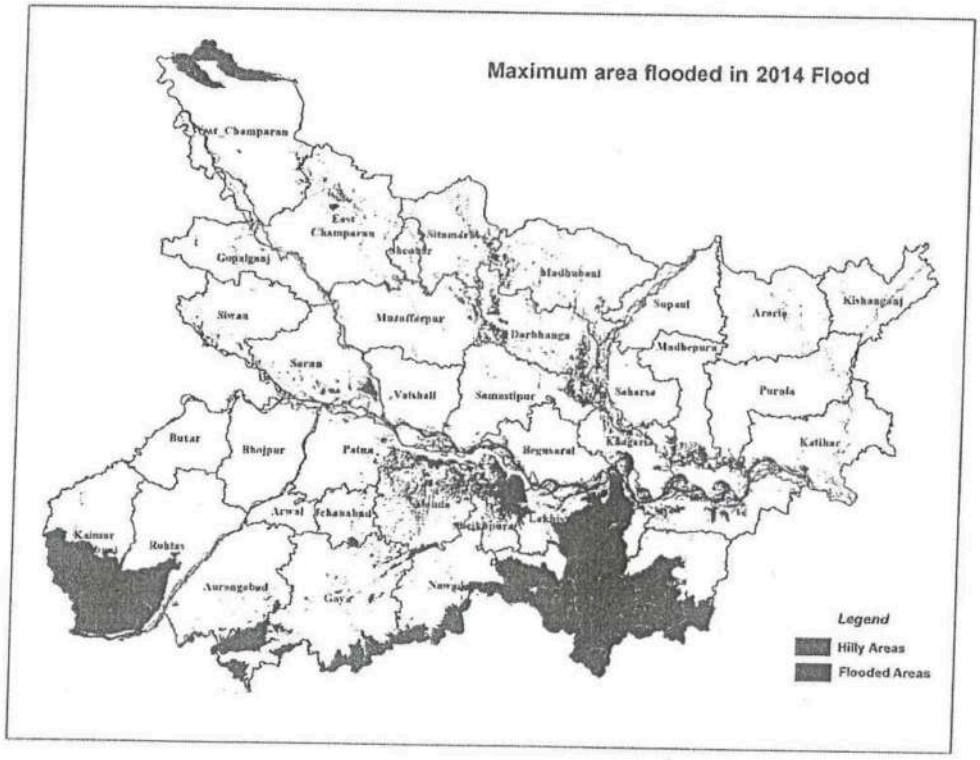

Figure- 8.8Composite Inundation Map for 2014

20

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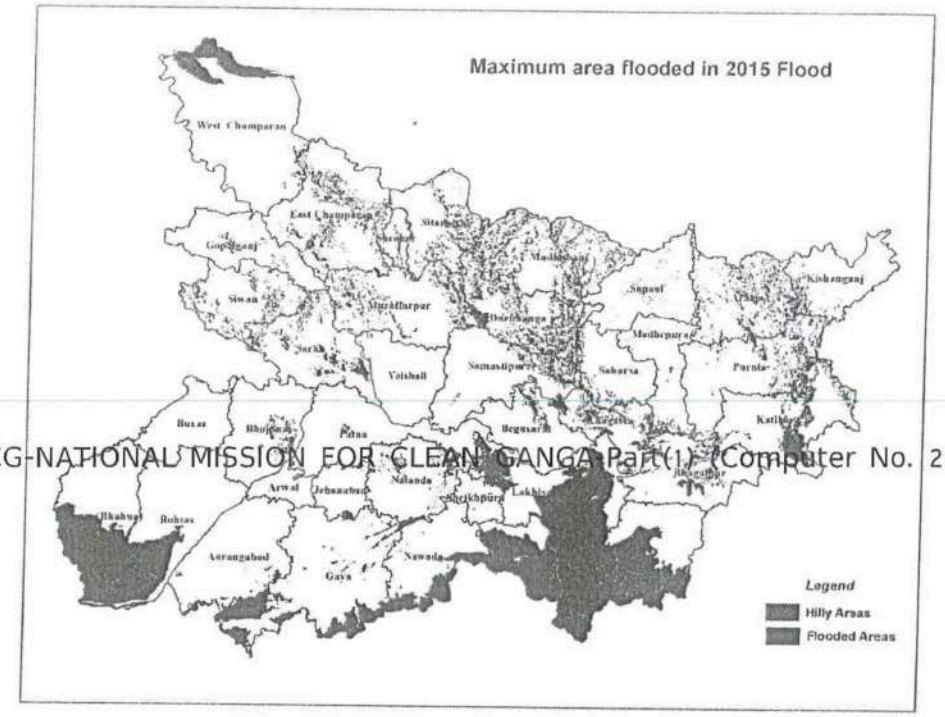

Figure - 8.9Composite Inundation Map for 2015

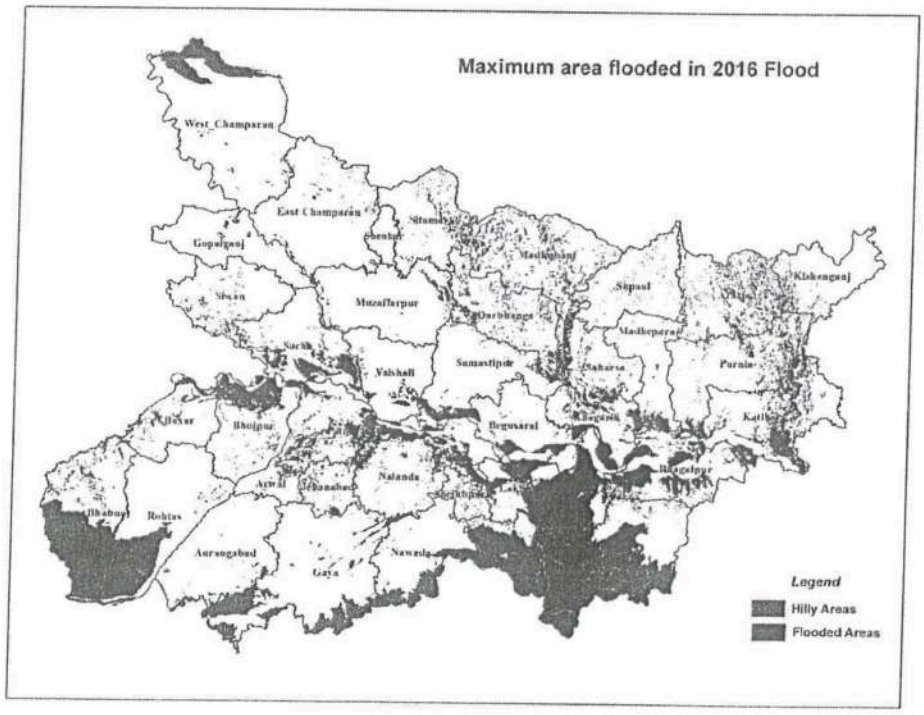

Figure - 8.10Composite Inundation Map for 2016

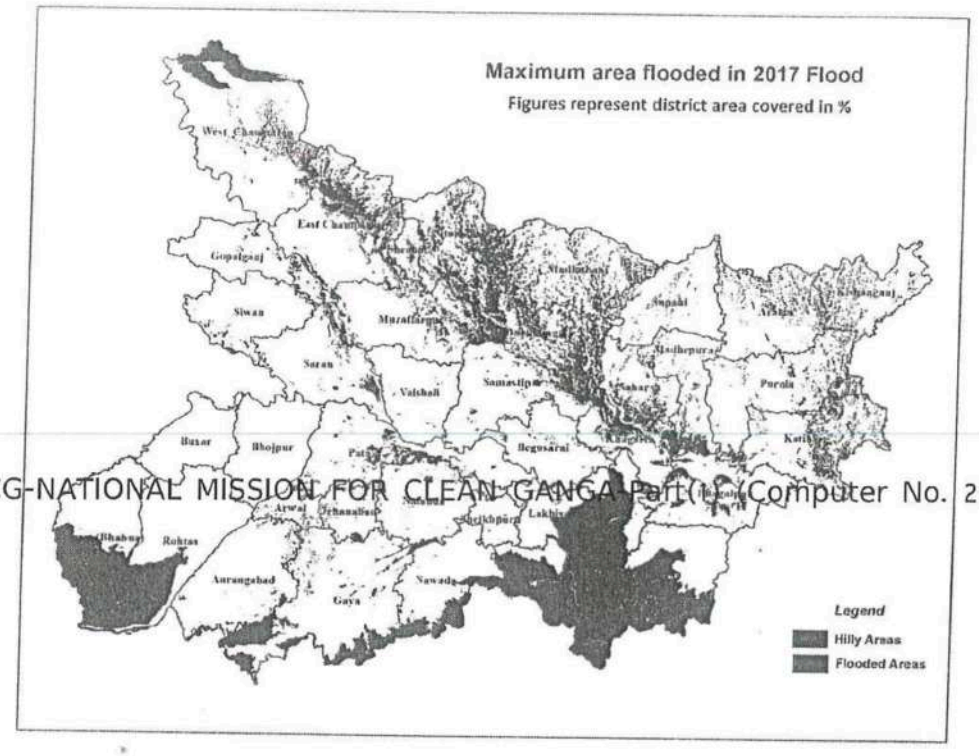

Figure - 8.11Composite Inundation Map for 2017

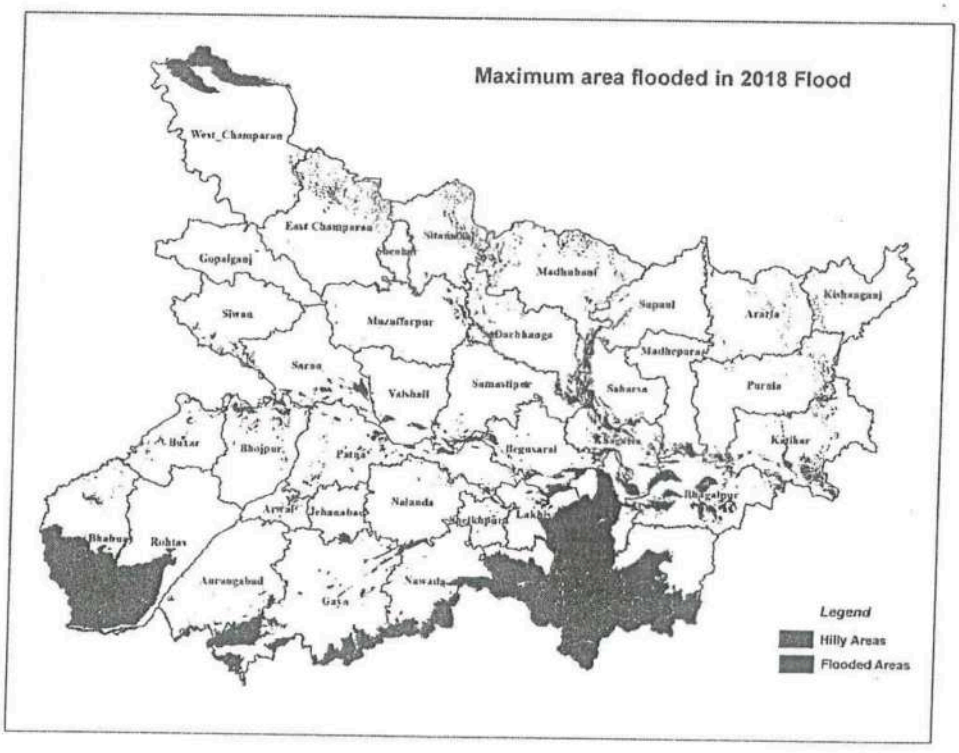

Figure- 8.12Composite Inundation Map for 2018

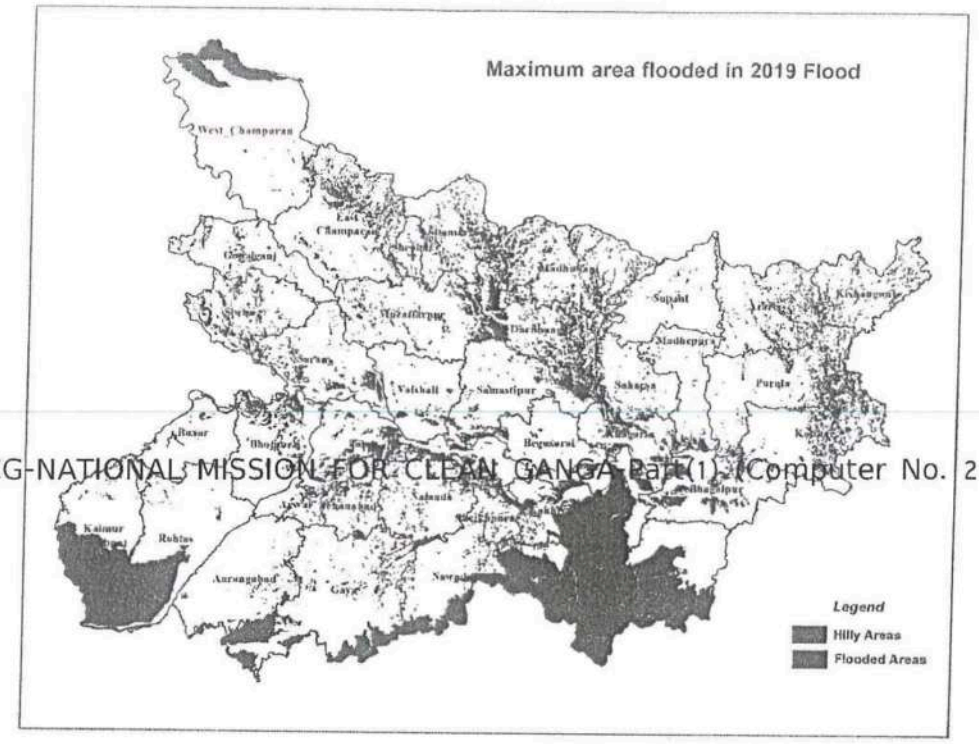

Figure- 8.13Composite Inundation Map for 2019

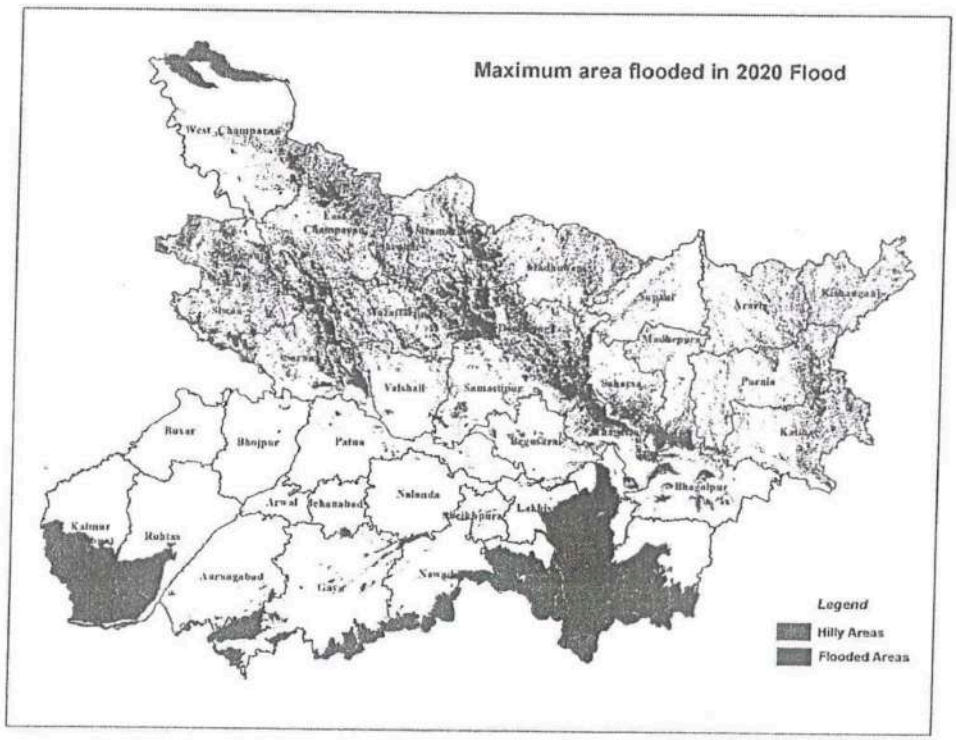

Figure - 8.14Composite Inundation Map for 2020

9.0 CONCLUSION

Land and water form the basis of human civilization. Since time immemorial man has been living close to rivers as availability of water is guaranteed. Even when cultivation was not organized as an activity to support survival, living close to water bodies was a necessity. Later on, cultivation practices developed and land from rivers were occupied for this purpose. In a climatic region where water pours down in plenty there were dangers of being washed away hence men learned to choose safer places for living and farming. Despite all efforts many civilizations have been partly or wholly obliterated by force of water. These experiences taught us first lesson of flood management, where staying away from furious water was the core theme. Later on; as men acquired assets in the form of permanent shelter and farmlands; they started making protective arrangements to minimize losses.

Fight between life giving river and ever encroaching human beast

We have now come to a phase where we are losing more battle than winning. Tremendous growth of population coupled with huge infrastructure development in all kinds of Geographies has pushed modern civilization in to an ever-continuing war with nature. Despite all kinds of technological development, water is prime need for our survival. So, we still try to live near water bodies causing problem of further accommodation. Any further encroachment will prove detrimental to society.

According to the draft River Conservation Zone (Regulation of Harmful Activities) Rules, 2012, an active floodplain is defined by high flood line (HFL), which in entrenched /embanked stretches of a river is the available space (including the river channel/s) in the valley of entrenched stretch, or between two embankments, or between existing roads on either side along a river acting as an embankment. In other stretches of the river HFL, active floodplain shall be the 100-year flood line.

Flood plain zoning regulations are becoming stricter and execution of other large projects for drinking water availability gets priority. Fortunately, we have realized importance of availability of clean water and started planning for ensuring its availability for future generations. Still there are regions where we can still survive and develop by establishing a balance with nature. Almost every part of the globe is thickly populated but all of them do not have advantage of water availability. Food is required by them as well, hence someone has to produce enough to ensure food for all. Bihar has the advantage of water availability so it can produce more food for future generations. We have left open agricultural land for cultivation while infrastructure and living space has been kept to a minimum. Flood protection and revival of time-tested old irrigation practices are being taken up keeping in mind the growing responsibility of ensuring food availability for the country and those in need.

Hence it is cleared that on account of existing topography near river banks, availability of fertile land, people's dependability on domestic use of water and the high cost of land in non-flood plain area; dense population in northern plain terrain are bound to settle within embanked river areas (Embankment length of 3780Km), which indicate the non-feasibility of flood plain zoning in the state of Bihar.

Annexure-II

List of Projects Completed up to July-2023

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation	
	Name Of the Project	District/Town	Sanction Date	Completion Date
Uttarakhand				
1.	Interception and Diversion (I&D)	Badrinath	16/10/2008	Aug-17
2.	Pollution Abatement works (Interception and Diversion with STP)	Badrinath	29/03/2017	July-20
3.	Sewage Treatment Plant (STP)	Devprayag	22/07/2009	Jul-16
4.	Interception and Diversion (I&D)	Devprayag	08/07/2009	Oct-17
5.	Restoration and Reconstruction of Sewerage Scheme due to disaster in Devprayag	Devprayag	25/06/2015	Aug-16
6.	Interception and Diversion (I&D)	Joshimath	17/03/2010	Mar-16
7.	Interception and Diversion (I&D)	Gopeshwar	18/03/2010	Mar-17
8.	Interception & Diversion and STP, at Chamoli	Chamoli- Gopeshwar	29/03/2017	Feb-21
9.	Sewerage Scheme at TriveniGhat	Rishikesh	23/03/2011	Jun-15
10.	Interception and Diversion (I&D)with STP	Rishikesh	16/03/2017	Feb-22
11.	Sewerage system and STP for Tapovan area	Tapovan (Tehri)	23/03/2011	May-16
12.	upgradation of 3.50 MLD STP	Tapovan (Tehri)	16/03/2017	Apr-18
13.	Sewerage Scheme at Ahbab Nagar Jwalapur Zone E-2 at Haridwar	Haridwar	23/03/2011	Dec-14

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation	
	Name Of the Project	District/Town	Sanction Date	Completion Date
14.	Construction of 18 mld STP at Sarai, Haridwar	Haridwar	23/03/2011	Apr-14
15.	Sewage Treatment Plant (STP) at Jagjeetpur(68MLD) &Sarai(14MLD)	Haridwar	16/03/2017	Feb-20
16.	Tetiary treatment of existing 27 MLD STP at Jagjeetpur&Upgradation of existing 18 MLD STP at Sarai	Haridwar	16/03/2017	Sep-19
17.	Interception and Diversion works at Sarai&Jagjeetpur	Haridwar	16/03/2017	Apr-19
18.	Laying of Sewer Lines in ArihantVihar& New Vishnu Garden, Kankhal in Haridwar	Haridwar	16/01/2018	Dec-18
19.	Sewerage System and STP for GangotriDham	Gangotri	23/03/2011	Oct-17
20.	Restoration and Reconstruction of Sewerage Scheme due to disaster in Gangotri	Gangotri	25/06/2015	Oct-16
21.	Restoration and Reconstruction of Sewerage Scheme due to disaster in Uttarkashi	Uttarkashi	23/07/2015	Sep-17
22.	Upgradation of 2MLD STP(Gyansu)	Uttarkashi	16/03/2017	Dec-18
23.	Interception and Diversion (I&D) Sewage Treatment Plant (STP)	Karanprayag	16/03/2017	Feb-20
24.	Interception and Diversion (I&D) Sewage Treatment Plant (STP)	Rudraprayag	16/03/2017	Nov-20
25.	Pollution Abatement works for River Alaknanda (STP creation of 10KLD & 50KLD)	Kirtinagar	16/03/2017	Jul-18

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation	
	Name Of the Project	District/Town	Sanction Date	Completion Date
26.	Interception & Diversion and STP	Srinagar	29/03/2017	Apr-19
27.	Upgradation of Existing STP (3.5 MLD)	Srinagar	29/03/2017	Feb-19
28.	Interception & Diversion and STP	Nandprayag	29/03/2017	Apr-19
29.	Rising main (500m) and STP of 12.5MLD	Muni Ki Reti	29/03/2017	Sep-20
30.	Upgradation of Existing STP (3.0 MLD)	Swargashram (PaudiGarhwal)	29/03/2017	Dec-18
31.	Interception & Diversion of Nallas Discharging in Kosi River at Ramnagar	Ramnagar (Kosi River)	15/02/2019	Jul-21
32.	Pollution Abatement of River Alaknanda at Srikot-Gangnali Part A	Srikot-Gangnali (River Alaknanda)	08/03/2019	Feb-21
33.	Sludge Management Plant at Chorepani, Muni Ki Reti Uttarakhand State, under Namami Gange Programme	Muni Ki Reti	08/10/2020	Jan-22
34.	Interception and Diversion (I&D)with STP	Joshimath	16.03.17	Feb-23
35.	Interception & Diversion Works for Rispana & Bindal River in Dehradun (under NGP)	Dehradun (Rispana & Bindal River)	13.09.2018	Feb-23
36.	Repair and Restoration (Protection works) in existing STPs/Sewerage network and its appurtenant works damaged during natural calamity (Cloud Burst & Glacial Breakdown) 2021 in Uttarakhand	Devprayag, Karanprayag and Chamoli-Gopeshwar	04.08.2022	Feb-23
Uttar Pradesh				
37.	Sewerage & Non-Sewerage schemes for Pollution abatement of River Ganga at District-'B' & 'E' of Allahabad	Allahabad	06/05/2010	Mar-16

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation	
	Name Of the Project	District/Town	Sanction Date	Completion Date
38.	Sewerage & Non-Sewerage schemes for Pollution abatement of River Ganga at District-'A'	Allahabad	06/05/2010	Mar-16
39.	Sewerage work in Swerage District-E	Allahabad	22/02/2011	Jun-16
40.	14 mld STP at Salori, Allahabad	Allahabad	27/11/2013	Sep-16
41.	Sewerage System in Sewerage District-C &Allahpur, Allahabad (Prayagraj)	Allahabad (Prayagraj)	27/11/2013	Jan-19
42.	Sewerage Works in Sewerage District-A of Allahabad	Allahabad	20/02/2014	Oct-19
43.	Sewerage system with Sewer network-(District B)	Allahabad	30/12/2014	Apr-19
44.	Sewer Network in District E of Allahabad -Part 2 (Additional Work) under Component "A"	Allahabad	28/09/2016	May-18
45.	Rehabilitation and Operation & Maintenance of existing Sewage Treatment Infrastrcture at Allahabad (HAM)	Allahabad	09/03/2018	Jun-21
46.	JICA assisted Ganga Action Plan Phase-II Project at Varanasi (EAP - JICA) Construction of 140 MLD STP at Dinapur	Varanasi	14/07/2010	Nov-18
47.	Construction of interceptor sewers, relieving trunk sewer & rising mains	Varanasi	14/07/2010	Nov-18

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation	
	Name Of the Project	District/Town	Sanction Date	Completion Date
48.	Construction of 3 pumping stations (Chaukaghat, Phulwariya&Sariya)	Varanasi	14/07/2010	Nov-18
49.	Rehabilitation of 5 Ghat pumping stations and STPs at Dinapur&Bhagwanpur	Varanasi	14/07/2010	Jul-20
50.	Non Sewerage, Institutional Development & Other works	Varanasi	14/07/2010	Sep-21
51.	Sewerage system & STP works	Garmukteshwar	24/02/2011	Apr-18
52.	Sewerage system & STP works (Phase I)	Moradabad (Ramganga)	24/02/2011	Nov-21
53.	Sewerage system & STP works (Phase II)	Kannuaj (Kali)	24/02/2011	Apr-18
54.	Sewerage scheme at Narora, Bulandshar	Bulandsahar	04/03/2014	Apr-18
55.	Sewerage Works in AnupShahar, BulandShahar	AnupShahar	19/05/2014	Feb-19
56.	Sewerage scheme and STP at BithoorKanpurnagar, (UP)	Bithoor, Kanpurnagar	10/10/2017	Feb-20
57.	Sewerage Treatment Plant (STP) for Assi-BHU Sewerage District at Ramana (HAM)	Ramana (Varanasi)	21/09/2017	Jun-21
58.	Interception,diversion of Drains & Sewage Treatment works at Ramnagar	Ramnagar (Varanasi)	28/07/2017	Jun-21

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation	
	Name Of the Project	District/Town	Sanction Date	Completion Date
59.	Interception/Diversion of SisamauNala of Kanpur City under Component "B" of NamamiGangeProgramme	Kanpur City	03/10/2016	Apr-21
60.	Sewerage Works in Sewerage District 1 of Kanpur	Kanpur (District 1)	18/10/2016	Sep-21
61.	Rehabilaition of Sewerage Infrastructure &Augmenation/Upgradation of STP (5MLD)	Vrindavan	29/03/2017	Feb-20
62.	Firozabad Sewerage Scheme (Interception & Diversion) works	Firozabad (River Yamuna)	01/03/2019	Jul-21
63.	Faecal Sludge Management for pollution abatement at Chunar	Chunar	07/03/2019	Jun-21
64.	Interception & Diversion (I&D) of drains at Ayodhya, District-Faizabad	Ayodhya-Faizabad (Saryu-River)	11/06/2018	Feb-20
65.	Rehabilitation of old trunk sewer	Varanasi	14/07/2010	June-22
66.	Rehabilaition/Renovation of Mathura sewerage scheme : Construction of 30 MLD STP at Masani (under Hybrid annuity based PPP model-NamamiGangeProgramme)	Mathura	13/12/2017	June-22
67.	Sewerage Scheme (Interception & Diversion) works	Etawah	28/02/2019	Feb-22
68.	Faecal Sludge Management (Co-treatment) for abatement of pollution in River Ganga at Bijnor	Bijnor	14/12/2020	Jun-22

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation	
	Name Of the Project	District/Town	Sanction Date	Completion Date
69.	Interception & Diversion with STP at Kasganj	Kasganj (Kali river)	24/12/2018	Jan-22
70.	Interception & Diversion and STP works of Baghpat Town	Baghpat (River Yamuna)	19/02/2019	Dec-22
71.	Interception, Diversion and Treatment Works for Naini (District G) Phaphamau (District F) and Jhunsi Area District : Allahabad (under Hybrid annuity based PPP model-Namami Gange Programme) STP-42 MLD Naini, 16 MLD Jhusi and 14 MLD Phahphamau	Prayagraj	19/05/2017	June-23
Bihar				
72.	Sewage Treatment Plant - Beur for Patna, Bihar	Patna-Beur	15/07/2014	Jul-20
73.	Sewage Treatment Plant - Karmalichak for Patna, Bihar	Patna-Karmalichak	15/07/2014	Oct-19
74.	Saidpur STP and adjoining Network for Patna, Bihar	Patna-Saidpur	01/04/2015	Feb-21
75.	Sewerage scheme at Pahari (Zone IVA (S)), Patna, Bihar	Patna-Pahari	26/12/2013	Jul-21
76.	Sewerage system with Sewer network, Patna Beur	Patna Beur	31/12/2014	Jun-22
77.	Saidpur Sewer Network, Patna, Bihar	Patna-Saidpur	01/04/2015	Jun-22
78.	Sewage Treatment Plant at Pahari - Patna, Bihar	Patna-Pahari (60 MLD)	26/12/2013	May-22

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation	
	Name Of the Project	District/Town	Sanction Date	Completion Date
79.	I&D and STP Project under Namami Gange Programme	Patna-Barh (11 MLD)	10/08/2017	Jun-22
80.	Interception, Diversion & Sewage Treatment Plant works under NamamiGangeProgramme	Sultanganj	01/08/2017	Jan-22
81.	Interception and Diversion and STP works in Sonepur Town (under NamamiGangeProgramme)	Sonepur	14/09/2018	Aug-2022
82.	Sewerage system with Sewer network ,Patna Karmalichak	Patna-Karmalichak	30/12/2014	Feb-23
83.	Sewerage scheme at Pahari Zone V, Patna, Bihar	Patna-Pahari	20/02/2014	Feb-23
84.	Interception, Diversion & Sewage Treatment Plant works under Namami Gange Programme	Naugachia	01/08/2017	Feb-23
Jharkhand				
85.	Sewerage scheme and STP	Sahibganj	26/12/2013	
86.	Sewerage scheme and STP	Rajmahal (3.5 MLD)	30/03/2017	Jun-22
West Bengal				
87.	Sewerage system & STP	Gayeshpur	22/02/2011	Jan-17
88.	Sewerage system & STP	Kalyani	01/03/2011	Dec-17
89.	Sewerage system & STP	Bhatpara	01/03/2011	Nov-18
90.	Sewerage scheme & STP Halishar	Halisahar (16MLD)	20/02/2014	Jun-22
91.	Sewerage System and STP at Budge-Budge	Budge-Budge (9.30 MLD)	11/07/2014	Mar-22
92.	Sewerage system with Sewer network and STP -	Barrackpore (24MLD)	30/12/2014	Jun-22

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation	
	Name Of the Project	District/Town	Sanction Date	Completion Date
93.	Interception & Diversion with STP(Upgradation of existing 13 MLD STP to 18 MLD capacity)	Kancharapara (Barrackpore) (18 MLD)	28/11/2018	Jul-22
94.	Design and Build of I& D structure. including Lock Gate and it's all appurtenant structures as well as allied works at Barrackpore Municipality, North 24 Parganas, West Bengal State	Barrackpore Municipality	08/10/2020	Jul-22
95.	DPR of Interception & Diversion Network for existing drains falling in river Ganges including STP at NabadwipMuncipality	Nabadwip (20MLD)	18/01/2018	Apr-22
96.	Rejuvenation of existing STPs alongwith lifting stations & pumping station	Chandanagar BansberiaUttarpara-Kortung-Konnagar Baidyabati Bhadreswar	08/03/2019	Jul-22
97.	Rejuvenation of existing STPs alongwith lifting stations & pumping stations	Naihati Garulia Titagarh Panihati Titagarh-Bandipur	08/03/2019	Jul-22
Harayana				
98.	Sewerage and Sewage Treatment Plant (STP)	Panipat	17/07/2012	Jan-18
99.	Sewerage and Sewage Treatment Plant (STP)	Sonepat	17/07/2012	Jun-18
Delhi				
100.	Rehabilitation of Trunk Sewer No.5	Delhi -YAP-III - Kondli zone (K2)	06/05/2016	Feb-21
101.	Rehabilitation of Rising Mains	Delhi -YAP-III - Kondli zone (K4)	16/03/2017	Dec-21
102.	Rehabilitation of Rising Main	Delhi -YAP-III - Rithala zone (R1b)	16/03/2017	Feb-21

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation	
	Name Of the Project	District/Town	Sanction Date	Completion Date
103.	Rehabilitation of Trunk Sewer No.4	Delhi -YAP-III - Kondli zone (K1)	05/05/2016	Mar-22
104.	Construction of 318 MLD (70 MGD) WWTP with 10 years O & M on DBO basis at Coronation Pillar, Delhi	Coronation Pillar, Delhi (318 MLD)	03/12/2018	Mar-22
105.	Rehabilitation of Trunk Sewers	Delhi -YAP-III - Rithala zone (R1a)	05/05/2016	Aug-2022
Himachal Pradesh				
106.	Sewerage scheme for Zone II & III of Paonta Town in Tehsil PoantaSahib,DistrictSirmour, Himachal Pradesh	Paonta Sahib (District -Sirmour) (Yaumna-River)	31/12/2018	Dec-21

Annexure-III

List of Projects under Implementation as on July-2023

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation		Physical Progress in %	Financial Progress (Funds Release in Cr.)	Issues Faced, if any/ Remarks
	Name Of the Project	District/Town	Sanction Date	Completion Date			
Uttarakhand							
1.	I & D and STP for Gauri Kund and Tilwada	Rudraprayag	04/08/2022	Mar-25			Under Progress
2.	I & D and STP works at Muni ki reti, Neelkanth, Swarg aashram	Muni Ki Reti	06/09/2022	Apr-2025			Under Tendering
3.	(I&D) and STP work of 06 nos. Polluted River Stretches to Rejuvenate River Bhela, Dhela, Kichha, Kosi, Nandhore, Pilakhar and Kashipur Sewerage (I&D) Scheme (Dhela River)	Udham Singh Nagar (Dhela)	17.09.2021	Jan–24	30	38.44	Under Progress
4.	Co-Treatment of Septage at existing STPs of Haridwar-150 KLD (100 KLD Jagjeetpur + 50 KLD Sarai), Rishikesh-50 KLD, Srinagar 30 KLD and Despravag-5.0 KLD in	Haridwar	11.06.2022	Dec-23			Under tendering

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation		Physical Progress in %	Financial Progress (Funds Release in Cr.)	Issues Faced, if any/ Remarks
	Name Of the Project	District/Town	Sanction Date	Completion Date			
5.	I&D with STP works at Sapera Basti, Dehradun	Dehradun	25.10.2022	Apr-25			Under Tendering
Utter Pradesh							
6.	Pollution Abatement Works for River Ram Ganga at Moradabad (Sewerage Zone-2)under Hybrid annuity based PPP model-NamamiGangePrograamme)	Moradabad (Ramganga)	23/07/2018	Jan-2025	10	1.76	Under Progress
7.	Rehabilitation of existing Sewage Treatment Infrastructure , Development of sewage Treatment Plant at Pankha	Pankha-Kanpur	12/03/2018	Sep-2023	96	220.73	Under Progress
8.	Interception,diversion of Drains & Sewage Treatment works at Unnao (under Hybrid annuity based PPP model-NamamiGangePrograamme)	Unnao	28/07/2017	Sep-2023	95	52.01	Under Progress
9.	Interception,diversion of Drains & Sewage Treatment works at Shuklaganj (HAM)	Shuklaganj, Distt-Unnao	28/07/2017	Dec-2023	69	19.82	Under Progress

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation		Physical Progress in %	Financial Progress (Funds Release in Cr.)	Issues Faced, if any/ Remarks
	Name Of the Project	District/Town	Sanction Date	Completion Date			
10.	Interception, Diversion and Treatment Works for abatement of Pollution of River Ganga at Mirzapur Town (HAM)	Mirzapur	28/05/2020	Mar-2024	59	53.61	Under Progress
11.	Interception , Diversion & Sewage Treatment Works in Farrukhabad-Fategarh (HAM)	Farrukhabad	16/10/2017	Apr-2024	52	69.96	Under Progress
12.	Sewerage Scheme (I&D and STP Works at Gokul Barrage, Mathura) HAM	Mathura	07/09/2022	Apr-2025			Under Tendering
13.	Pollution Abatement Works for River Saryu/Ghaghara at Faizabad town, District Ayodhya (Interception & Diversion with STP)	Faizabad (Saryu/Ghaghara River)	06/05/2021	Dec-2024	32	13.81	Under Progress
14.	Interception & Diversion with STP at Sultanpur (Construction of New 7 mld&Upgradation of existing 5 mld to10 mld)	Sultanpur (Gomti River)	24/12/2018	Sep-2023	97	43.89	Under Progress
15.	Interception & Diversion with Rehabilitation of sewerage scheme at Agra(under Hybrid annuity based PPP model-	Agra (Yaumna-River)	06/05/2020	Mar-2025	4	12.70	Under Progress

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation		Physical Progress in %	Financial Progress (Funds Release in Cr.)	Issues Faced, if any/ Remarks
	Name Of the Project	District/Town	Sanction Date	Completion Date			
	NamamiGangePrograMme)						
16.	Interception & Diversion works and STP at Muzaffarnagar(under Hybrid annuity based PPP model-NamamiGangePrograMme)	Muzaffarnagar (Hindon-River)	02/01/2019	Sep-2023	84	94.19	Under Progress
17.	Interception & Diversion works and STP at Budhana(under Hybrid annuity based PPP model-NamamiGangePrograMme)	Budhana	18/02/2019	Sepc-2023	93	19.50	Under Progress
18.	Interception & Diversion works and STP at Bareilly	Bareilly (Ram Ganga-River)	03/01/2019	Mar-2024	75	59.35	Under Progress
19.	Interception & Diversion works and STP at Jaunpur	Jaunpur (River Gomti)	12/02/2019	Sep-2023	99	137.58	Under Progress
20.	Pollution Abatement Works for River Kalikat Meerut under Meerut Municipality (Interception & Diversion with STP)(under Hybrid annuity based PPP model-	Meerut (River Kaliat)	06/05/2020	Apr-2024		0.00	LOA issued to (JV) M/s GA Infra Private Ltd, Rajasthan and, M/s SSG

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation		Physical Progress in %	Financial Progress (Funds Release in Cr.)	Issues Faced, if any/ Remarks
	Name Of the Project	District/Town	Sanction Date	Completion Date			
	NamamiGangePrograMme)						Infratech Pvt. Ltd. New Delhi on 27.05.2023.
21.	Interception & Diversion and STP works at Lucknow	Lucknow (River Gomti)	02/03/2019	Apr-2024	38	36.94	Under Progress
22.	Sewerage,Sewage Treatment works at Ghazipur city(under Hybrid annuity based PPP model-NamamiGangePrograMme)	Ghazipur	16/11/2017	Feb-2024	61	48.79	Under Progress
23.	Interception & Diversion works for Kairana Town, Distt-Shamli, Uttar Pradesh State under NamamiGangePrograMme	Kairana	07/12/2020	Apr-24	66	17.78	Under Progress
24.	Interception & Diversion (I&D) and Sewage Treatment Plant works at Saharanpur, Uttar Pradesh (under Hybrid annuity based PPP model-Namami Gange Programme)	Saharanpur	11/06/2022	Apr-2025			Under Tendering

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation		Physical Progress in %	Financial Progress (Funds Release in Cr.)	Issues Faced, if any/ Remarks
	Name Of the Project	District/Town	Sanction Date	Completion Date			
25.	I&D and STP Works for Assi-BHU Area (Phase II), Varanasi, Uttar Pradesh' under Namami Gange Programme	Varanasi	19.10.2022	Apr-2025			Under tendering
26.	I&D and STP Works	Chhata	25/10/2022	Apr-2025			Under Tendering
27.	I&D and STP Works	Kosi	25/10/2022	Apr-2025			Under Tendering
28.	I&D and STP Works	Vrindavan	25/10/2022	Apr-2025			Under Tendering
29.	I&D and STP works at Hathras Town in Uttar Pradesh State under Namami Gange Programme	Hathras	30.01.2023	Aug-2025			Under Tendering
30.	Interception & Diversion and STP works at Lucknow, Phase-II Part-I	Lucknow	30.01.2023	Aug-2025			Under Tendering
31.	Interception & Diversion of Balance 7 drains and Augmentation of Rajapur STP Capacity by 90 MLD (Sewerage District D) at Prayagraj Under Namami Gange Programme	Prayagraj	27.01.2023	Aug-2025			Under Tendering
32.	Interception and diversion of balance discharge of 13 drains and augmentation of	Prayagraj	14.03.2023	Apr-2025			Under Tendering

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation		Physical Progress in %	Financial Progress (Funds Release in Cr.)	Issues Faced, if any/ Remarks
	Name Of the Project	District/Town	Sanction Date	Completion Date			
	Salori STP (sewerage district C)						
33.	I&D and STP works at Banat Town, Dist. Shamli in Uttar Pradesh State under Namami Gange Mission-II	Shamli	25.05.2023	Jun-2025			AA & ES Issued
34.	I&D and STP works at Babri & Bantikhera Villages, Dist. Shamli in Uttar Pradesh State under Namami Gange Mission-II	Shamli	25.05.2023	Jun-2025			AA & ES Issued
35.	I&D and STP works at Thanabhawan Town, Dist. Shamli in Uttar Pradesh State under Namami Gange Mission-II	Shamli	25.05.2023	Jun-2025			AA & ES Issued
36.	I&D and STP works at Shamli Town, Dist. Shamli in Uttar Pradesh State under Namami Gange Mission-II	Shamli	25.05.2023	Jun-2025			AA & ES Issued
Bihar							
37.	Sewer Network, SPS and STP	Begusarai	08/03/2010	Dec-23	81	190.21	Under Progress
38.	Sewer Networks, SPS and STP	Buxar	08/03/2010	Dec-23	39	17.29	Tendering
39.	Sewer Networks, SPS and STP	Hajipur (Gandak)	08/03/2010	Dec-23	78	251.48	Under Progress
40.	Sewer Networks, SPS and STP	Munger	20/05/2010	Dec-23	82	238.66	Under Progress

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation		Physical Progress in %	Financial Progress (Funds Release in Cr.)	Issues Faced, if any/ Remarks
	Name Of the Project	District/Town	Sanction Date	Completion Date			
41.	Interception, Diversion & Sewage Treatment Plant works under Namami Gange Programme	Patna-Mokama	28/07/2017	Oct-23	99	43.13	Under Progress
42.	Sewage Treatment Plant (50MLD) and Sewerage Network (150 km)in Kankarbagh-Patna(under Hybrid annuity based PPP mode-Namami Gange Programme)	Patna-Kankarbagh	11/08/2017	Mar-23	30	45.41	Under Progress
43.	Sewage Treatment Plant (100MLD) and Sewerage Network (288 km)in Digha-Patna(under Hybrid annuity based PPP mode-Namami Gange Programme)	Patna -Digha	11/08/2017	Mar-23	36	198.13	Under Progress
44.	Interception & Diversion & Sewage Treatment Plant for Maner Town	Maner-Patna	02/01/2019	Dec-23	68	18.82	Under Progress
45.	Interception & Diversion & Sewage Treatment Plant for Danapur Town	Danapur-Patna	08/02/2019	Mar-24	53	32.89	Under Progress
46.	Interception & Diversion & Sewage Treatment Plant for Phulwarishariff Town	Phulwarishariff-Patna	08/02/2019	Mar-24	49	5.78	Under Progress
47.	Interception and Diversion and STP works in Fatuha (under	Fatuha	24/08/2018	Mar-24	34	5.07	Under Progress

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Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation		Physical Progress in %	Financial Progress (Funds Release in Cr.)	Issues Faced, if any/ Remarks
	Name Of the Project	District/Town	Sanction Date	Completion Date			
	NamamiGangePrograMme)						
48.	Interception and Diversion and STP works in Bhagalpur (under Hybrid annuity based PPP mode-NamamiGangePrograMme)	Bhagalpur	12/10/2017	Mar-24	40	59	Under Progress
49.	Interception and Diversion and STP scheme in Kahalgaon (under NamamiGangePrograMme)	Kahalgaon	30/12/2019	Dec-24			Tendering.
50.	Interception and Diversion and STP works in Chhapra (under NamamiGangePrograMme)	Chhapra	30/11/2018	Aug-23	95	110.63	Under Progress
51.	Interception and Diversion and STP works in Bakhtiyarpur (under NamamiGangePrograMme)	Bakhtiyarpur	24/12/2018	Oct-23	92	30.73	Under Progress
52.	Interception and Diversion and STP works in Barahiya (under NamamiGangePrograMme)	Barahiya	03/12/2019	Dec-24			Tendering

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation		Physical Progress in %	Financial Progress (Funds Release in Cr.)	Issues Faced, if any/ Remarks
	Name Of the Project	District/Town	Sanction Date	Completion Date			
53.	Interception and Diversion and STP works at Dehri (under Namami Gange Programme)	Dehri	01/12/2021	Oct-24			Tendering
54.	I&D and STP Works, NGM-II	Ramnagar	12/09/2022	Apr-25			Tendering
55.	I&D and STP Works, NGM-II	Sapaul	07/09/2022	Apr-25			Tendering
56.	Interception and Diversion and STP works	Narkatiaganj	17.10.2022	Feb-25			Tendering
57.	Interception & Diversion and STP scheme for Motihari town, Bihar under Namami Gange Mission-II	Motihari	24.01.2023	Nov-2025			Under Tendering
58.	Interception & Diversion of drains and STP works at Daudnagar town, Bihar under Namami Gange Mission-II	Daudnagar	24.01.2023	Aug-2025			Under Tendering

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation		Physical Progress in %	Financial Progress (Funds Release in Cr.)	Issues Faced, if any/ Remarks
	Name Of the Project	District/Town	Sanction Date	Completion Date			
59.	Interception & Diversion and STP scheme for Lakhisarai town	Lakhisarai	10.03.2023	Apr-2025			Under Tendering
60.	Interception & Diversion and STP scheme for Jamui town, Bihar" under Namami Gange Mission-II	Jamui	11.07.2023	Jun-2025			AA&ES Issued
Jharkhand							
61.	I & D and STP Project	Phusro	15/12/2020	May-2023			LOA Issued
62.	I&D and STP scheme at Ramgarh	Ramghar	17/10/2022	Mar-2025			Under Tendering
63.	I&D and STP Works	Dhanbad	30/01/2023	Jan-2026			Under Tendering
West Bengal							
64.	Abatement & Rehabilitation of Tolly'sNullah (Adi Ganga), Kolkata-(Interception & Diversion with PS and STP) (under Hybrid annuity based PPP mode-NamamiGangePrograMme)	Tolly'sNullah (Adi Ganga)	17/08/2017	Feb-2026			Tendering

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation		Physical Progress in %	Financial Progress (Funds Release in Cr.)	Issues Faced, if any/ Remarks
	Name Of the Project	District/Town	Sanction Date	Completion Date			
65.	Pollution Abatement Works for River Ganga at Howrah(I & D with STP)	Howrah	23/08/2017	Aug-23	91	49.99	Under Progress
66.	Pollution Abatement Works for River Ganga at Bally under Howrah Municipal Corporation (I & D with STP (HAM)	Bally	10/10/2017	Aug-23	93	45.45	Under Progress
67.	STP & Sewer network - (HAM)	Kamarhati and Baranagar Municipalities	17/01/2018	Aug-23	91	47.2	Under Progress
68.	Pollution Abatement works for River Ganga at Behrampore-Municipal Town (Interception & Diversion)	Berhampore	17/01/2018	Dec-23	33	0	Under Progress
69.	Pollution Abatement Works for River Ganga at Jangipur (Interception & Diversion with STP)	Jangipur Municipality	11/06/2018	Dec-23	52	24.5	Under Progress
70.	Pollution Abatement Works for River Ganga at Kolkata municipality (Installation of New Penstock/construction of I & D structures Gates and Refurbishment of Existing Gates/I & D structures along the Bank (Eastern &	Kolkata	08/09/2022	Jan-24			Under Tendering

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation		Physical Progress in %	Financial Progress (Funds Release in Cr.)	Issues Faced, if any/ Remarks
	Name Of the Project	District/Town	Sanction Date	Completion Date			
	Western) of Beliaghata Circular Canal)						
71.	Pollution Abatement Works for River Ganga at Kolkata (Garden Reach) municipality (I & D with STP) HAM Number of STP- 1 (65 MLD) PS- 8 No.	Kolkata	07/09/2022	Apr-25			Under Tendering
72.	Pollution Abatement works for River Ganga at Maheshtala-Municipal Town (Interception & Diversion with STP)under Hybrid Annuity based PPP	Maheshtala Town	10/05/2018	June-24	25	31.86	Under Progress
73.	Pollution Abatement works for River Ganga at Hooghly Chinsurah-Municipal Town (Interception &Diversion with STP)	Hooghly-Chinsurah	10/05/2018	June-24	62	56.61	Under Progress
74.	Faecal Sludge Management for abatement of pollution in River Ganga	Burdwan	20/06/2022	Mar-24			Under Tendering

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation		Physical Progress in %	Financial Progress (Funds Release in Cr.)	Issues Faced, if any/ Remarks
	Name Of the Project	District/Town	Sanction Date	Completion Date			
75.	Interception and Diversion Network for Drains including Pumping Stations and STP under	Durgapur	03/01/2019	Apr-24			Under Tendering
76.	Interception and Diversion Sewerage System & STP for Asansol&Kulti towns	Asansol&Kulti (River Damodar&Barakar)	12/02/2019	Apr-24			Tendering (Revised DPR under Progress)
77.	Pollution Abatement Works for River Ganga at North Barrackpore municipality(Interception and Diversion with STP)	North Barrackpore	02.12.2021	Sep-24			Under Progress
78.	Pollution Abatement Works for River Ganga at Kolkata Municipal Corporation (Rehabilitation of existing 50 MLD STP at Keorapukar and other allied works at Kolkata)	keorapukur	25.10.2022	Jul-24			Under Tendering
79.	Pollution Abatement Sewerage Project (Interception and Diversion with STP) at Chakdah Municipal Town	Chakdah	15.03.2023	Apr-25			Under Tendering
Delhi							

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation		Physical Progress in %	Financial Progress (Funds Release in Cr.)	Issues Faced, if any/ Remarks
	Name Of the Project	District/Town	Sanction Date	Completion Date			
80.	Rehabilitation and upgradation of Kondli Phase-I STP (45 MLD), Phase-II STP (114 MLD) & Phase-III STP (45 MLD)	Delhi -YAP-III - Kondli zone (K3)	05/05/2016	Sep-23	94	225.62	Under Progress
81.	Rehabilitation and up-gradation of Phase-I STP (182 MLD)	Delhi -YAP-III - Rithala zone (R2)	05/05/2016	Sep-23	90	170.55	Under Progress
82.	Construction of 564 MLD (124 MGD) Waste Water Treatment Plant (WWTP)	Delhi -YAP-III - Okhla zone (O)	16/03/2017	Sep-23	88	478.77	Under Progress
Rajasthan							
83.	Environmental Improvement Plan for River Chambal at Kota	Kota	25/02/2021	Sep-23	92	187.04	Under Progress
Madhya Pradesh							
84.	Additional Decentralized STP to cater Abatement of river pollution of Kanh & Saraswati River, Indore Madhya Pradesh under Namami Gange Mission-II	Indore	28/03/2023	Apr-25			AA&ES Issued
85.	Interception & Diversion (I & D) with STP works at Ujjain town, Madhya Pradesh State under Namami Gange Mission-II	Ujjain	24/05/2023	Jun-25			AA&ES Issued

Annexure-IV

List of Common Effluent Treatment Plants

Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation		Physical Progress in %	Financial Progress (Funds Release in Cr.)	Issues Faced, if any/ Remarks
	Name Of the Project	District/ Town	Sanction Date	Completion Date			
1.	20 MLD CETP for Tannery cluster at Jajmau, Kanpur-Funding under NGP	Jajmau	24.07.2018	March-24	77	304.00	Under Progress
2.	Upgradation of existing CETP for Textile Printing Units at Mathura Industrial Area, Mathura-	Mathura	28.11.2018	Mar-23	100	9.51	Commissioned
3.	Construction of Industrial Effluent/ Sewer Piped Network & Setting up Common Effluent Treatment Plant (CETP) of 7.5 MLD Capacity in Gorakhpur Industrial Development Authority (GIDA) at Gorakhpur"- Uttar-Pradesh	Gorakhpur	11.01.2022		0	0.00	Under Tendering **NIT will be published by the end of Aug 2023**
4.	Upgradation of 4.5 MLD CETP for Banthar Leather Technology Park at Banthar,U.P -Funding under NGP	Banthar	21.02.2020	Feb-25	23%	10.00	Under Progress.
5.	Upgradation of 2.15 MLD CETP to 2.6 MLD located at Unnao Industrial Area, Unnao, Unnao District - Uttar Pradesh--Funding under NGP	Unnao	22.06.2020			0.00	LoA by Industry y SPV has been kept on hold. Since CETP is non-compliant, accordingly a Closure direction has been issued under section 5 of EPA 1986, on 23 June 2023 to Unnao CETP as well as connected industries.
6.	Demonstration of end-to-end treatment of Textile Wastewater using TADOX Technology with	Rooma	03.12.2021	Jun-23	100	0.40	Completed

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Sl. No.	Name of the Project with Location		Original/ Proposed Timeline for implementation		Physical Progress in %	Financial Progress (Funds Release in Cr.)	Issues Faced, if any/ Remarks
	Name Of the Project	District/ Town	Sanction Date	Completion Date			
	an onsite 20 KLD Pilot Plant at CETP, Rooma, Utter Pradesh						
7.	Upgradation of 2.1 MLD CETP for treatment of Effluents from Textile Industries	Hapur					Upgradation CETP Commissioned.