

प्रदूषण रोकिए!
पर्यावरण बचाइए!!

दूरभाष एवं फ़ैक्स : 05542-281440
Phone & Fax : 05542-281440



क्षेत्रीय कार्यालय
उत्तर प्रदेश प्रदूषण नियंत्रण बोर्ड, बस्ती
Regional Office
UTTAR PRADESH POLLUTION CONTROL BOARD, BASTI

संदर्भ संख्या : 48/सा0-138/एन0जी0टी0 ओ0ए0 नं0-433/2022/2023 दिनांक : 16.05.2023

To,

The Registrar General,
Hon'ble National Green Tribunal,
Principal Bench,
Faridkot House, Copernicus Marg,
New Delhi- 110001

Sub: Regarding submission of Joint Committee Report with respect to Order dated 09.02.2023 Passed by the Hon'ble National Green Tribunal, New Delhi in Original Application No. 433 of 2022, Pateshwari Prasad Singh V/s State of Uttar Pradesh and Others.

Sir,

Kindly refer to the subject mentioned above. In compliance of the order dated 09.02.2023 passed by the Hon'ble National Green Tribunal, Principal Bench, New Delhi in Original Application No. 433 of 2022, Pateshwari Prasad Singh V/s State of Uttar Pradesh and Others, Please find attached herewith Joint Committee Report for your kind perusal and further necessary action.

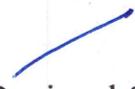
Sincerely Yours,

Enclosures: As above


(Chandresh Kumar)
Regional Officer

Copy to: Following for information and further necessary action.

1. Shri Pradeep Misra Advocate, Supreme Court, B-235, Sector-XIX, Noida, District-GB Nagar, 201301.


Regional Officer

ब्लॉक रोड, बुद्धापुरम, बड़ेबन, बस्ती-272001

Web site: www.uppcb.com, e-mail id: robasti@uppcb.in, ropcbbasti@gmail.com

INTERIM REPORT OF THE JOINT COMMITTEE

**AS PER DIRECTION OF HON'BLE NATIONAL GREEN
TRIBUNAL ORDER DATED 09.02.2023**

IN THE MATTER OF

Pateshwari Prasad Singh

VS

State of Uttar Pradesh

[O.A. No. 433/2022]

MAY 2023

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**Report of Joint Committee constituted as per NGT
Order dated 09.02.2023 in the matter of O.A. No.
433/2022**

1.0 Background

**1.1 Hon'ble NGT Matter of Original Application (O.A.)
No. 433/2022**

Hon'ble NGT in its order dated 05.09.2022 in the matter of *Pateshwari Prasad Singh Versus State of Uttar Pradesh* in O.A. No. 433/2022 referenced the previous order dated 31.05.2022 vide which it directed that a Joint Committee of representatives of Regional Office of MoEF, Lucknow, State PCB, Ministry of Jal Sakti, Government of India as well as State of Uttar Pradesh and District Magistrate, Balrampur to meet within four weeks and undertake site visits, look into the grievances of the applicant and take requisite remedial action by following due process of law. The State PCB will be the Nodal agency for coordination and compliance.

The factual and action taken report may include all relevant aspects in particular present status of the river Suav, boundary of Flood Plain Zone (FPZ), status of encroachments on the same and steps already taken or to be taken for removal of the encroachments.

In compliance thereof Mr. R.K. Singh, Chief Environment Officer, Uttar Pradesh, PCB has sent the report of the Joint Committee vide letter dated 30.08.2022 emailed on 01.09.2022.

In the report of the Joint Committee, Suav has been mentioned to be a drain whereas in 1905 Gazetteer of District Gonda the same is referred to as river and, therefore, the fundamental question which arises in the present case is as to whether Suav is a river or a drain and the questions which arise further

relate to the aspects of demarcation of Flood Plain Zone (FZP) in case Suav is a river and the nature and extent of encroachments on the same.

Hon'ble NGT found that the **Joint Committee has addressed the issues pertaining to STP and Community Centre only** and the issues pertaining to status of Suav as river or Nala, demarcation of Flood Plain Zone and encroachments on the same issues **have not been addressed properly by the Joint Committee.** In view of the above facts, we consider it to **appropriate to constitute another Committee** comprising of Chairman of Central Water Commission or his nominee not below the rank of Chief Engineer, representatives of State Remote Sensing Organization, State of Uttar Pradesh, Ministry of Jal Shakti, Uttar Pradesh and State PCB and District Magistrate, Balrampur to undertake field visits and verify factual position by assessing ground reality as well as relevant revenue and administrative record and submit its report specifically addressing the issues as to whether, Suav is a drain (Nala) or River, demarcation of flood plain zone in case Suav is a river and extent/magnitude of encroachments on left and right banks of Suav in urban municipal limits of city Balrampur..

The new Committee made field visits and held detailed discussions with the officials from Revenue Department, Irrigation Department, State Remote Sensing application Centre and submitted its report before Hon'ble NGT vide email dated 18.01.2023.

Subsequently Hon'ble NGT vide Order dated 09.02.2023 while taking into cognizance the Report ,quoted the following para from the report submitted by the Committee and gave further direction to the Committee.

“In the previous paras, it has been described about the flood issues in Balrampur city, which is primarily due to spilling of River Rapti and its backwater effect leading to congestion. The Suav river as such is not responsible for the floods. However, its importance lies in draining out the flood waters from the low lying areas. It is brought out that the Suav river is ungauged i.e there is no long term high frequency observed

data of the river pertaining to discharge, water level and back waters data of river Rapti. Hence most of the data has to be generated using various empirical/Statistical methodologies based on which the flood plane zoning studies (to be more precise no construction zone) has to be carried out. A scientific study needs to be undertaken using the expertise of well-established institutions like one of the IIT. Based on the results of these studies it then may be possible to assess the extent of encroachment made within the municipal limits of Balrampur city and demarcate no construction zone. The Committee accordingly recommends to nominate expert(s) in the Committee to carry out such study to demarcate no construction along the river Suav within the Municipal Limits of Balrampur town and beyond. ”

“As suggested in the Joint Committee Report, we nominate Director or his nominee, National Institute of Hydrology (NIH), Roorkee as an expert Member of the Joint Committee. Accordingly, we direct the Joint Committee to undertake field visit and accomplish the task related to demarcation of Flood Plan Zone (FPZ) of Suav river, extent/magnitude of the encroachment (identification of houses, religious structures, schools, land etc. in FPZ) on the left and right banks of Sauv river in Urban Municipal Limits of Balrampur city and submit its report by 10.05.2023.”

2.0 Field Visit and meeting of the Joint Committee

After receipt of nomination of Dr. Anil Kumar Lohani, Scientist 'G' and Head Surface Water Hydrology, NIH, Roorkee, a meeting notice vide letter dated 13.04.2023 (**Annexure-I**) was issued by the Regional Officer, UPPCB for field visit and meeting of the Joint Committee on 20.04.2023 at Balrampur.

The following members of the Joint Committee were present on 20.04.2023 at Balrampur.

1. Shri Anupam Prasad, Chief Engineer, UGBO, CWC
2. Dr. Anil Kumar Lohani, Scientist 'G', NIH, Roorkee
3. Shri Rakesh Kumar, Chief Engineer, Saryu-II, WRD, UP, Gonda

4. Shri Arjun Singh, Scientist SD, RSAC, UP, Lucknow
5. Shri Rajendra Bahadur, SDM, Tehsil- Sadar, Balrampur (representing DM, Balrampur)
6. Shri Chandresh Kumar, Regional Officer, UPPCB, Basti- Co-ordinator.

2nd meeting of the Committee was held on 29.04.2023 at Lucknow in which all the members of the Committee were present except the representative of DM, Balrampur, Dr. Lohani, Scientist 'G' joined the meeting through Video-Conferencing.

3.0. Important points which emerged from the discussion /Field visit

The Joint Committee on 20.04.2023 visited the areas in the vicinity the Suav river and held discussions with officials of Irrigation Department and Balrampur Sugar mills. The gist of the discussions are as follows:

- i. As was detailed in the Committee's previous report, the area drained by the Suav river is extremely flat and the flooding in its catchment including Balrampur town is generally due to overflowing of river Rapti from its right bank into the catchment of river Suav. The officials of Balrampur Sugar mills also informed that the Balrampur town including the Sugar mill established during the British Period has been facing recurrent flood during monsoon due to overflowing of river Rapti and drainage congestion in river Suav.
- ii. The expert from NIH, Roorkee Dr. Lohani was of the view that since during floods (monsoon period) the whole of the catchment of Suav river is under water primarily due to overflowing of river Rapti from its right bank, running of any mathematical model for determination of the water levels of river suav during different time period in monsoon months for demarcation of flood plain would not serve the desired purpose. He further observed that hydro-meteorological data for the Suav catchment

and the quantum of water flowing from river Rapti is not available either with Irrigation Department or CWC.

- iii. The Irrigation officials informed that the river Rapti right bank has been embanked but there are many gaps through which the Rapti overflows into Suav catchment. Proposals have been prepared for closing these Gaps by the Irrigation Department.
- iv. The Committee after detailed deliberation and taking into account the views of the expert decided that it would not be correct to carry out modelling exercise for flood plain zoning in river Suav based on the flows received from river Rapti combined with rainfall received in Suav catchment, as the situation will drastically change after the Rapti river right bank is fully embanked. The expert Dr. Lohani suggested to carryout the modelling exercise using HEC-RAS model considering runoff generated through Rainfall over the Suav catchment.
- v. The following data was requested by Dr. Lohani for carrying out the modelling exercise.
 - a. Municipal limit map with details
 - b. Drainage map (Sewage) of Balrampur
 - c. X-section of Suav/Gopiyapu at various locations (200 m interval) with lat/long from UP Irrigation
 - d. Embankment details of river Rapti on Right bank in Balrampur district
 - e. Wetland/Jhil/Ponds details in Balrampur municipal limits
 - f. DEM of the area: A DEM, or Digital Elevation Model, is a requirement for flood plain zoning because it provides valuable information about the topography and elevation of the land in the flood-prone area. Using high resolution DEM as an input in hydrodynamic model provides the detailed maps of the floodplain and identify areas that are at high risk of flooding. The data is then processed to create a detailed 3D model of the terrain, which can be used to create accurate floodplain maps. Having accurate floodplain maps is essential for

managing flood risk and for making informed decisions about land use in flood-prone areas.

- g. Rainfall data of last 50 years/30 years
 - h. Floods of different return periods (25 Yr/50 Yr and 100 Yr) of Suav river
 - i. Master plan of Balrampur city
 - j. Water level maximum during last 20-25 years at a particular site
 - k. Land records showing municipal limit along Suav river
 - l. Rainfall data records available with Balrampur factory
 - m. Details of present embankments of Rapti and place/location from where river rapti enters in Suav river
 - n. High resolution DEM of Suav river basin from UPRSAC
 - o. Drainage map of Suav River basin from UPRSAC
 - p. Flood inundation maps of Balrampur for past years.
- vi. The officials present in the meetings informed that there is practically no hydromet data available for Suav Catchment. Balrampur Sugar mills official agreed to provided last two decades rainfall data. The Irrigation Department official informed that they have recent x-section data of Suav river, which they will share with Dr. Lohani. CWC shall share the rainfall data for stations in and around Suav catchment. The other data like land records within Municipal Limits and Master plan of Balrampur if any can be subsequently shared after the modelling exercise.
- vii. Shri Arjun Singh, Scientist, SD, RSAC, UP, Lucknow was requested to provide DEM of the Suav catchment and drainage map of the catchment.

4.0. Flood inundation modelling Report.

- i. The flood inundation modelling was carried out by Dr. Lohani, Scientist 'G' and expert in the Joint Committee and a report has been prepared, which is enclosed at **Annexure-II**. The report was discussed by the Joint Committee.
- ii. Efforts were made carry out the flood inundation modelling using HEC-RAS but as has been already mentioned that the area under study is very flat and the DEM developed using 30 m horizontal and 1 m vertical resolution CARTOSAT data is too coarse to capture the actual topography, embankments, shallow low lying areas etc.
- iii. 1 in 2 years to 1 in 100 years yearly peaks have been calculated using Middle Ganga Plains Subzone 1(f) of India, since, no observed discharge data for this area is available.
- iv. The flood inundation map for 1 in 25, 1 in 50 and 1 in 100 years for Suav river has been developed and superimposed on the Survey of India Toposheet.

5.0. Recommendations:

- i. As has been narrated above the DEM developed for the Suav catchment is too coarse considering the highly flat nature of the area thus a high resolution DEM through LiDAR/Drone survey is essentially required to capture the actual topography of the region for carrying out the flood inundation modelling.
- ii. Since LiDAR/Drone based DEM is not available for this region, thus LiDAR based survey of the Suav catchment will have to be carried by engaging professionals. As per rough estimate the cost of survey through

LiDAR/Drone and development of DEM would entail an expenditure of **Rs 75.00 lakh** for which financial provision has to be made.

- iii. Further studies will be carried out in time bound manner after the LiDAR/Drone based DEM and x-sections are available based on which the flood plain zoning will be formulated.



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Phone & Fax : 05542-281440



क्षेत्रीय कार्यालय
उत्तर प्रदेश प्रदूषण नियंत्रण बोर्ड, बस्ती
Regional Office
UTTAR PRADESH POLLUTION CONTROL BOARD, BASTI

संदर्भ संख्या : 11/सा0-138/पाटेश्वरी प्रसाद/2023

दिनांक : 13-04-2023

सेवा में,

- श्री अनुपम प्रसाद, चीफ इंजीनियर
यू0जी0बी0ओ0, केन्द्रीय जल आयोग,
जान्हवी सदन, 21/496, इन्दिरा नगर,
लखनऊ-226016(उ0प्र0)।
- श्री राकेश कुमार, मुख्य अभियन्ता
सरयू परियोजना-द्वितीय,
सिंचाई एवं संसाधन विभाग, उ0प्र0
गोण्डा।
- डॉ0 अनिल कुमार लोहानी, साइंटिस्ट 'जी' एवं
हेड, सरफेस वाटर हाइड्रोलोजी डिविजन,
नेशनल इन्स्टीट्यूट आफ हाइड्रोलोजी,
रूढ़की-247667
- श्री अर्जुन सिंह, वैज्ञानिक एस0डी0
रिमोट सेन्सिंग एप्लीकेशन सेन्टर
उ0प्र0।
- उप जिलाधिकारी, तहसील-सदर,
बलरामपुर।

विषय:-माननीय राष्ट्रीय हरित अधिकरण, नई दिल्ली में योजित ओ0ए0 सं0-433/2022 पाटेश्वरी प्रसाद सिंह बनाम स्टेट आफ उ0प्र0 में पारित आदेश दिनांक 09.02.2023 के परिप्रेक्ष्य में साइट विजिट/बैठक करने के संबंध में।

महोदय,

कृपया उपरोक्त विषयक माननीय एन0जी0टी0 में योजित ओ0ए0 सं0-433/2022 पाटेश्वरी प्रसाद सिंह बनाम स्टेट आफ उ0प्र0 में पारित आदेश दिनांक 09.02.2023 का संदर्भ ग्रहण करने का कष्ट करें (आदेश की छायाप्रति संलग्न)। उक्त के परिप्रेक्ष्य में आपसे दूरभाष पर हुई वार्ता के अनुक्रम में दिनांक 20.04.2023 को प्रातः 11:00 बजे माननीय एन0जी0टी0 के आदेश दिनांक 09.02.2023 के अनुपालन में साइट विजिट/बैठक करने हेतु कलेक्ट्रेट परिसर, बलरामपुर में उपस्थित होने का कष्ट करें, जिससे गठित समिति की संयुक्त आख्या माननीय एन0जी0टी0 में ससमय दाखिल किया जा सके।

संलग्नक:-उपरोक्तानुसार।

भवदीय


क्षेत्रीय अधिकारी

प्रतिलिपि:-

- जिलाधिकारी महोदय, बलरामपुर को सादर सूचनार्थ प्रेषित।
- सदस्य सचिव महोदय, उ0प्र0 प्रदूषण नियंत्रण बोर्ड, लखनऊ।
- मुख्य पर्यावरण अधिकारी(वृत्त-6), उ0प्र0 प्रदूषण नियंत्रण बोर्ड, लखनऊ।
- श्री आर0वी0 सिंह, सहायक वैज्ञानिक अधिकारी, उ0प्र0 प्रदूषण नियंत्रण बोर्ड, बस्ती को इस निर्देश के साथ प्रेषित है कि उक्त के परिप्रेक्ष्य में आवश्यक कार्यवाही करने का कष्ट करें।

क्षेत्रीय अधिकारी

ब्लॉक रोड, बुद्धापुरम, बड़ेबन, बस्ती-272001

Web site: www.uppccb.com, e-mail id: robasti@uppccb.in, ropccbasti@gmail.com

(PC-1) E-UPPCB (A. RO BASTI)







Flood Inundation mapping of Suav river in Balrampur District of UP

1. Introduction

Balrampur Town and adjoining areas in the Balrampur district in UP has a perennial problem of flooding during the monsoon season. River Suav flows through Balrampur town and acts as drainage channel for areas in and around Balrampur town. Suav river originates from a low lying area and after traversing the fields enters Balrampur town and after passing through many low lying areas (jhils) drains into River Rapti near Rasoolabad tehsil.

Hon'ble NGT through a public litigation has taken into cognizance the recurring flooding of areas in Balrampur town and possible encroachment of flood plains of river Suav in Balrampur Town and has formed a Joint Committee to accomplish the task related to demarcation of Flood Plan Zone (FPZ) of Suav river, extent/magnitude of the encroachment (identification of houses, religious structures, schools, land etc. in FPZ) on the left and right banks of Suav river in Urban Municipal Limits of Balrampur city

2. Study area and Data availability

The catchment, drainage and Digital Elevation Model (DEM) (30 m horizontal resolution and 1 m vertical resolution Cartosat DEM) and SOI topsheet of the area was made available to the committee. The map of study area is shown in Figure 1. The river width is in some stretches less than 30 m. Hence, the river cross-section, road and embankment are not properly represented in this DEM. However, this DEM is used for analysis as other high resolution data is not readily available at this moment. The catchment area at various chainage provided to the committee is given in Table 1. Discharge data are not available for this river.

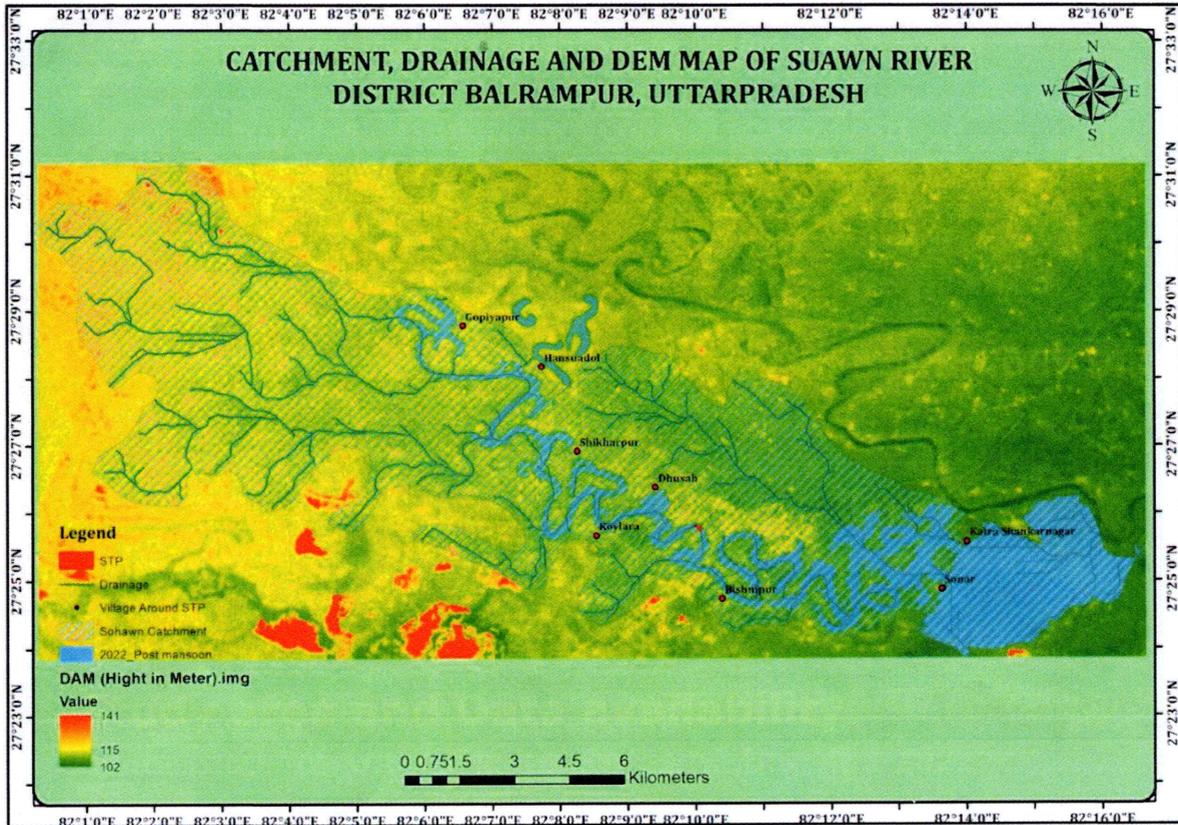


Figure 1: Catchment. Drainage and DEM map of the Suawn river

Table 1: Catchment area at various chainage

Location/ Chainage	Catchment Area (km ²)
STP KM 18.200 of Gopiyapur	48.43
Head of Gopiyapur or at Chandetal	85.29
Head of Suwaw at Rasoolabad	235.32

3. Estimation of Design Discharge

The study area lies in the Middle Ganga Plains Subzone 1(f) of India. Since, no observed discharge data for this area is available, the regional flood frequency relationships developed for ungauged basin of Middle Ganga Plains Subzone 1(f) by Kumar et al (2003) is used to estimate design flood for various return periods. The relationship was developed with data of 8 sites, catchment are

varying from 32.89 to 447.76 km² and their mean annual peak floods vary from 24.29 to 555.21 m³/s. The developed relationship is given below:

$$Q_T = \left[34.842 - 34.304 \left\{ -\ln \left(1 - \frac{1}{T} \right) \right\}^{0.01} \right] A^{1.084}$$

Where Q_T is flood estimate in m³/s for T-year return period, and A is catchment area in km². Using this equation design flood for various return periods are estimated as given in Table 2.

Table 2: Design flood at various locations

Return period (Year)	Peak flood (m ³ /s)		
	STP KM 18.200 of Gopiyapur	Head of Gopiyapur or At Chandetal	Head of Suwaw at Rasoolabad
2	44.5	82.2	247.0
5	70.4	129.9	390.4
10	87.3	161.2	484.5
25	108.5	200.5	602.3
50	124.2	229.3	689.0
100	139.6	257.8	774.5

4. Flood Inundation Modelling

HEC-RAS, a hydraulic model developed by the U.S. Army Corps of Engineers (USACE), is extensively applied in calculating the hydraulic characteristics of rivers and flood inundation modelling. The latest update on the program, HEC-RAS 6.3 includes capabilities to model the hydraulics of a river both one and two dimensionally. HEC-RAS model needs details of river cross sections for 1D modelling and Bathymetry/terrain data for 2D modelling. The 2D modeling capability uses a Finite-Volume solution scheme. This algorithm was developed to allow for the use of a structured or unstructured computational mesh maximum upto 8 sides in a computational cell. Here, the supplied Carto DEM is used to setup HECRAS model for the study reach as shown in Figure 2 .The flood inundation extent maps for 25, 50 and 100 year return period flood are generated from the HEC RAS model are shown in Figure 3 and Figure 4.



Figure 2: HEC RAS model setup

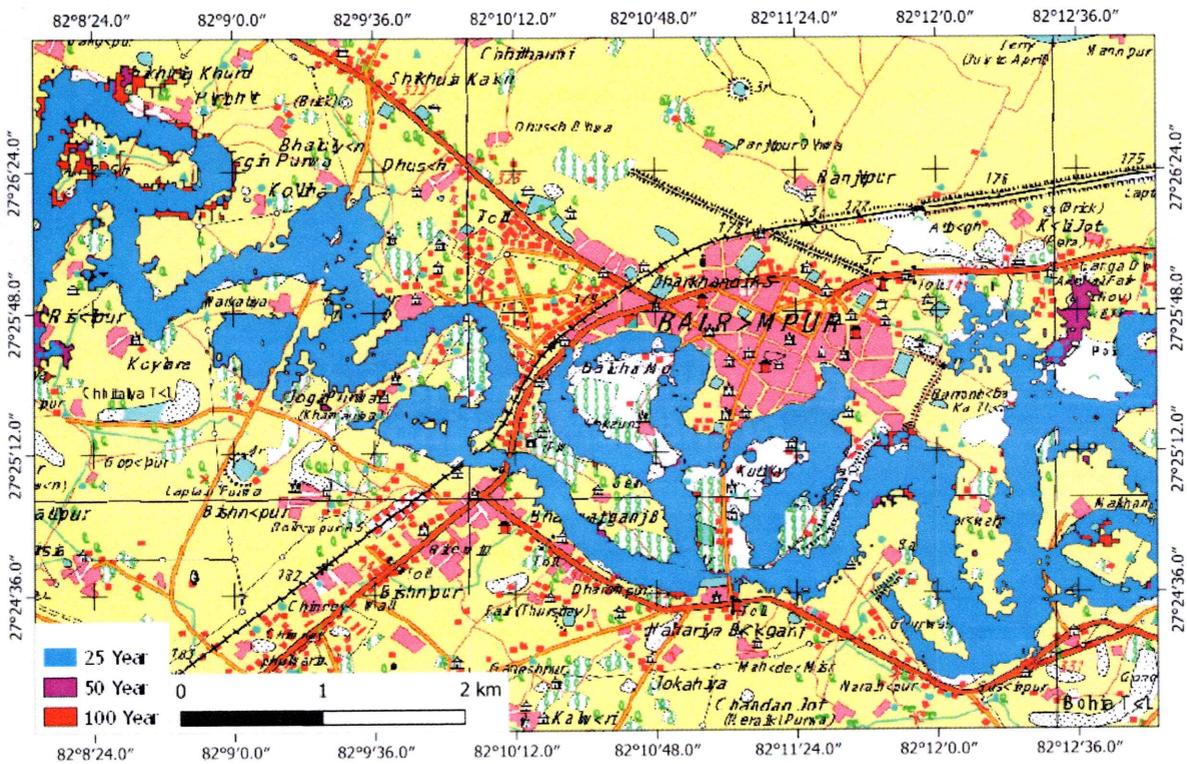


Figure 3: Flood inundation extent superimposed over SOI topsheet

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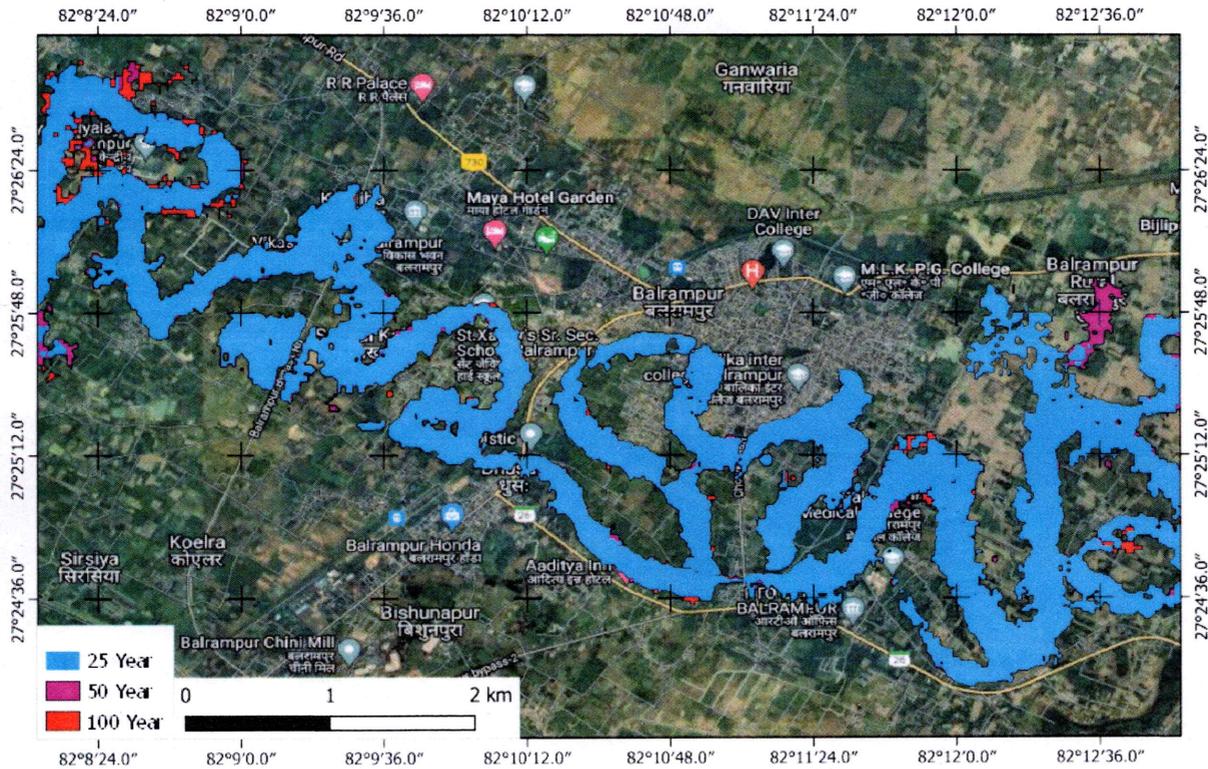


Figure 4: Flood inundation extent superimposed over Google hybrid satellite image

5. Conclusions and Recommendations

The design flood for various return periods is estimated based on catchment area and regional relationships due to unavailability of any observed discharge data in the river. Flood inundation modelling corresponding to different discharge is carried out using HEC RAS model. The carto DEM used for the modelling is of 30 m horizontal resolution and 1 m vertical resolution. The study area is relatively flat terrain and there are number of road and flood protection work, which are not properly represented in the DEM. It is recommended to develop a high resolution Digital Elevation Model with help of LiDAR survey with detail representation of these features and a detailed study may be carried out in future.

Reference

- i. CWC (1985) Flood estimation for Middle Ganga Plain Subzone 1(f)', Central Water Commission
- ii. Kumar, R., Chatterjee, C., Kumar, S, Lohani A.K., Singh R.D. (2003) Development of Regional Flood Frequency Relationships Using L-moments for Middle Ganga Plains Subzone 1(f) of India. Water Resources Management 17,243–257(2003).
<https://doi.org/10.1023/A:1024770124523>



(Chandresh Kumar)

Regional Officer, UPPCB



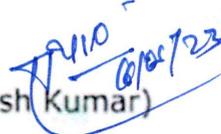
(Rajendra Bahadur)

SDM, Balrampur



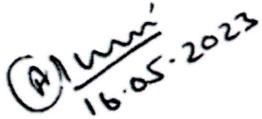
(Arjun Singh)

Scientist, SD, RSAC, UP



(Rakesh Kumar)

Chief Engineer, I&WRD, Gonda



(AK Lohani)

Scientist 'G', NIH, Roorkee



(Anupam Prasad)

Chief Engineer, CWC, Lucknow