

Flood Hazard Atlas - Bihar

- A Geospatial Approach

Prepared by



National Remote Sensing Centre
Indian Space Research Organisation
Dept. of Space, Govt. of India



In Association with
National Disaster Management Authority
Ministry of Home Affairs, Govt. of India



Disaster Management Department
Govt. of Bihar, Patna

&



Bihar State Disaster Management Authority
Govt. of Bihar, Patna



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Dr. K. Sivan



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व
सचिव, अन्तरिक्ष विभाग
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FOREWORD

Floods are major natural disasters in Bihar State and have a great impact on loss of property, infrastructure and agriculture. Identification of the flood-prone areas and the risk associated would offer significant help for the planners to devise area-specific mitigation measures. Satellite Remote Sensing provides information on actual flood inundation for different magnitudes of floods, in addition to various other land information which could be used for delineating the flood hazard zones.

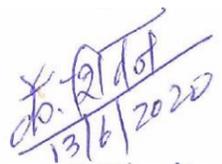
Under the Disaster Management Support (DMS) Programme of Indian Space Research Organisation (ISRO), National Remote Sensing Centre (NRSC) has been generating flood inundation maps using satellite data for all major flood events that have occurred in the country for more than two decades, and the information has been provided to the State Relief/Disaster Management Departments. This has enabled generation of reliable database on spatial flood inundation patterns and frequency of occurrence, which can be used to generate the flood hazard maps.

NRSC / ISRO had already prepared satellite based flood hazard atlas for Bihar and was released by the then Hon'ble Minister for Disaster Management during June, 2013 at Patna. This atlas was prepared using the satellite based observations for 13 years from 1998 to 2010. I am happy to know that the atlas was found to be very useful for the district administration of Bihar, Government of Bihar. Further, Govt of Bihar requested ISRO to extend support for the disaster management activities and signed MoU with ISRO during July, 2019.

ISRO continued to extend support to Bihar and updated the earlier atlas and prepared an updated flood hazard atlas, using about 274 satellite datasets spanned over 22 years from 1998 to 2019, through NRSC/ISRO. I am sure that the information provided in the atlas will be of use to the Government of Bihar in flood preparedness, flood risk assessment, planning and implementation that is necessary for long-term mitigation measures in minimizing the damage due to flood disaster.

I compliment the project team at NRSC / ISRO, Disaster Management Department, Govt. of Bihar, Bihar State Disaster Management Authority and National Disaster Management Authority for bringing out this informative and useful Flood Hazard Atlas for the benefit of the State.

Dated: June 13, 2020
Bangaluru


(कै. शिवन / K.Sivan)

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निदेशक / **Director**



PREFACE

Flood is the one of the major natural disasters in India that causes immense damage to property and human life almost every year. It is estimated by the Ministry of Water Resources that India has 40 Million Hectares of floodplains. Flood Hazard zonation is one of the best non-structural methods for flood damage mitigation.

Department of Space (DOS), as the nodal agency for National Natural Resources Management System (NNRMS), has launched a major Disaster Management Support Programme (DMSP) with NRSC as the single window delivery mechanism for providing near-real time products and services using satellite remote sensing data to support various phases of disasters. Preparation of flood inundation maps and assessment of damages has been an ongoing operational activity for more than two decades, thus, enabling creation of reliable and long term database on flood hazards and associated risks.

Using historical satellite data available during 1998-2019, National Remote Sensing Centre (NRSC), ISRO has prepared the flood hazard maps for Bihar State, About 274 Indian Remote Sensing (IRS) Satellite and foreign satellite datasets, spanning over 22 years (1998 to 2019) acquired at different flood magnitudes over Bihar floodplains have been used to create the flood hazard maps. Spatial extent of flood inundation and the frequency of flooding in a given area are derived from the satellite datasets. The hazard zones are categorized into five classes ranging from Very Low hazard zone to very high hazard zone. A flood hazard index was calculated for each district considering the flood hazard category, hazard area and intra annual flood variations to find the severity of flood hazard in various districts.

To ensure effective acceptance of the information, the hazard maps prepared using satellite remote sensing data has been ratified with ground truth by the respective district administration of Government of Bihar. This will enable all stake holders towards assessment of vulnerability for effective management and decision making. It has been witnessed since the release of the first Atlas, that the Atlas has assisted the planning agencies, the state and district administrations and the communities at panchayat levels in raising the level of alertness about the disaster proneness of the identified areas and the need for disaster preparedness and mitigation on a scientific and realistic basis.

I am sure that information on flood hazard derived from space datasets will be useful to Government of Bihar for various disaster risk management planning, preparedness and mitigation.

शांतनु Santanu Chowdhury
(SANTANU CHOWDHURY)



Nitish Kumar
Chief Minister, Bihar



MESSAGE

I am very happy to know that National Remote Sensing Centre (NSRC), Indian Space Research Organization (ISRO), Hyderabad, in association with National Disaster Management Authority (NDMA), New Delhi and the Government of Bihar has prepared the Flood Hazard Atlas for the State of Bihar using satellite data of 1998-2019.

Bihar is one of the most flood prone States in India, accounting for around 17.2% of the flood prone area of the country. About 76 percent of the population in North Bihar lives under the recurring threat of flood devastation. Bihar's vulnerability to floods is reflected from the fact that floods have become an annual feature in the State.

I am sure the information available in this Atlas would be of immense help to the State Government in formulating a comprehensive plan and in implementing efficient mitigation measures for flood management in the State of Bihar.

I congratulate all those who have been involved with the preparation of the Atlas.

Patna

Date: 20 June 2020

Nitish Kumar



Sushil Kumar Modi
Deputy Chief Minister, Bihar



MESSAGE

Bihar has been traditionally a flood prone state. The people of Bihar have displayed extraordinary strength to struggle and live with such disasters and this approach has been mainstreamed in our culture and traditions. Governments of Bihar have committed its full-fledged support to the disaster risk reduction initiatives and help the people of the state to minimize the impacts of disasters. The insights, experiences and inspiration from the Sendai Framework for Disaster Risk Reduction were adopted by the state when it developed its own Roadmap for Disaster Risk Reduction- the very first of its kind in India.

The officers, elected representatives, community institutions and all agencies inspired by the vision of a safer Bihar are making their best efforts at mitigating as well as preparing for floods through targeted interventions at village, block, district and state levels. All of these efforts can be made more effective through a structured understanding of flood risk in different parts of the state.

I am happy to know that the National Remote Sensing Centre (NSRC), Indian Space Research Organization (ISRO), Hyderabad, in association with National Disaster Management Authority (NDMA), New Delhi and the Government of Bihar has prepared the Bihar Flood Hazard Atlas: 1998-2019. I am sure this would be of immense help to all of us involved in flood risk management in Bihar.

My good wishes to all of those who have been engaged in the preparation of this Atlas.

Patna

Date: 20 June 2020

Sushil Kumar Modi



Lakshmeshwar Roy
Minister, Disaster Management, Bihar



MESSAGE

Bihar is a multi-hazard prone state and for centuries, our people have learnt to cope with and reduce risks from various natural disasters through their own indigenous knowledge. Floods have emerged as the prime area of concern for the people of Bihar given their near-annual frequency in the state. With increasing urbanization and evident impacts of climate variability in the state, a scientific approach to understanding flood and designing necessary measures to minimize losses is critical.

I am happy to learn that the National Remote Sensing Centre (NSRC), Indian Space Research Organization (ISRO), Hyderabad, in association with Government of Bihar has prepared the Bihar Flood Hazard Atlas: 1998-2019. The Atlas is a much needed document for Disaster Management and other departments to take informed decisions for minimising the impact of floods on the people of Bihar.

I congratulate the team that has been engaged in the preparation of this Atlas.

Patna

Date :20 June 2020

Lakshmeshwar Roy



Vyas Ji, I.A.S. (Retd)
Vice Chairman

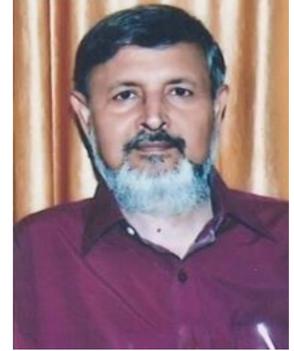
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MESSAGE

This is the second updated District wise Flood Hazard Atlas for Bihar State based on spatial satellite imagery data and daily water levels recorded for the period June to October of various rivers of Bihar observed during 2011 to 2019 years. The first edition of the atlas, based on data from 1998 to 2010 was released in 2013, which was a milestone in moving towards a safer and floods resilient Bihar. In this edition of updated atlas, meticulous efforts have been made to overcome the errors found in the information on village/block wise flood inundation areas. So this time, as informed by NRSC, the results of flood inundation areas has been ground verified by all the district administration through DMD, Govt of Bihar.

In Bihar flood prone area accounts for 6.868 million hectare out of its geographical area of 9.4163 million hectares. We witness flood almost every year causing extensive damage to lives and properties. Hence, crucial information on flood inundation areas for different magnitude of floods including duration of flood using multitude satellite data can be used by Disaster Management Department (DMD) and the district administration for reducing the impact of flood.

I hope this updated edition will be helpful for DMD and the district administration in identifying the risk and mitigation measures to be ensured before the on set of floods. I heartly congratulate NRSC for bringing up this updated flood hazard atlas.

Sincerely,

Patna

Date: 10 June 2020

(Vyasji)

जी. वी. वी. शर्मा, भा.प्र.से.
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गृह मंत्रालय
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Government of India
Ministry of Home Affairs
National Disaster Management Authority



MESSAGE

Action Point No.5 of Prime Minister's ten point Agenda for disaster risk reduction requires leveraging technology to enhance the efficiency of disaster risk management efforts. With the goal to create a safe and disaster resilient India through an integrated dynamic and technology-driven approach for disaster risk management, National Disaster Management Authority has commenced various programmes to induct science and technology in the country. One such important initiative is to develop upgraded hazard profiles of various natural hazards (for their subsequent use in vulnerability and risk assessment work). Flood is one of the most frequent disasters that affect our economy very badly. Information of the flood hazard profile at a reasonably large scale is not available for planning necessary mitigation measures by concerned State Government.

The initiatives of Indian Space Research Organization to utilize Space based technology for disaster risk reduction in the country are exemplary. The Working Committee of Experts formed by National Disaster Management Authority decided to prepare the flood hazard map for the State of Bihar on priority, utilizing the scientific inputs from the various Stake Holders and the actual satellite based observations on flood inundated areas of Bihar accumulated over the past 22 years by the National Remote Sensing Centre (NRSC) as a major step forward in NDMA's initiative to induct S&T for Disaster Management.

I am sure the updated Flood Hazard Atlas prepared by NRSC, ISRO using the space based data would deliver the much needed information for the efficacious management of flood hazard in the State of Bihar.


(G.V.V SARMA)

Place : New Delhi
Dated: 13 June, 2020



Deepak Kumar
Chief Secretary, Bihar



MESSAGE

It is a matter of great pleasure that National Remote Sensing Centre, ISRO have joined hands with the State Government of Bihar to release the Flood Hazard Atlas for Bihar State using satellite data observations. Flood is a regular, almost annual, phenomenon in the State of Bihar causing widespread damage to life and property. This is a well thought out effort and would add a new and effective dimension in flood and disaster management in the country.

This Atlas would not only help in effective flood management but also would be a great help in post-flood activities associated with damage assessment and flood relief. Concept of hazard index would provide a tool to the policy and decision makers to give due attention to the severely affected areas.

I congratulate the team responsible for the pioneer work.

Patna

Date: 20 June 2020

Deepak Kumar



Pratyaya Amrit, I.A.S
Principal Secretary, Disaster Management



MESSAGE

Government of Bihar adopted the Disaster Risk Reduction Road map incorporating the intentions and approaches of Sendai Framework for Disaster Risk Reduction in 2016. “Understanding Risk” is the first priority laid down by the Framework and has been imperative in the all the efforts of the Government to enhance our efficiency in managing floods.

I am delighted that National Remote Sensing Centre, ISRO and Government of Bihar have completed the Flood Hazard Atlas for Bihar. As one of the critical steps in building a scientific understanding of flood risk in various parts of the state, this effort will not only be useful for effective flood management but also help all the departments of the Government to take risk informed decisions.

Disaster management Department has received unconditional support from the Hon’ble Chief Minister of Bihar and the insights from his vision of a disaster resilient Bihar have prompted us to work with highly specialized agencies such as National Remote Sensing Centre (NRSC), ISRO. On behalf of Government of Bihar, I thank them for this fruitful collaboration. I also deeply appreciate the leadership and the team of scientists at NRSC involved in this massive exercise for all their efforts.

Patna

Date: 20 June 2020

Pratyaya Amrit

ACKNOWLEDGEMENTS

The project team would like to place on record our deep sense of gratitude to Dr. K. Sivan, Chairman, ISRO and Secretary, Department of Space for showing keen interest in DMS programme and for his extensive support in DMS activities of NRSC.

The project team sincerely thanks Sri G. V. V. Sharma, IAS, Member Secretary, National Disaster Management Authority (NDMA) for his support and encouragement given during this task.

The project team expresses deep sense of gratitude to Sri Santanu Chowdhury, Director, NRSC for his constant encouragement, keen interest and for providing necessary support in bringing out this atlas.

The project team conveys earnest thanks to Dr. P. G. Diwakar, Director, EDPO, ISRO Headquarters, Bengaluru for his continuous support and guidance in disaster management support activities of NRSC.

The project team is grateful to Sri Pratyaya Amrit, I.A.S, Principal Secretary, Disaster Management, Govt. of Bihar for his continuous support in completing the flood hazard atlas. The team sincerely acknowledges the support and persue of Sri Sandeep Poundrik, I.A.S, Joint Secretary (Mitigation), NDMA, Delhi in preparing the flood hazard atlas.

Support, guidance and cooperation provided by Dr. V. Bhanumurthy, AD, NRSC, and Dr. B. P. Shantanu, AD, EDPO & PD-DMSP, ISRO are sincerely acknowledged. The project teams sincerely thank Sri G. S. Rao, AD, EDPO, APD-DMSP, ISRO for his persistent support, cooperation, and his contribution in preparing this atlas.

The project team sincerely thank the officers of Disaster Management Department, Government of Bihar for completing the ground validation of the hazard atlas very effectively in time. The project team sincerely acknowledge the support provided by BSDMA in completing the flood hazard atlas.

Support provided by officers of National Disaster Management Authority, New Delhi is sincerely acknowledged. The project team sincerely thank Central Water Commission, Indian Meteorological Department for providing field data in preparing this flood hazard atlas.

Finally, the project team is indebted to all the scientists who contributed earlier in generating the flood maps in near real time. The team thanks everyone who contributed directly or indirectly in preparing this atlas.

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Executive Summary

Flood hazard maps are one of the very important non-structural methods of flood damage mitigation. These maps are useful in planning developmental activities, construction of relief, rescue, health centers and in planning flood tolerant crops in floodplains. Satellites provide synoptic observations of the natural disasters at regular intervals that help in disaster risk reduction in the country. Over a period of time, National Remote Sensing Centre, ISRO has created a repository of large data pertaining to the floods & cyclones in different areas of the Country. These historical flood maps, generated by NRSC/ISRO, are useful for identification of flood hazard areas. First version of Bihar Flood Hazard Atlas was released in 2013, in which historic satellite data of 1998 to 2010 was used. On behest of National Disaster Management Authority, NRSC/ISRO has revised and updated State level and District wise Flood Hazard Zonation Atlas for Bihar State using the available historical satellite datasets spanning over 22 years (1998 to 2019). About 274 Indian Remote Sensing (IRS) satellite and foreign satellite datasets (optical and microwave) during this period were acquired covering different flood magnitudes in Bihar State and used in generating the flood hazard maps. The flood hazard zones are categorized into five classes ranging from very low hazard zone to very high hazard zone based on the hazard classification schema finalized by the expert committee constituted by NDMA. Water level data of 40 gauge stations for the 22 years period has been obtained from Central Water Commission and analyzed to compute number of flood events in each year. Flood hazard index was calculated for each district considering the flood hazard category, hazard area and intra annual flood variations to find the severity of flood hazard in all districts. Flood inundation and frequency of occurrence are provided in the Atlas. The flood hazard maps have been validated in ground by the Disaster Management Department, Government of Bihar, through its district administration. Suggestions given by them are incorporated in this report. In Bihar State, it is estimated that about 35.06 lakh hectares of land is affected by floods during the last 22 years and 29 districts come under very high, high and moderate flood hazard category. It is believed that this atlas would be found to be useful in its value for followup flood mitigation efforts in the Bihar State.

1.0 INTRODUCTION

1.1 FLOOD AND ITS SEVERITY

Among all natural disasters, floods are the most frequent being experienced by India. India is one of the worst flood affected countries in the globe and damage caused by floods is very high compared to any other disasters. Nearly 75 to 80 % of the total annual rainfall is concentrated over a short monsoon season of four months (June-September) in India. As a result, the rivers witness a heavy discharge during these months, leading to widespread floods. Cyclones are other major water disasters in India. Coastal States mainly, West Bengal, Odisha, Andhra Pradesh, Tamil Nadu are affected by cyclones more frequently in the country. Assam, Uttar Pradesh, Bihar, Andhra Pradesh, Odisha, and West Bengal States are the most frequent flood/cyclone affected States in the country. About 40 million hectares of land in the country is liable to floods according to National Flood Commission, and an average of 7.2 million hectares of land is affected annually. Table-1 shows the extent of flood damages incurred during 1953-2016 in India. The annual average cropped area affected is approximately 3.9 million hectares. The most flood-prone rivers in the country are the Brahmaputra and the Ganga, these rivers carry about 60 per cent of the nation's total river flow. The other flood prone areas are the west flowing rivers such as the Narmada and Tapi in the north-west region; east flowing rivers like Mahanadi, Godavari, Krishna and Cauvery in the Central India and the Deccan region.

There are several causative factors for flooding in the country. Inadequate capacity of the rivers to contain the high flows brought down from the upper catchment (outside of India) due to heavy rainfall, leads to flooding. Area having poor drainage characteristic gets flooded by accumulation of water due to high intensity of rainfall. Excess irrigation water applied to command area and increase in ground water level due to seepage from canals and irrigated field accentuate the problem of water logging, subsequently it will have impact on floods. Figure 1 show a field photograph of the flood situation in part of Bihar State. Flooding is accentuated by erosion and silting of the riverbeds resulting in reduction of carrying capacity of river channel, leading to changes in river courses & obstructions to flow due to landslides, synchronization of floods in the tributary rivers and retardation due to tidal effects. With the increase in population and developmental activity, there has been tendency to occupy the flood plains, which has resulted in more serious nature of damage over the years. Because of the varying rainfall distribution, many a times, areas which are not traditionally prone to floods also experience severe inundation. Thus flood is the single most frequent disaster faced by the country. Floods have different dimensions, inundation due to spills over the banks, drainage congestion due to poor drainage characteristics, erosion due to change in river course are the main causes for flooding. Figure 2 shows total damages to Urban, Rural Infrastructure and Crops.



Fig: 1. Field photograph showing flood situation in part of Bihar (Source: Internet)

Table-1: The Extent of Damage due to Floods/Heavy Rains during 1953 to 2016 in India

Sl.No	Year	Area affected in Mha	Population affected in million	Damage to Crops		Damage to houses		Cattle lost	Human live lost	Damage to Public Utilities in Rs. Crore	Total damages crops, houses and public utilities in Rs. Crores
				Area in Mha	Value in Rs. Crore	Nos.	Value in Rs. Crore	Nos.	Nos.	Nos.	(col 6+8+11)
1	2	3	4	5	6	7	8	9	10	11	12
1	1953	2.3	24.3	0.9	42.1	264924	7.4	47034	37	2.9	52.4
2	1954	7.5	12.9	2.6	40.5	199984	6.6	22552	279	10.2	57.2
3	1955	9.4	25.3	5.3	77.8	1666789	20.9	72010	865	4.0	102.7
4	1956	9.2	14.6	1.1	44.4	725776	8.0	16108	462	1.1	53.6
5	1957	4.9	6.8	0.5	14.1	318149	5.0	7433	352	4.3	23.4
6	1958	6.3	11.0	1.4	38.3	382251	3.9	18439	389	1.8	44.0
7	1959	5.8	14.5	1.5	56.8	648821	9.4	72691	619	20.0	86.2
8	1960	7.5	8.4	2.3	42.6	609884	14.3	13908	510	6.3	63.2
9	1961	6.6	9.3	2.0	24.0	533465	0.9	15916	1374	6.4	31.4
10	1962	6.1	15.5	3.4	83.2	513785	10.7	37633	348	1.1	94.9
11	1963	3.5	10.9	2.1	30.2	420554	3.7	4572	432	2.7	36.6
12	1964	4.9	13.8	2.5	56.9	255558	4.6	4956	690	5.1	66.6
13	1965	1.5	3.6	0.3	5.9	112957	0.2	7286	79	1.1	7.1
14	1966	4.7	14.4	2.2	80.2	217269	2.5	9071	180	5.7	88.4
15	1967	7.1	20.5	3.3	133.3	567995	14.3	5827	355	7.9	155.4
16	1968	7.2	21.2	2.6	144.6	682704	41.1	130305	3497	25.4	211.1
17	1969	6.2	33.2	2.9	281.9	1268660	54.4	270328	1408	68.1	404.4
18	1970	8.5	31.8	4.9	162.8	1434030	48.6	19198	1076	76.4	287.8
19	1971	13.3	59.7	6.2	423.1	2428031	80.2	12866	994	129.1	632.5
20	1972	4.1	26.7	2.5	98.6	897301	12.5	58231	544	47.2	158.2
21	1973	11.8	64.1	3.7	428.0	869797	52.5	261016	1349	88.5	569.0
22	1974	6.7	29.5	3.3	411.6	746709	72.4	16846	387	84.9	569.0
23	1975	6.2	31.4	3.9	271.5	803705	34.1	17345	686	166.1	471.6
24	1976	11.9	50.5	6.0	595.0	1745501	92.2	80062	1373	201.5	888.7
25	1977	11.5	49.4	6.8	720.6	1661625	152.3	556326	11316	328.9	1201.8
26	1978	17.5	70.5	10.0	911.1	3507542	167.6	239174	3396	376.1	1454.8
27	1979	4.0	19.5	2.2	170.0	1328712	210.6	618248	3637	233.6	614.2
28	1980	11.5	54.1	5.6	366.4	2533142	170.9	59173	1913	303.3	840.5
29	1981	6.1	32.5	3.3	524.6	912557	159.6	82248	1376	512.3	1196.5
30	1982	8.9	56.0	5.0	589.4	2397365	383.9	246750	1573	671.6	1644.9
31	1983	9.0	61.0	3.3	1285.9	2393722	332.3	153095	2378	873.4	2491.6
32	1984	10.7	54.6	5.2	906.1	1763603	181.3	141314	1661	818.2	1905.6
33	1985	8.4	59.6	4.7	1425.4	2449878	583.9	43008	1804	2050.0	4059.3
34	1986	8.8	55.5	4.6	1231.6	2049277	534.4	60450	1200	1982.5	3748.5
35	1987	8.9	48.3	4.9	1154.6	2919380	464.5	128638	1835	950.6	2569.7
36	1988	16.3	59.6	10.2	2510.9	2276533	741.6	150996	4252	1377.8	4630.3
37	1989	8.1	34.2	3.0	956.7	782340	149.8	75176	1718	1298.8	2405.3
38	1990	9.3	40.3	3.2	695.6	1019930	213.7	134154	1855	455.3	1708.9
39	1991	6.4	33.9	2.7	579.0	1134410	180.4	41090	1187	728.9	1488.3
40	1992	2.6	19.3	1.7	1027.6	687489	306.3	78669	1533	2010.7	3344.5
41	1993	11.4	30.4	3.2	1308.6	1926049	528.3	211193	2864	1445.5	3282.5
42	1994	4.8	27.5	4.0	888.6	914664	165.2	52315	2078	740.8	1794.6
43	1995	5.2	35.9	3.2	1714.8	2001898	1307.9	62438	1814	679.6	3702.3
44	1996	8.0	44.7	3.8	1124.5	726799	176.6	73208	1803	861.4	3005.7
45	1997	4.6	29.7	2.3	692.7	505128	152.5	27754	1402	1985.9	2831.2
46	1998	10.8	47.4	7.5	2594.2	1932874	1108.8	107098	2889	5157.8	8860.7
47	1999	7.8	28.0	1.8	1850.9	1613260	1299.1	91289	745	462.8	3612.8
48	2000	5.4	45.0	3.6	4246.6	2628855	680.9	123252	2606	3937.0	8864.5
49	2001	6.2	26.5	4.0	688.5	716187	816.5	32704	1444	5604.5	7109.4
50	2002	7.1	26.3	2.2	913.1	762492	599.4	21533	1001	1062.1	2574.5
51	2003	6.1	43.2	4.3	7307.2	775379	756.5	15161	2166	3262.2	11325.9
52	2004	5.3	43.7	2.9	778.7	1664388	879.6	134106	1813	1656.1	3314.4
53	2005	12.6	22.9	12.3	2370.9	715749	380.5	119674	1455	4688.2	7439.7
54	2006	1.1	25.2	1.8	2850.7	1497428	3636.8	266945	1431	13303.9	19790.9
55	2007	7.1	41.4	8.8	3121.5	3280233	2113.1	89337	3389	8049.0	13283.7
56	2008	3.4	29.9	3.2	3401.6	1566809	1141.9	101780	2876	5046.5	9589.9

57	2009	3.8	29.5	3.6	4232.6	1235628	10809.8	63383	1513	17509.4	32551.8
58	2010	2.6	18.3	5.0	5887.4	293830	876.0	39706	1582	12757.3	19520.6
59	2011	1.9	16.0	2.7	1393.8	1152518	410.5	35982	1761	6053.6	7857.9
60	2012	2.1	14.7	2.0	1534.1	174526	240.6	31558	933	9170.0	10944.6
61	2013	7.5	25.9	7.5	6378.1	699525	2032.8	163958	2180	38937.8	47348.8
62	2014	12.8	26.5	8.0	7255.2	311325	582.0	60196	1968	7710.9	15548.1
63	2015	4.5	33.2	3.4	17043.9	3959191	8047.0	45597	1420	32200.2	57291.1
64	2016	7.1	26.6	6.7	4052.7	278240	114.7	22367	1420	1507.9	5675.3
	TOTAL	460.3	2040.3	251.0	102273.6	79465079	44390.3	6022676	105472	199730.2	347581.2

(Source: nidm.gov.in/PDF/guidelines/floods.pdf)

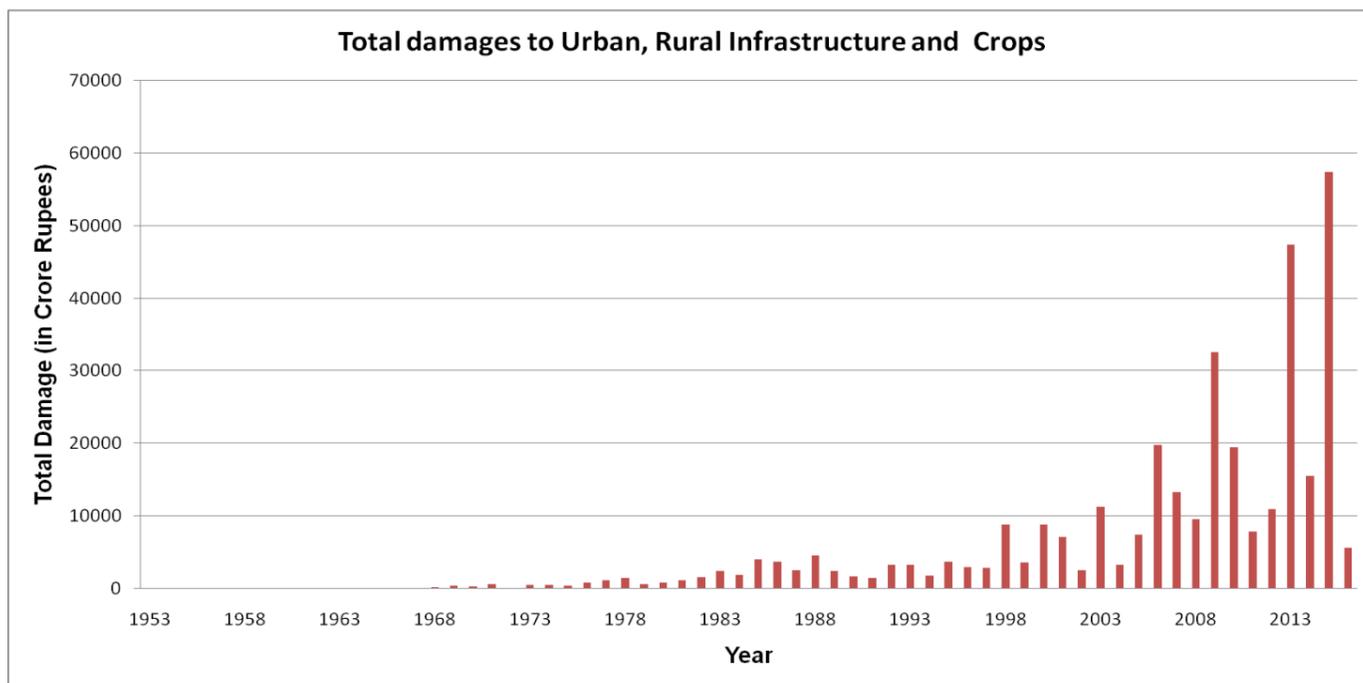


Fig: 2. Total Damages to Urban, Rural Infrastructure and Crops (Source: nidm.gov.in)

1.2 MANAGEMENT OF FLOODS

In India, systematic planning for flood management commenced with the Five Year Plans, particularly with the launching of National Program of Flood Management in 1954. During the last 48 years, different methods of flood protection structural as well as non-structural methods have been adopted in different states depending upon the nature of the problem and local conditions.

In order to mitigate the impact of floods appropriate flood management measures have to be implemented. These measures can be classified into;

1. Structural measures
2. Non-structural measures

Structural Measures: In this approach, physical structures are envisaged to prevent the flood waters from reaching potential damage centers. The main structural measures undertaken so far in India are;

1. Embankments, Floodwalls, Flood levees
2. Dams and Reservoirs
3. Natural Detention Basin
4. Channel Improvement
5. Drainage Improvement
6. Diversion of flood water
7. Catchment area treatment/ afforestation
8. Anti-erosion works

Non-Structural Measures: Non-structural measures strive to keep the people away from floodwater. It contemplates use of flood plains judiciously. This technique allows the use of floodplains by reducing the disaster dimension, while retaining its beneficial needs. Following are the main non-structural measures

1. Floodplain zoning
2. Flood proofing
3. Flood Forecasting and Warning
4. Regulation of Reservoirs
5. Relief and rescue operations during the flood event

Flood hazard zonation (FHZ) is one of the most important non-structural measures, which facilitates appropriate regulation, and development of floodplains thereby reducing the flood impact. The recurrent flood events at frequent intervals demand the need for identification of flood hazard prone areas for prioritizing appropriate flood control measures. In this context, satellite remote sensing data plays an important role in delineating such flood hazard zones.

1.3 REMOTE SENSING FOR FLOOD MANAGEMENT

Satellite remote sensing technology has made substantial contribution in every aspect of flood disaster management such as preparedness, prevention and relief. Space systems from their vantage position have unambiguously demonstrated their capability in providing vital information and services for flood management. The Earth Observation satellites provide comprehensive, synoptic and multi temporal coverage of large areas in real time and at frequent intervals and thus have become valuable for continuous monitoring of floods. In case of persistent cloud cover situation, microwave satellites, which have got all weather capability, can be used for identifying the extent of flood inundation. During last two decades satellite remote sensing has been operationally used for flood disaster management in India. Figures – 3 & 4 shows the pre-flood and during-flood IRS satellite images over Bihar. Blue colour indicates the water, and red colour indicates vegetation. Table-2 provides list of satellites and sensors used for flood mapping (1998-2019).

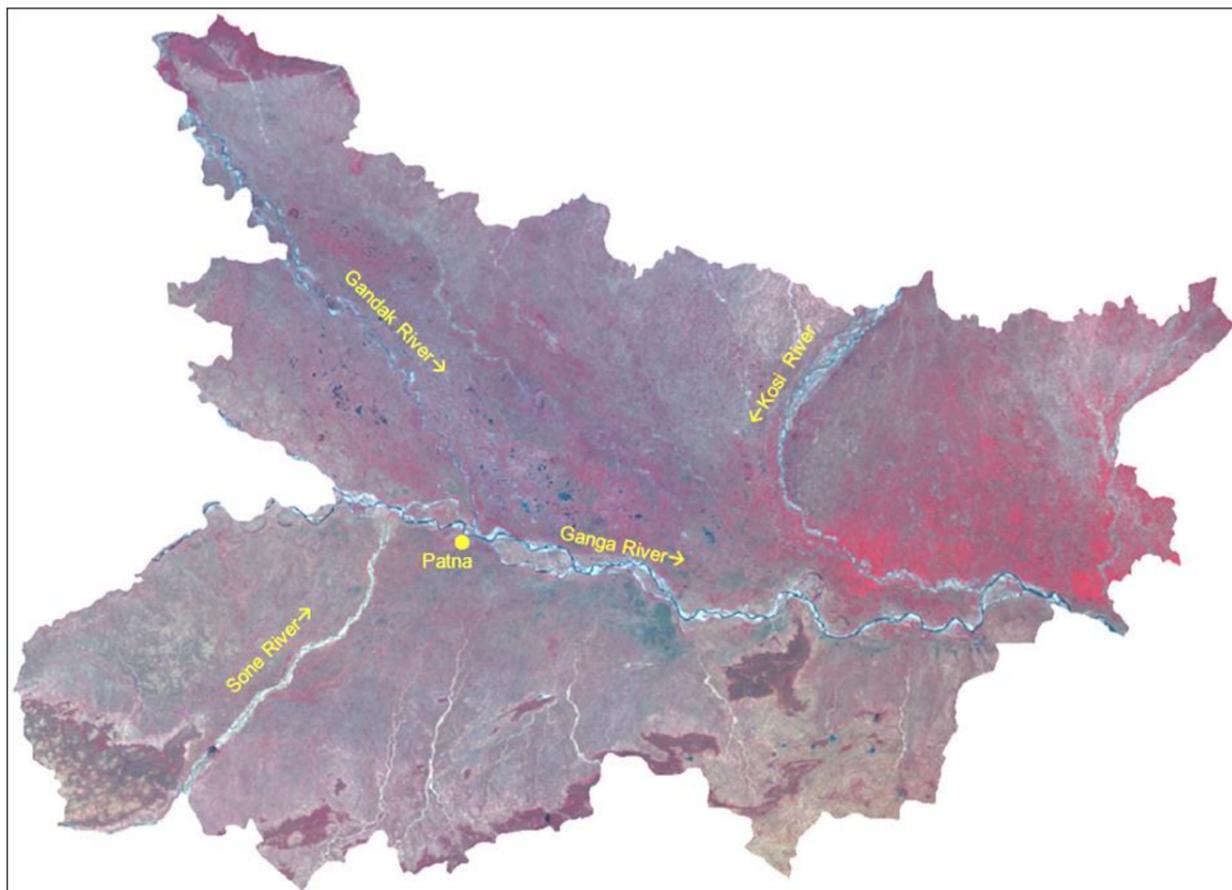


Fig.3: IRS satellite image showing the pre-flood situation in Bihar.

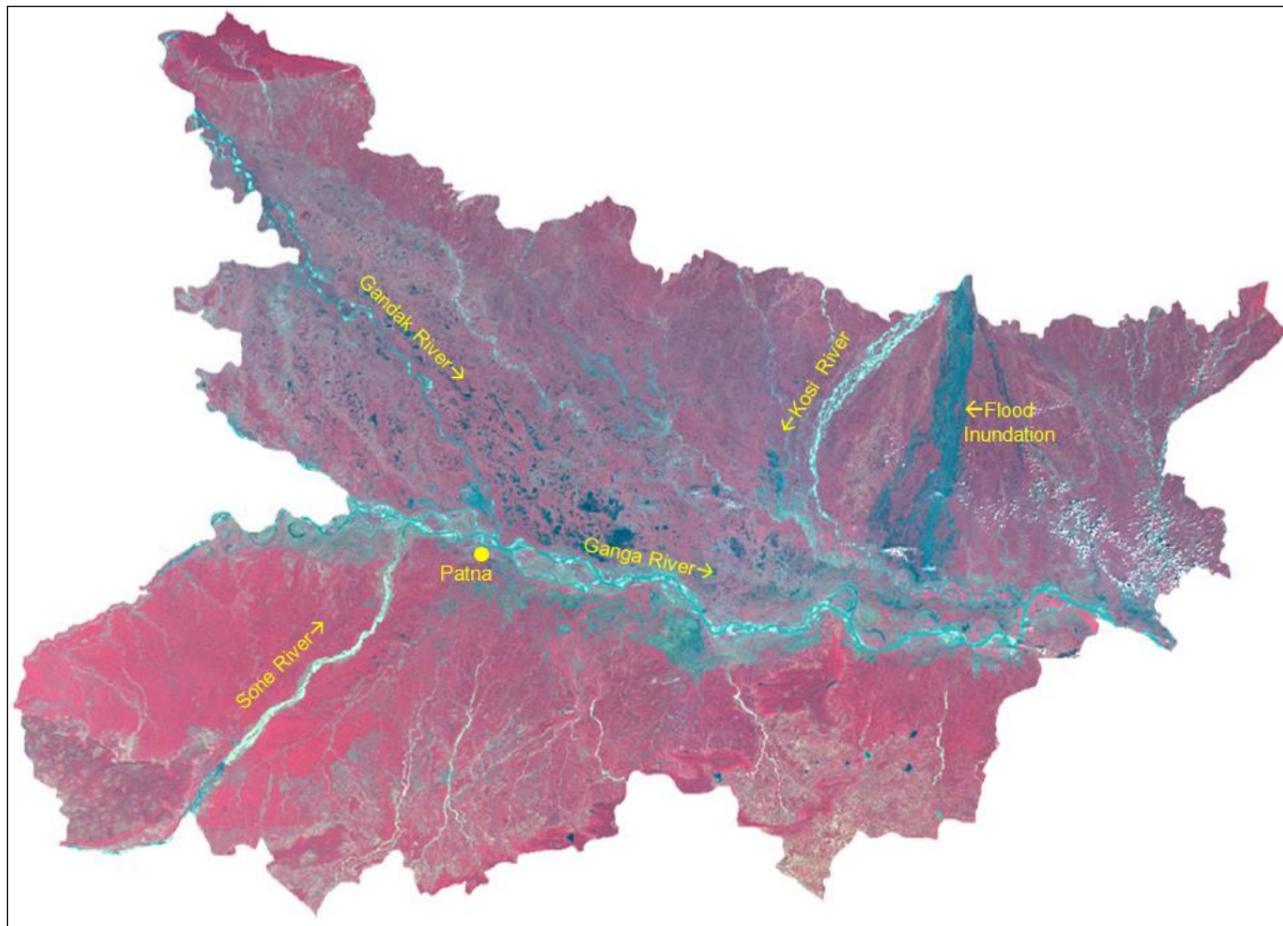


Fig. 4 : IRS satellite image showing the flood situation in Bihar (2008)

Table-2 Satellites and sensors for flood mapping (1998-2019)

S No	Satellite	Sensor	Spatial Resolution
1	IRS-1C & 1D	WiFS	188 m
		LISS-III	23.5 m
		PAN	5.8 m
2	IRS-P6RESOURCESAT-1 & RESOURCESAT-2	AWiFS	56 m
		LISS-III	23.5 m
		PAN/L4-MX	5.8 m
3	IRS-P5 CARTOSAT-1	PAN	2.5 m
4	CARTOSAT-2/2A/2B	PAN	1.0 m
5	RADARSAT-1 & 2	SAR	100m, 25m,3m & 8m
6	RISAT-1	SAR	3m,6m, 25m
7	SENTINEL-1/2	SAR	10m
8	TerraSAR-X	SAR	18.5m
9	ALOS-2	PALSAR-2	10m

The potential use of remote sensing technology for flood disaster management can be as follows:

- Flood inundation mapping and monitoring
- Rapid damage assessment
- Monitoring and mapping of flood control works and changes in the river course
- Identification of river bank erosion
- Flood hazard zonation
- Improvement in flood forecasting & warning models

Conventional flood hazard mapping techniques requires historical flood data to map flood plains. In addition to a record of peak flows over a period of years, a detailed survey (cross sections, slopes and close contour maps), maps such as soils, physiography, land use, vegetation, population density, infrastructure, and settlements along with hydraulic roughness estimates are required before determination of the extent of flooding for an expected recurrence interval. Some of the data required for hazard mapping is difficult to obtain from ground measurements and is time consuming. Flood hazard zonation map requires mainly flow information and fine resolution, Digital Elevation Model (DEM). As the fine resolution DEM is not available for most of the floodplains, with these constraints it is difficult to prepare Flood hazard zonation maps conventionally. In this context, the Earth Observation Satellites provide the extent of flooding for major flood events at regular intervals, which helps in identifying frequency of the inundated areas. If satellite datasets during flood times are available over a period of time for a flood plain they can be used for flood hazard mapping.

Flood Hazard Atlas is useful in the following:

- For controlling developmental activities.
- For constructing the flood retention structures
- For constructing relief & rescue shelters and health centres in flood plains
- Useful in relief and rescue operations during flood and for effective disaster risk reduction.
- For planning flood tolerant crops in floodplains.

1.4 INITIATIVES OF DEPARTMENT OF SPACE

Keeping in view of the demonstrated potential of earth observation and communication satellites, Department of Space (DoS) has launched Disaster Management Support Programme (DMSP) for providing geospatial information for disaster management to the nation. DoS is executing a Disaster Management Support Programme (DMSP) by integrating operationally the space technology inputs and services on a reliable and timely basis for strengthening India towards disaster management.

Disaster Management Support Programme:

In order to provide vital inputs and support in the event of a disaster, Department of Space (DoS), Government of India, has been developing techniques and methodologies by integrating space based inputs and services for disaster management. DMS Programme addresses five issues mainly (i) creation of digital database at appropriate scales for facilitating hazard zonation, damage assessment, etc., in perennially disaster prone areas, (ii) development of appropriate Remote Sensing & Geographical Information System (GIS) based decision support tools and techniques and demonstrations catering to the information needs at different levels, (iii) acquisition of close contour information for priority areas, (iv) strengthening the communications backbone for addressing the

real time / near real time information transfer needs and (v) networking of scientific institutions for exchange of data, information and knowledge.

Towards enabling the operational services, a Decision support center (DSC) has been established at National Remote Sensing Centre (NRSC), Hyderabad, as a single window provider, interfacing with the National / State Disaster Management Agencies. The important components of the DSC include satellite/ aerial data acquisition strategy, user required information and formats, output generation, dissemination of information generated to the users through networking, support functions such as digital database, query shells, hazard zonation, etc.

2.0 FLOOD PROBLEM IN BIHAR

2.1 ABOUT BIHAR

Bihar known as a Land of Nirvana is located between 24° 15' 09" to 27° 31' 17" N latitude and 83° 14' 48" to 88° 16' 54" E longitudes in the eastern part of the country. Bihar lies mid-way between West Bengal in the east and Uttar Pradesh in the west. It is bounded by Nepal in the north and Jharkhand in the south. Patna, capital of Bihar state is situated on the banks of the holy river Ganga. The state is located in the fertile Gangetic Plains. The name Bihar is derived from a Sanskrit word Vihara. Bihar is the 12th largest state in terms of geographical area 94,163 sq. km. and 3rd largest by population. The Ganges river divides Bihar into two unequal halves and flows through the middle from west to east. Bihar has a diverse climate. Central parts of Bihar have some small hills. The Himalayan mountains are to the north, in Nepal. To the south is the Chota Nagpur plateau, which was part of Bihar until 2000 but now is part of a separate state called Jharkhand. Bihar has notified forest area of 6,764.14 sq. km., which is 7.1% of its geographical area. Central Bihar, south of Ganges, is a region with rich agriculture resources. Figure 5 shows the location and physical features of Bihar state

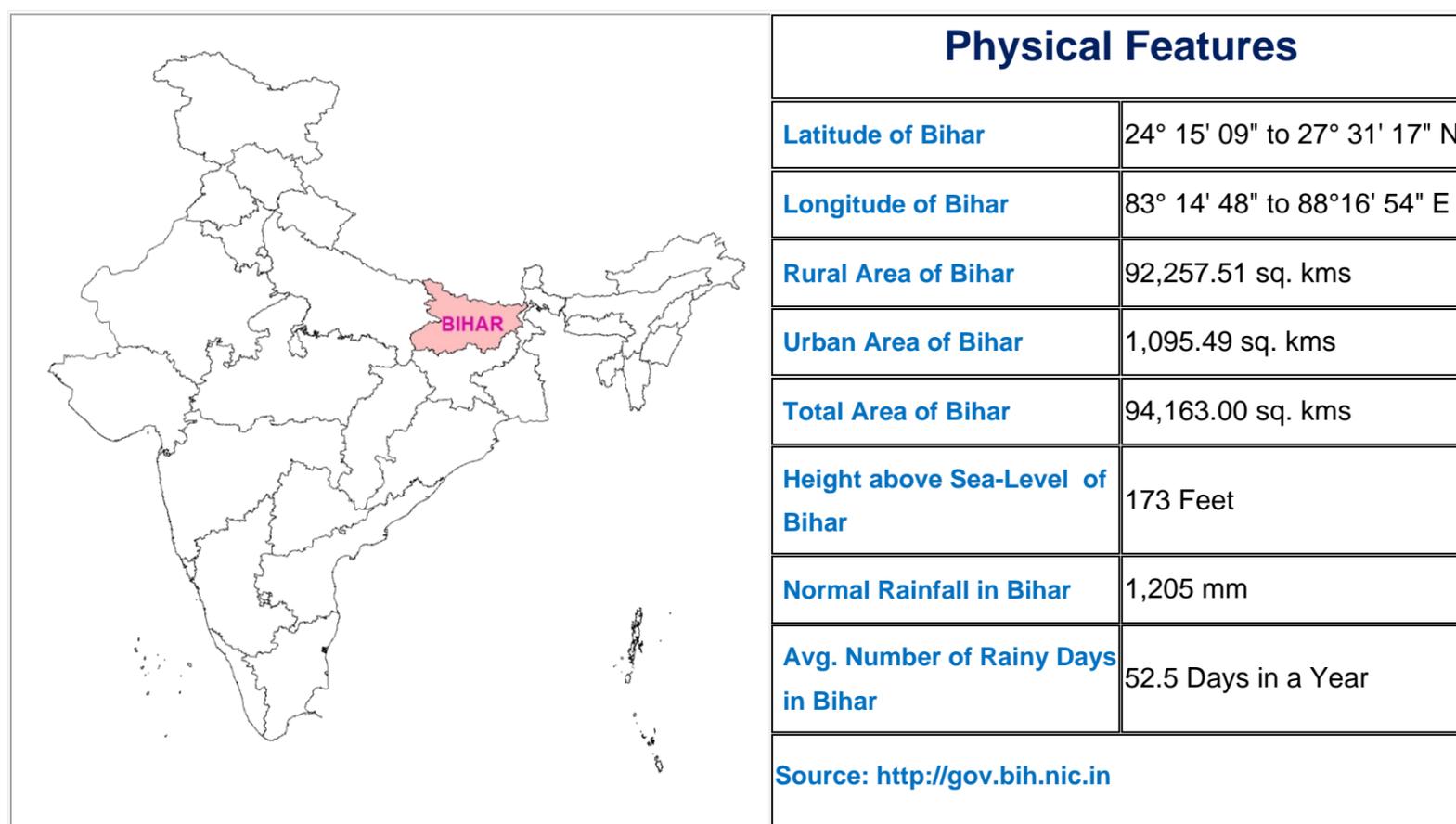


Fig 5: Location map of Bihar state

2.1.1 Administrative Setup

Bihar state is divided into 9 divisions and 38 districts for administrative purposes. There are 534 sub-districts, about 139 statutory towns and 60 census towns and about 44,874 villages. Table-3 shows the divisions, head quarters and districts of Bihar. Figure-6 shows the district map of Bihar state.

Table-3: Divisions and Districts in Bihar state

Sl. No.	Division	Headquarters	District
1	Bhagalpur	Bhagalpur	Banka, Bhagalpur
2	Darbhanga	Darbhanga	Begusarai, Darbhanga, Madhubani, Samastipur
3	Kosi	Saharsa	Madhepura, Saharsa, Supaul
4	Magadh	Gaya	Arwal, Aurangabad, Gaya, Jehanabad, Nawada
5	Munger	Munger	Jamui, Khagaria, Munger, Lakhisarai, Sheikhpura
6	Patna	Patna	Bhojpur, Buxar, Kaimur, Patna, Rohtas, Nalanda
7	Purnia	Purnia	Araria, Katihar, Kishanganj, Purnia
8	Saran	Chapra	Gopalganj, Saran, Siwan
9	Tirhut	Muzaffarpur	East Champaran, Muzaffarpur, Sheohar. Sitamarhi, Vaishali, West Champaran

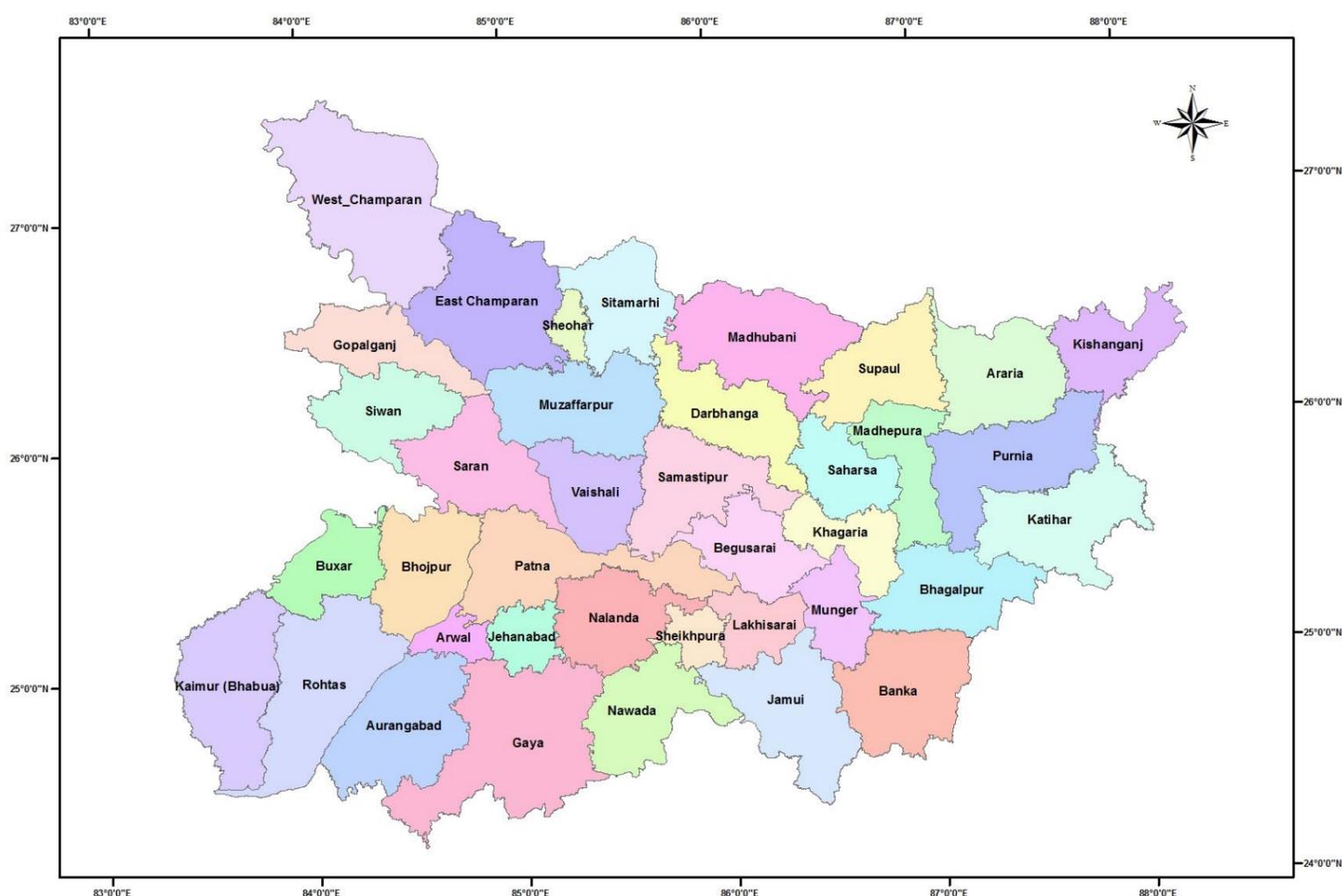


Fig.6: District map of Bihar state (Source: BSDMA, Bihar)

2.1.2 Demography

Bihar is the third most populated state of India with total population of 1,03,804,637 (43,243,795 male and 39,754,714 female) as per 2011 census. Nearly 90 percent of Bihar’s population lives in rural areas. There is an overall growth of 25.07 % in the total population of the state in the last one decade during 2001-2011. The urban population in the last 10 years has increased by 35.11 % and around 88.70 % live in the villages of rural areas. Table-4 shows the total population of various districts, male and female population and population density.

Table-4: District-wise demographic profile of Bihar, 2011

Sl.No.	District	Area in sq.km	Total population					Decadal growth (Percentage)	Density of Population (per.sq.km)
			Person	Male	Female	Rural	Urban		
1	Patna	3202	5772804	3051117	2721687	3262711	2510093	22.34	1803
2	Nalanda	2355	2872523	1495577	1376946	2415034	457489	21.18	1220
3	Bhojpur	2395	2720155	1431722	1288433	2331450	388705	21.27	1136
4	Buxar	1703	1707643	888356	819287	1543476	164167	21.77	1003
5	Rohtas	3851	2962593	1547856	1414737	2535085	427508	20.22	763
6	Kaimur	3362	1626900	847784	779116	1561538	65362	24.75	488
7	Gaya	4976	4379383	2266865	2112518	3803888	575495	26.08	880
8	Jehanabad	932	1124176	586202	537974	989816	134360	21.34	1206
9	Arawal	637	699563	362945	336618	648094	51469	19.01	1099
10	Nawada	2494	2216653	1145123	1071530	2001120	215533	22.49	889
11	Aurangabad	3305	2511243	1310867	1200376	2275761	235482	24.75	760
12	Saran	2641	3943098	2023476	1919622	3591053	352045	21.37	1493
13	Siwan	2219	3318176	1672121	1646055	3135865	182311	22.25	1495
14	Gopalganj	2033	2558037	1269677	1288360	2396270	161767	18.83	1258
15	Muzaffarpur	2172	4778610	2517500	2261110	4308714	469896	27.54	1506
16	East Champaran	3968	5082868	2674037	2408831	4683820	399048	29.01	1281
17	West Champaran	5228	3922780	2057669	1865111	3528781	393999	28.89	750
18	Sitamarhi	2294	3419622	1800441	1619181	3228904	190718	27.47	1491
19	Sheohar	349	656916	347614	309302	628821	28095	27.32	1882
20	Vaishali	2036	3495249	1847058	1648191	3262715	232534	28.58	1717
21	Darbhanga	2279	3921971	2053043	1868928	3541846	380125	19	1721
22	Madhubani	3501	4476044	2324984	2151060	4311466	164578	25.19	1279
23	Samastipur	2904	4254782	2228432	2026350	4107725	147057	25.33	1465
24	Munger	1419	1359054	723280	635774	974425	384629	19.45	958
25	Begusarai	1918	2954367	1560203	1394164	2387311	567056	25.75	1540
26	Shekhpura	689	634927	329593	305334	526132	108795	20.82	922

27	Lakhisarai	1228	1000717	526651	474066	857751	142966	24.74	815
28	Jamui	3098	1756078	914368	841710	1611431	144647	25.54	567
29	Khagaria	1486	1657599	880065	777534	1570470	87129	29.46	1115
30	Bhagalpur	2569	3032226	1614014	1418212	2432126	600100	25.13	1180
31	Banka	3020	2029339	1064307	965032	1957988	71351	26.14	672
32	Saharsa	1687	1897102	995502	901600	1741927	155175	25.79	1125
33	Supaul	2425	2228397	1157815	1070582	2122869	105528	28.62	919
34	Madhepura	1788	1994618	1042373	952245	1906448	88170	30.65	1116
35	Purnea	3229	3273127	1695829	1577298	2932527	340600	28.62	1014
36	Kishanganj	1884	1690948	868845	822103	1527249	163699	30.44	898
37	Araria	2830	2806200	1460878	1345322	2637656	168544	30	992
38	Katihar	3057	3068149	1601158	1466991	2794765	273384	28.23	1004
	Bihar	94163	103804637	54185347	49619290	92075028	11729609	25.07	1102

(Source: Census of India, 2011:Primary Census Abstract-2011 (Provisional))

2.1.3 Soils of Bihar

The Bihar plane consists of a thick alluvial mantle of drift origin overlying in most part. The soil is mainly young loam rejuvenated every year by constant deposition of silt, clay and sand brought by different streams.

There are three major types of soil in Bihar:

Piedmont Swamp Soil - found in northwestern part of West Champaran District. Terai Soil - found in northern part of the state along the Border of Nepal. The Gangetic Alluvium - the plain of Bihar is covered by gangetic alluvium (both new as well as old). (Source: <http://gov.bih.nic.in>)

2.1.4 Climate

The climate of Bihar is represented by the following seasons:

Winter - January to February

Pre- season - March to May

Southwest monsoon-June to September

Post- monsoon - October to November

The south west monsoon covers the state of Bihar normally by 15th June and can be quite severe in some parts of the state. The monsoon thus reaches Bihar after covering much of north India. The rainy season is fairly humid but it gets hot when there is a let up in the rains for days together. The South west Monsoon withdraws from the state normally in early October. Bihar also gets the winter rains to a significant extent and its Rabi crop is mostly dependent on this precipitation.

2.1.5 Temperature

Normal mean monthly temperature at all the three stations Patna, Bhagalpur and Gaya shows that the maximum temperature is in the month of May and minimum in the month of January. Gaya observed minimum temperature of 8.9°C in January and maximum temperature of 40.5°C in the month of May. The mean monthly maximum and minimum temperature of Gaya are 47.9°C and 1.4° C respectively.

2.1.6 Land use/ Land cover

The fertile alluvial plain of Bihar occupying the Gangetic Valley extends from the foothills of the Himalayas in the north to a few miles south of the river Ganges as it flows through the State from the west to the east. Rich farm land and lush orchards extend through out the state. The major crops in the State are; paddy, wheat, lentils, sugarcane, jute (hemp, related to the marijuana plant, but a source of tough fibers and "gunny bags"). Also, cane grows wild in the marshes of West Champaran. The principal fruits in the State are; mangoes, banana, jack fruit and litchis.

From the landuse/landcover map generated under ISRO-NRC (Natural Resources Census) project using 2018-19 Indian Remote Sensing Satellite (IRS) AWiFS data, it is observed that about 72.66% of the area is under cultivation, with 48.59% land under double/triple crop, 6.97% under rabi crop and 17.1% under kharif crop. About 7.6% area of the state area is under forest cover, deciduous forest constituting about 5.27%; scrub/degraded forest making 1.48% and evergreen forest about 0.85%. Figure 7 shows the percentage of Various Landuse/Landcover Classes (2018-2019) and Figure 8 shows the land use/land cover map for Bihar state based on the analysis of IRS AWiFS data of 2018-19.

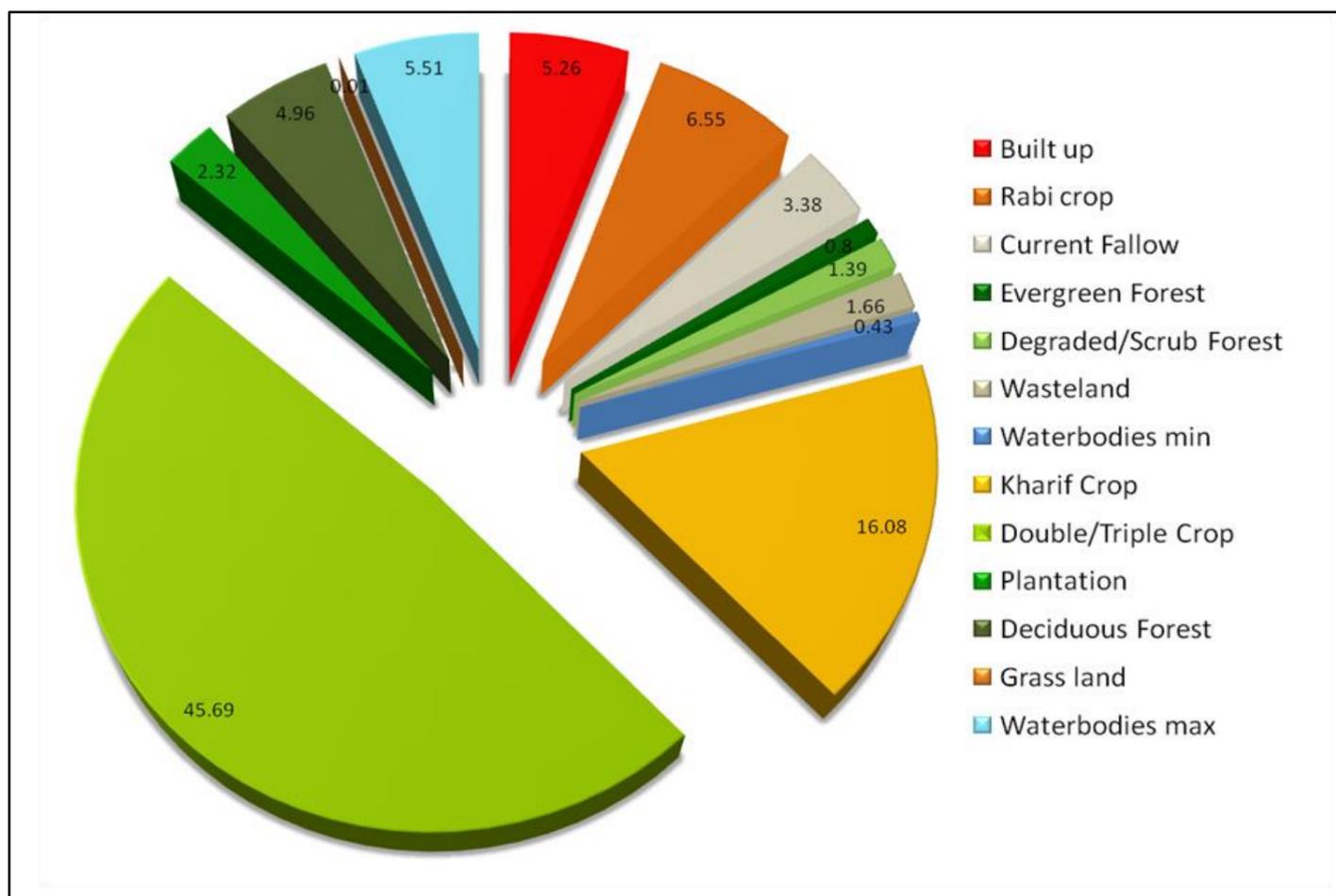


Fig.7: Percentage of Various Landuse/Landcover Classes (2018-2019)
(Source:LULC, ISRO, NR Census project)

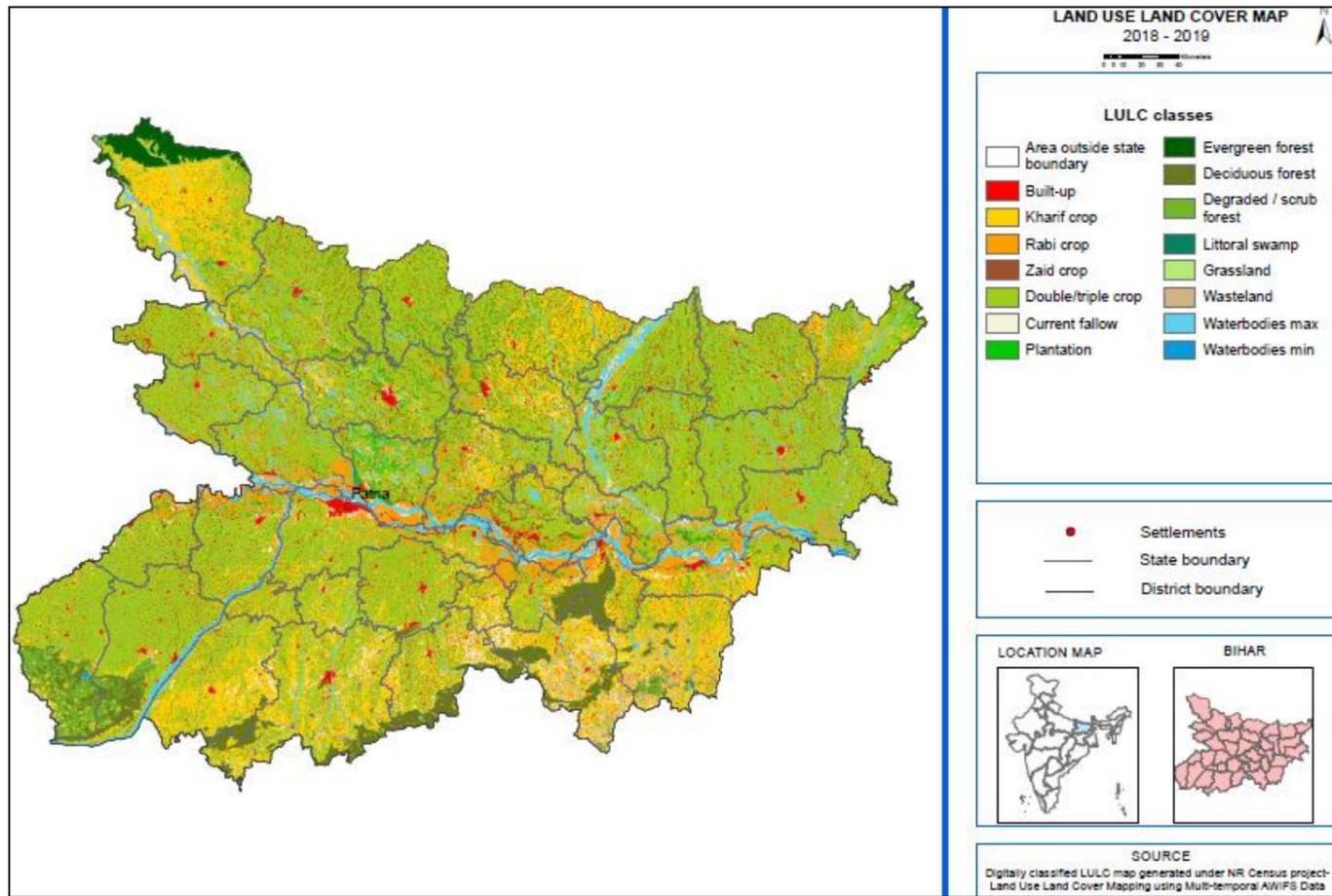


Fig 8. Landuse/Landcover map based on IRS AWIFS data of 2018-2019

2.1.7 Major River Basins of Bihar

Bihar is richly endowed with water resources, both the ground water resource and the surface water resource. The state has considerable water supply from the rivers which flows within the territory of the State. The major river basins in Bihar are Gandak, Bagmati/Adhwara, Kamla-Balan, Kosi, Mahananda, Karmnasa, Sone, Punpun, Harohar, Kiul, Badua and Chandan (Figure.9). Ganga is the main river which is joined by tributaries with their sources in the Himalayas. Some of them are Saryu (Ghaghra), Gandak, Budhi Gandak, Bagmati, Kamla-Balan and Mahananda. There are some other rivers that start from the plateau area and meet in Ganges or its associate rivers after flowing towards north. Some of them are Sone, UttariKoyal, Punpun, Panchane and Karmnasha. These rivers make the water available for irrigation purpose and also help in generating the hydro-thermal energy for the state. Apart from this, they provide a medium for water transport, provide fishes for fishery industry and enrich the natural resources of state in many other ways.

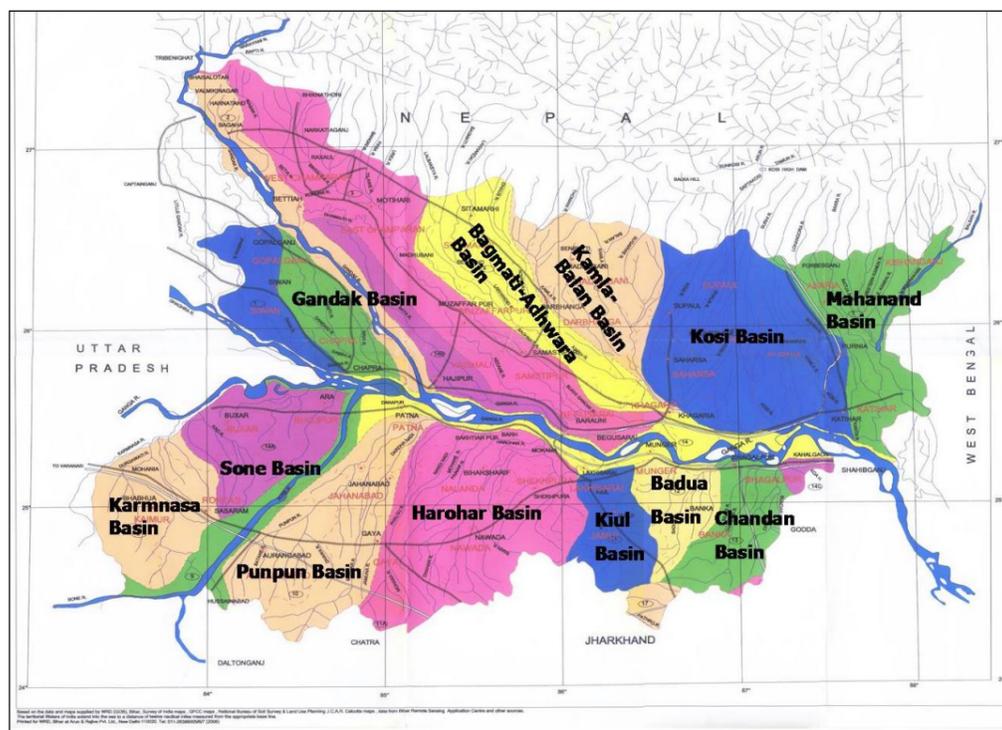


Fig 9. Major River Basins in Bihar (Source: fmis.bih.nic.in)

2.1.8 River System of Bihar

2.1.8.1 North Bihar

Important rivers namely Ghaghra, Gandak, Burhi Gandak, Kosi, Mahananda, etc. drain directly into river Ganga. The master drain flowing from west to east, whereas Bagmati-Adhwara, Kamla-Balan etc. drain into the Ganga through the Kosi.

The Ghaghra, Gandak and Burhi Gandak rivers of north Bihar are now more or less stabilized. It is believed that river Gandak has travelled from near Burhi Gandak on the east to its present course on the west in course of last several hundred years. In this process of shifting, it has created numerous chauras (saucer like depressions) and mauns (deep horseshoe shaped water bodies formed due to avulsions/cut-offs) in the basin. The other north Bihar Rivers such as the Bagmati, Adhwara group of rivers, Kamla-Balan and Kosi are still very unstable due to steep slopes in their upper reaches and high silt charges and are always exerting tremendous pressure on the embankments within which they are presently contained at enormous cost and efforts. The Kosi River is known to have shifted from near Purnea on the east to its present course on the west. However, this river tried to move towards east from its present course after the Kusaha breach in Aug 2008, but was brought back to its present course in Jan 2009 by adopting suitable river diversion measures.

In its lateral travel of about 120 km. in course of about two centuries, the Kosi has created a number of swamps and marshy lands in the basin, apart from depositing coarse silt and sand in almost entire area. The major rivers of north Bihar have catchment in Himalayan origin and considerable portion of their catchments lie in the glacial region. They are, therefore, snow-fed and perennial in flow. These rivers have catchments in the Himalayan region in Nepal and in Tibet. They receive very copious rainfall during monsoon which causes rise in discharge of these rivers by 50 to 90 times higher than fair weather flows. This causes frequent flooding of a large portion of north Bihar during monsoon.

2.1.8.2 South Bihar

This tract of land is drained mainly by rivers which are rainfed, having their origins either in the Vindhya hills or in the hills of Chhotanagpur and Rajmahal. These rivers are either dry or carry scanty discharges in non-monsoon months. Karmanasa, Sone, Punpun, Kiul, Badua, Chandan etc. are the important rivers of this region which join ultimately river Ganga.

A peculiar phenomenon in this region is the formation of Tal. The southern bank of the Ganga is naturally formed as a levee obstructing the drainage of the land on the south of it, which extends up to the foot of Chhotanagpur hills. The natural slope of this land is from south to north, i.e. from foot hills of the Chhotanagpur hills to Ganga. There are several rivers in this tract which drain the rain water of the tract and accumulate them behind the high bank of Ganga. This has resulted in formation of tals viz. Mokama group of Tals, the area just on the south of the high Ganga bank extending from Fatuha to Barahia, which comprises of Fatuha Tal, Bakhtiyarpur Tal, Barh Tal, More Tal, Mokama Tal, Barahiya Tal and Singhaul Tal. These Tals also receive backwater of the Ganga when the latter is in high spate. Therefore, the Tals get submerged in water during monsoon season and are thus deprived from kharif cultivation in most of the area. Even after the monsoon season, entire area does not get drained into the Ganga quickly. However, bumper rabi & hot weather crops are grown in the Tal area when it gets freed from submergence in time. (Source: fmis.bih.nic.in)

2.1.8.3 Major Rivers of Bihar

The Main Ganga Stem (Bihar): The Ganga enters Bihar near Buxar in the middle region of its course, nearly 155 km downstream from Varanasi. The total length of the Ganga in Bihar is nearly 445 km. Apart from 110 km along the UP-Bihar border, the catchment area of the main Ganga stem in Bihar is about 16900 sq. km. The Ganga stem in Bihar comprises the main river course, trunk and adjoining areas including 'diara' lands. The catchment areas of small rivers falling directly into the main Ganga-stem have also been included as a part of the Ganga stem. Ganga stem 'A' sub-basin includes the catchment areas of rivers like Kao, Dharamavati and other small channels meeting the main stem of the river Ganga between its confluence with the river Karmnasa near Chausa and that with the river Sone near Maner. The sub-basin is bounded by the river Ganga in the north, the Sone in the east, the Karmnasa in the west. This sub-basin is bounded by the Bilasi, Chandan, Chir river basins in the south and the west, the Gumani in the east and the main Ganga stem in the south. While traveling through Bihar, it has a number of tributaries on its left and right banks which are important rivers in themselves. These are described in brief as below:

The Gandak: The Gandak known as the Kali in Nepal, originates near the Nepal-Tibet border at an altitude of 7620 m situated northeast of Dhaulagiri. While flowing in Nepal, it receives a number of tributaries such as the Mayangadi, the Bari and the Trisuli. After traveling nearly 100 km in Nepal, it enters the plains of the West Champaran district of Bihar near Valmikinagar, Just above Valmikinagar, at Triveni on Indo-Nepal border it receives two tributaries, the Panchnad and the Sohna. From Valmikinagar the Gandak flows in southerly direction and forms UP-Bihar border to some distance and then it flows through West Champaran, Saran, Muzaffarpur and Vaishali districts of Bihar before joining the Ganga on its left bank opposite Patna city. The total length of the river is 630 km of which 370 km lies in Nepal and Tibet.

The Burhi Gandak: The Burhi Gandak takes off from Chautarwa 'Chatur' in the West Champaran district. One of its major tributaries, the Masan raises from the springs of the Someshwar hills at an elevation of 300 m. The river is known as Sikarahna in its upper reach upto the confluence of the river Dhanauti. After flowing for a distance of about 56 km, the river takes a southerly turn where it is joined by Dubhara and Teur. From this point, the river takes a south-easterly direction and flows through the Muzaffarpur district for about 32 km. In this reach, the river spills over its banks and a number of spill channels take off and join it later. Flowing through Darbhanga, Samastipur, Begusarai and Munger districts, it joins the Ganga on the left bank near Khagaria town opposite to the town of Munger. Its total length is 580 km.

The Bagmati: The Bagmati rises in the Shivpuri range of hills in Nepal, 16 km north-east of Kathmandu at an elevation of 1500 m and flows in westward direction draining the Kathmandu valley. The river cuts through the Mahabharata range of hills in Nepal and enters India in Bihar in the village Shorwatia in the Sitamarhi district. In this reach, three spill channels take off from the Bagmati region together near village Joriahi at about 2.5 km south of Samastipur-Narkatiyaganj railway line. The river Lalbakeya, an important right bank tributary of the Bagmati joins it near Dewapur just downstream of Khoripakar. The river Bagmati once again tried to avulse into the Purani Dhar below Khoripakar during floods in the year 1983. The Purani Dhar takes off near village Balwa and is also called the Belwa Dhar. The take off point of this Belwa Dhar is very unstable and is getting wider and wider to an extent that even in lean season nearly 40 percent of the Bagmati river water passes through the Belwa Dhar which outfalls into the Burhi Gandak near Minapur in the district of Muzaffarpur. The river Bagmati in its last reach is joined by the Darbhanga-Bagmati River, one of its Major tributaries on the left bank, just above Hayaghat. The Darbhanga-Bhagmati drains the Adhwara group of rivers. After the confluence with the Darbhange-Bagmati, the river Bagmati is known as the Kareh. From here it runs in south-east direction for 191 km and before outfalling into the Kosi near Badlaghat, it receives the Hasanpur-Bagmati near Kudra on its right bank and the old Kamla near Phuhia on its left bank. The total length of Bagmati is about 589 km of which 195 km lies in Nepal and the rest 394 km in Bihar.

The Kamla Balan: The Kamla Balan originates in the inner valleys of the Himalayas in the Mahabharat range of hills in Nepal at an elevation of 1200 m. It is joined by a number of streams on both the banks during its flow in the Mahabharata range in fact, two important streams namely the Kalikhola and the Tawakhola flowing in opposite directions, from west to east and east to west respectively, join together and flow in the name of the river Kamla. The river Kamla after traveling a few kilometers in the west emerges out through a gorge near Tetaria and debouches near the Terai area of Nepal at chisapani about 48 km. north of Indo-Nepal border. In the Terai portion in Nepal, the river is joined by the tributaries like the Jiwa, the Gurmi, the Lohjara, the Mainwati etc. on the left bank. On the tight bank the Bachraja takes off from the Kamla, the mouth of which is now silted up. It is an old abandoned course of river Kamla. Then onwards, the river flows in southern direction and debouches into the plains near Indo-Nepal border and enter Indian Territory in the district of Madhubani in Bihar. It flows in southern direction till it joins the river Kareh (Bagmati) near Badlaghat. The rivers Dhauri, Soni, Balan and Sugarave join the river kamala on its left bank in the Indian Territory. During the floods of 1954, the river Kamla abandoned its course near Bhakua village and avulsed into the river Balan and since then it is flowing through the course of the river Balan and it's hence known as the Kamla – Balan. The total length of the river Kamla Balan is 238 km of which 208 km lies in Nepal and the remaining 120km in India.

The Kosi: The River Kosi originated at an altitude of over 7000m above MSL in the Himalayas. The upper catchment of the river system lies in Nepal and Tibet. The highest peak of the world, the Mount Everest and Kanchanjanga lie in the Kosi catchment. It is one of the ancient rivers of India and has its mention in the old literatures as Kaushika. It is known as Sapt Kosi in Nepal because its seven tributaries the Sun Kosi, the Bhota Kosi, the Tamba Kosi, the Dudh Kosi, the Barun Kosi, the Arun Kosi and the Tamur Kosi meet above Tribeni (about 10km upstream of Chatra). Below the confluence of Tribeni, the river Kosi flows in a narrow gorge for a length of about 10km till it debouches into the plains near Chatra, the river enters the Indian Territory near Hanuman Nagar in Nepal. The river Kosi has been notorious for its meandering behavior which would be apparent from the fact that it had changed its course across a width of about 250 years. Subsequently it flows in easterly direction and ultimately joins the Ganga near Kursela in katihar district. The average bed slope of the river in different reaches from its origin to outfall is in the range of 1.4/km to 0.11m/km.

The Mahananda: The River Mahanada is a major northern tributary of the river Ganga passing through Nepal, India (Bihar and West Bengal) and Bangladesh. The Mahananda originates from Mohalidram hill of the Himalayas at Chimali at an altitude of 2060m and about 6.4km north-east of Kurseong town in Darjeeling district of west Bengal. After flowing 20km in the hills of Darjeeling the river enters the plains near Siliguri. River Balason joins this river below Siliguri on its right bank. It then flows in a south-westerly direction forming more or less the boundry between India and Bangladesh. The old Balason River joins Mahananda on its right bank upstream of Sonapkur Hat. Another tributary the Chenge joins the Mahananda on its right bank about 3.2 km upstream at Taibpur Railway Bridge. The eastern kankai, a major tributary joins the Mahananda on the right bank near Kuttighat at about 0.60 km downstream of its crossing with Kishanganj-Bahadurganj road. The western kankai, another major tributary carrying discharge higher than the Mahananda joins on its right bank about 3.2km upstream of Dengraghat. The river Mahananda bifurcates into two branches near Bagdob in Bihar. The western course known as Phulhar (Jhaua) carries about 75% of the total discharge and is joined downstream of Bagdob on the right side by Parman, major tributary. The eastern course known as Barsoi branches carries the remaining 25% discharge. The total length of Mahananda forms its origin to outfall point in the river Padma near Godagrighat is 376 km.

The Sone: The Sone originates in Maikala range of hills in MP at an elevation of 640m after passing through the Vindhya range of hills in MP; it crosses the Kaimur hills and flows in north east direction. It enters UP in Mirzapur district and flows in east direction. It receives the Rihand and the Kanhar on its right bank and the Ghagra on its left bank before entering Bihar through Palamu district where it receives the north Koel River on its right bank. The river takes a north-east course and enters Rohtas district. It then forms the boundry between Patna and Bhojpur districts for some distance and then flows through Aurangabad and Patna district; it joins the Ganga at about 16

km upstream of Danapur in the Patna district. The river Sone has a total length of 784 km of which about 500 km lie in MP, 82 km in UP and the balance 202 km in Bihar.

The Punpun: The Punpun originates from Chotnagpur hills in Hariharganj block of Palamu district in Bihar at an elevation of 442 km. The Punpun has four major right bank tributaries namely the Morhar, the Dardha, the Madar and the Batane which have significant contributions to its flood flow, whereas its left bank tributaries such as the Khudwa, the Beige, the Siroka and the Panchane etc. are very small rivers and therefore their contribution to the flood flow in the basin is insignificant. It flows for most of its portion in a north, north-east direction and outfalls into the Ganga near Fatuha at about 25 km downstream of Patna. Its total length is about 235 km. As in the case of the main river, the tributaries are also rained and majority of them originate from the same range of hills in Palamu, Aurangabad and Gaya districts of Bihar. (Source: <https://nidm.gov.in/>)

2.2 FLOODS IN BIHAR

Bihar is one of the most flood affected States in the country, accounting around 17.2% of the flood prone area of the country. Figure 10 shows the area liable to floods in Bihar published by BMTPC (Building Material and Technology Promotion Council), Ministry of Housing and Urban Poverty Alleviation, GOI. About 76 percent of the population, in the north Bihar lives under the recurring threat of flood devastation. The plains of Bihar, adjoining Nepal, are drained by a number of rivers that have their catchments in the steep and geologically nascent Himalayas. Kosi, Gandak, Burhi Gandak, Bagmati, Kamla Balan, Mahananda and Adhwara group of rivers which originates from Nepal, carry high discharge and very high sediment load and drops it down in the plains of Bihar. About 65% of catchments area of these rivers falls in Nepal/Tibet and only 35% of catchment area lies in Bihar. Thus the remedial measure of the flood problem of Bihar acquires international dimensions. It is reported that the plains of north Bihar have recorded the highest number of floods during the last 30 years. In the years 1998, 2004, 2007, 2008, 2012, 2013, 2016, 2017, 2018 and 2019 Bihar witnessed high magnitudes of flood. The total area affected by floods has also increased during last few years. Bihar also faces waterlogging problem. The reasons of water-logging are spilling of silted small rivers, encroachment of drainage channels, embankment induced water-logging and presence of saucer type depression locally called Chours.

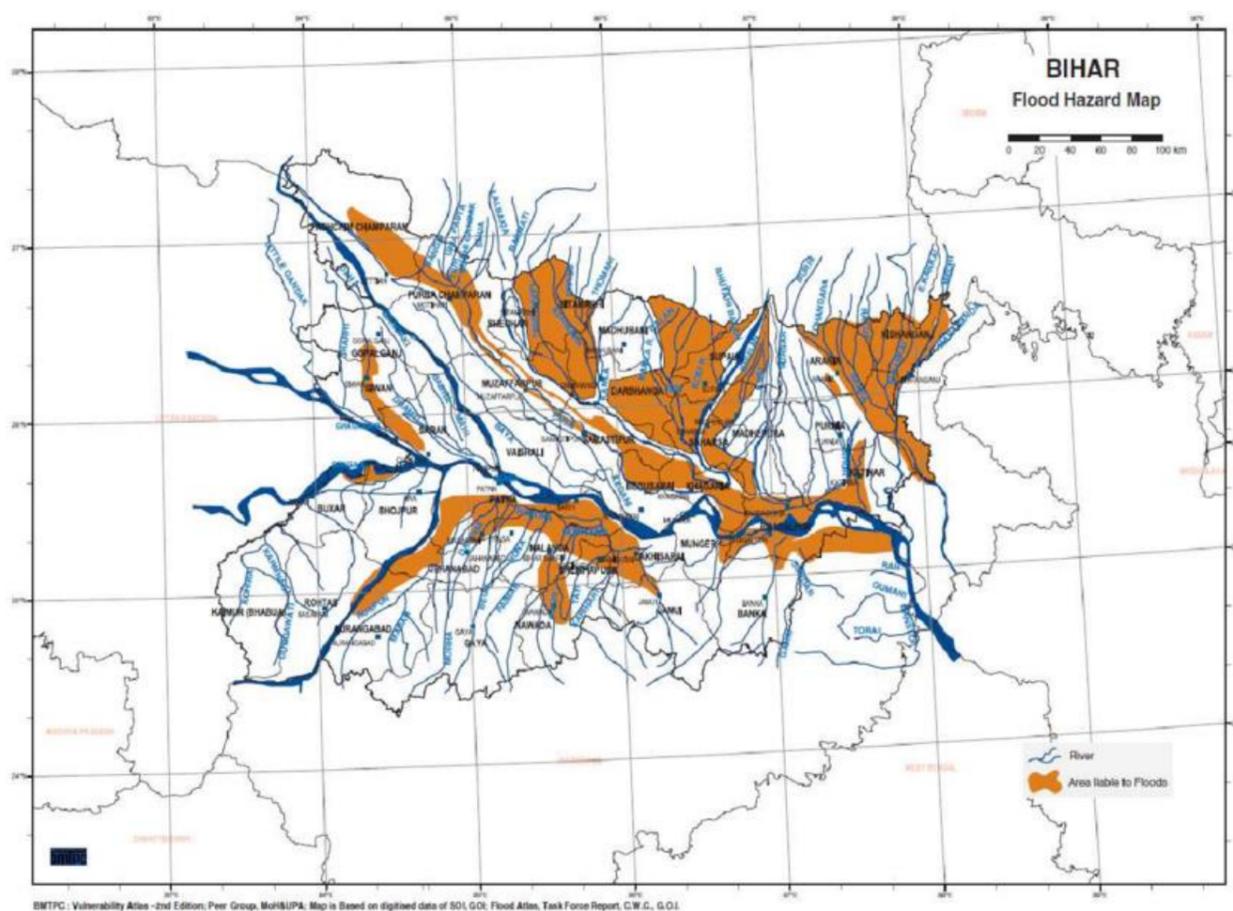


Fig-10 Areas Liable to Floods in Bihar (Source: BMTPC)

The plains of north Bihar are some of the most susceptible areas in India for flooding. The total area affected by floods has also increased during recent years. 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 about 320 km. 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. 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 in Bihar is getting more and more acute due to human intervention in the flood plain at an ever increasing scale. There must be a realization that minimizing the risk and damage from floods may be more rational way of flood management rather than formulating structural measures along the dynamic rivers such as the Kosi. Table-5 shows the damage due to floods during 1953-2019 in Bihar.

Table 5 Damage due to floods in Bihar during 1953-2019

STATEMENT SHOWING FLOOD DAMAGE DURING 1953 TO 2019										
Year	Area affected in (m.ha)	Population affected in (million)	Damage to Crops		Damage to Houses		Cattle lost nos.	Human live lost nos.	Damage to public utilities in Rs Crore	Total damage crops, houses & public utilities in Rs Crore
			Area (m.ha)	Value (Rs. Crore)	Nos.	Value in (Rs. Crore)				
1953	1	6.3	0.9	29	184300	6	33	5	1.5	36.5
1954	2.5	7.7	1.6	15	179451	5	1944	63	1.5	21.5
1955	1.8	7.1	1	20.3	111356	1.1	57	44	0.2	21.6
1956	1.3	3.1	0.4	5.2	79879	0.5	138	32	NIL	5.7
1957	0.8	1.7	0.3	Neg	18812	Neg	18	7	NIL	Neg
1958	0.7	2.4	0.3	3.2	14393	Neg	NIL	6	0	3.2
1959	0.2	1	0.2	Neg	914	Neg	2	NIL	NIL	Neg
1960	1.3	2.5	0.2	Neg	15952	Neg	15	7	0	0.0
1961	1.3	4.7	0.5	13.3	31570	Neg	10105	551	NIL	30.3
1962	1.1	4	0.7	9.6	64397	0.5	25	20	0	10.1
1963	0.3	0.7	Neg	0.8	606	0	2	NIL	NIL	0.8
1964	1.1	3.8	0.5	11.1	53285	0.5	52	32	1.7	13.3
1965	0.4	1.8	0.1	1.8	86185	Neg	1	2	NIL	1.8
1966	1.5	5.9	1.1	39	56125	Neg	64	38	NIL	39.0
1967	1.3	6.4	0.7	19.3	77699	0.3	68	23	0.1	19.7
1968	0.7	3.6	0.2	10.1	76503	0	7821	13	0	10.2
1969	1	4.2	0.5	28.8	69247	Neg	18	31	7.2	36.0
1970	0.9	3.9	0.4	14.7	16989	0.3	1855	2	0	15.1
1971	4.3	21.7	1.6	143.9	786000	29.3	426	23	44.2	217.4
1972	0.2	0.9	0	1.6	2225	0.1	NIL	NIL	0	1.7
1973	0.7	3.1	0.4	19.7	8819	0.3	6	8	0	20.1
1974	3.1	16.4	1.8	295	432000	52.9	321	80	34	381.8
1975	2.3	13.2	1.1	136.6	320311	9.7	1323	148	119.5	265.8
1976	3	13.6	0.9	94.6	494060	30	4518	186	81.3	.0
1977	1.2	3.1	0.2	11.8	19741	0.5	66	16	0	12.3
1978	2.4	12.1	1	94.6	310003	9.1	460	177	75.1	178.9
1979	0.8	3.7	0.3	19	27016	1	4	14	0.1	20.2
1980	1.9	7.6	1	Neg	81016	3.7	42	67	54	57.7
1981	1.3	7	0.6	72.1	76776	4	11	18	3	79.1

1982	0.9	4.7	0.3	97	68242	6.9	14	25	9.6	113.4
1983	1.5	5.1	0.4	23.4	24160	1.2	19	6	1.7	26.3
1984	3.1	13.6	1.6	185.4	334285	22	90	143	27.2	234.6
1985	0.8	4.9	0.4	30.3	69168	4.3	9	69	1.9	36.5
1986	1.8	7.3	0.6	103.7	76756	4.4	491	94	200	308.1
1987	4.2	24.5	2.2	601.3	1305484	217.7	4116	1116	490.6	1309.6
1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1990	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1991	0.98	4.823	0.4	23.61	27324	6.14	84	56	1.4	31.15
1992	0.08	0.55	0.02	0.58	1281	0.16	0	4	0.0075	0.75
1993	1.56	5.35	1.14	130.50	219826	88.14	420	105	30.41	249.05
1994	0.65	4.01	0.35	56.16	34876	4.95	35	91	1.52	62.63
1995	0.92	6.63	0.42	195.14	297765	75.1	3742	291	21.83	292.07
1996	1.19	8.73	0.73	71.69	116194	14.95	171	222	10.35	96.99
1997	1.47	6.96	0.65	57.37	174379	30.56	151	163	20.38	108.31
1998	2.51	13.47	1.28	366.96	NA	NA	NA	NA	NA	NA
1999	0.84	6.56	0.30	242.04	91813	53.85	136	243	54.10	349.99
2000	0.78	8.24	0.42	75.53	227897	148.56	1702	308	28.55	252.64
2001	1.19	9.10	0.65	267.22	222074	173.58	565	231	183.54	624.34
2002	1.97	16.02	0.94	511.50	419014	526.21	1450	489	408.92	1446.63
2003	1.82	8.16	0.79	94.45	84424	37.57	131	297	11.92	143.94
2004	2.70	21.3	1.40	522.05	929773	758.09	3272	885	1030.5	2310.64
2005	0.46	2.10	0.13	11.64	5538	3.83	4	58	3.05	18.52
2006	17.83	1.16	0.15	14.32	28115	25.97	31	44	85.27	125.56
2007	1.88	24.44	1.06	768.38	784328	831.45	2423	1287	642.41	2242.24
2008	0.64	5.09	0.26	167.30	256447	314.93	32026	626	467.91	950.14
2009	1.11	2.20	0.05	21.82	7674	5.28	2	125	5.30	32.40
2010	0.20	0.72	0.01	3.12	15170	7.05	0	32	1.69	11.86
2011	3.82	7.14	0.34	102.96	85182	69.07	183	249	1.54	173.57
2012	0.11	0.24	0.03	3.00	2261	1.60	0	15	1.62	6.22
2013	2.36	7.23	0.71	222.80	169501	35.34	6480	253	18.23	276.37
2014	3.90	3.00	0.50	176.4	13662	10.78	34	158	5.40	192.58
2015	0.01	0.49	0	0	518	0.69	1	27	0.03	0.72
2016	4.33	8.79	0.71	519.77	69102	40.03	538	458	116.49	676.29
2017	3.00	18.5	0.30	685.87	263848	778.79	472	815	103.37	1568.03
2018	0.03	0.15	0.00	5.14	1074	0.41	0	1	0.01	5.56
2019	1.06	14.94	0.36	446.64	45161	27.96	183	300	167.5	642.10
0 :- Not reported			Nil :- 0.000				Neg :- Negligible			

(Source: Disaster Management Department, Govt. of Bihar)

2.2.1 History of Major Floods in Bihar State

2.2.1.1 Floods in 2019

Bihar experienced severe floods in 2019, three waves of flood hit the state of Bihar over a period of four months causing major flooding problem and damage to life and property in many parts of Bihar. The rising water levels of River Mahananda, Bagmati, KamlanBalan, River Adhwara, Burhi Gandak, Kosi, Sone, Punpun and Gandak have led to severe floods. As soon as the very heavy rains and flooding were reported in October 2019, DSC at NRSC worked at war footing and activated the international charter and Sentinel Asia to receive multi mission satellite data. These data sets include SAR and very high resolution optical data. Satellite data from Indian Remote Sensing (IRS) as well as foreign satellites covering all flood events were analysed, rapid flood mapping, and satellite based damage assessment was carried out continuously. As per the request, flood layers and value added products were provided to the concerned State and Central Disaster Management departments through

mail, Bhuvan and NDEM Geo-portals. Almost 20 lakh hectare area covering in 34 districts of Bihar was observed to be affected by floods.

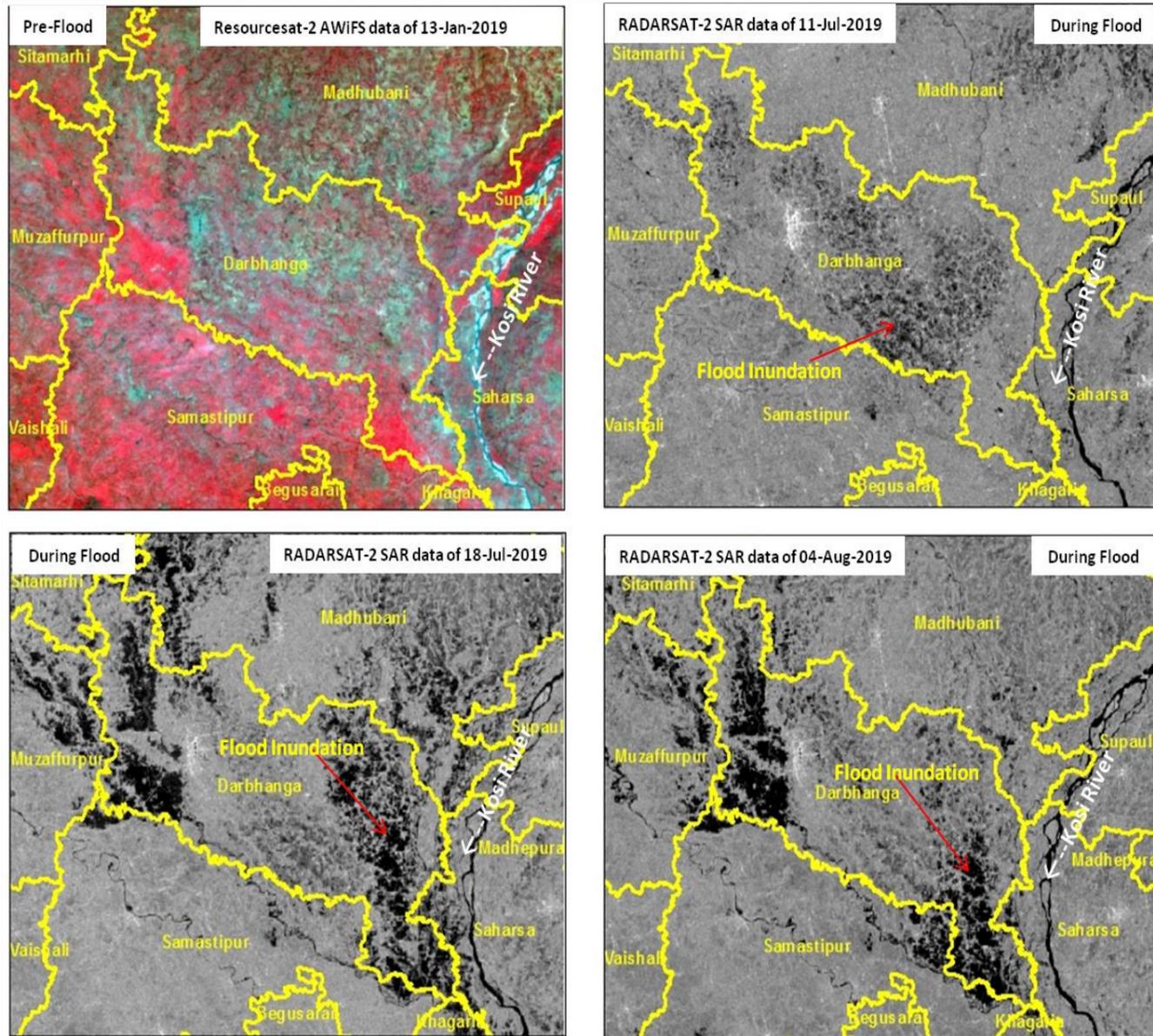


Fig-11 Satellite images showing flood inundation in part of Darbhanga District, Bihar State (2019)

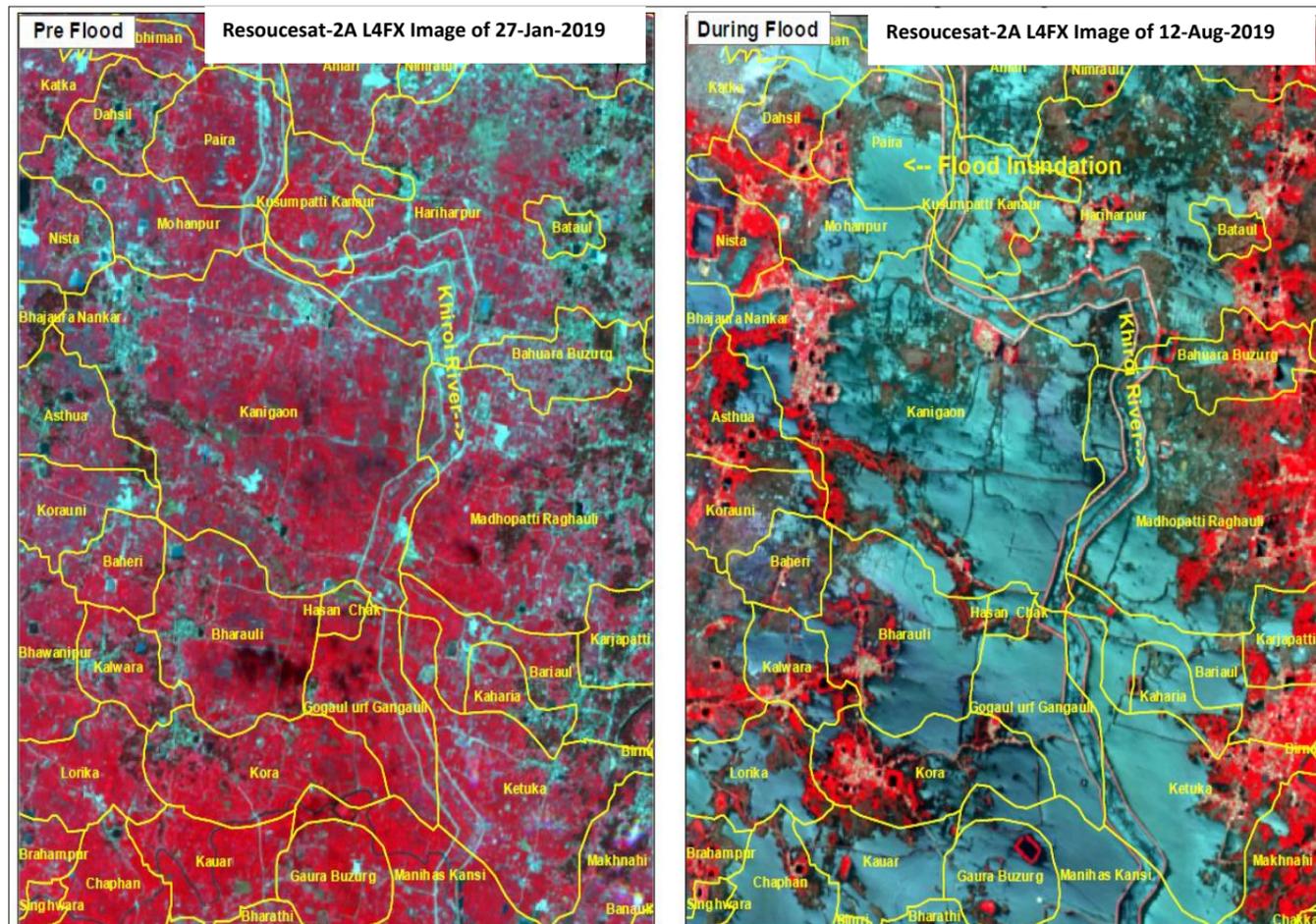
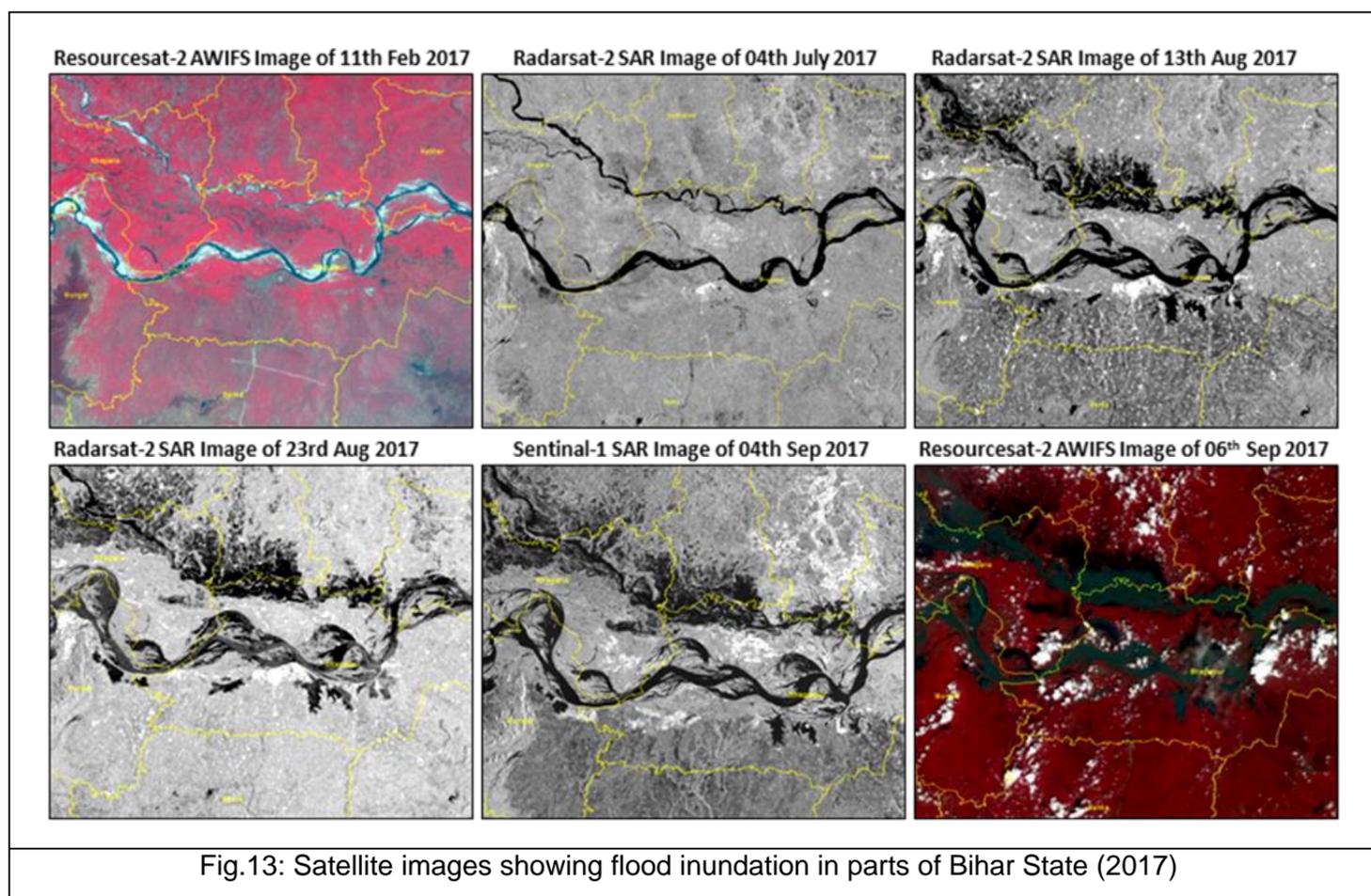


Fig-12 Satellite images showing detail view of flood inundation in part of Darbhanga District (2019)

2.2.1.2 Floods in 2017

In 2017, heavy rains during first week of June 2017 and then continuous rains during August 2017 followed by rising water levels in all the major tributaries of river Ganga lead to floods in Bihar inundating more than 25 districts of the state. The first wave of floods was observed in the month of July, 2017. The rise in the water level of Ganga and its tributary led to flooding in 5 districts of Bihar. The second wave of floods in Bihar state was reported due to heavy rains in Terai region of Nepal, Uttar Pradesh and Bihar from the first week of August. The floods continued till September. River Ganga was flowing above the danger level in Madhubani, Khagaria, Bhagalpur, Darbhanga districts. Figure 13 shows satellite images of flood inundation in parts of Bihar State.



2.2.1.3 Floods in 2016

In 2016, Floods were reported in Bihar during the fourth week of July 2016 due to heavy incessant rains and leading to rise in water levels of all the major rivers. River Bagmati in Muzaffarpur district, Kosi in Khagaria and Katihar districts and Mahananda in Purnia and Katihar districts were flowing above danger level. Heavy rains continued in first week of August, river Mahananda at Jhawa gauge site in Katihar district, River Kosi at Baltara gauge site in Khagaria district and at Kursela gauge site in Katihar district, river Bagmati at Benibad gauge site in Muzaffarpur district, river Ghagra in Siwan district were flowing above danger level. During fourth week of August 2016, River Ganga at Hathidah, Maner and Gandhighat gauge site in Patna district and Kahalgaon site in Bhagalpur district were reported to be in high flood situation. During third week of September, 2016 the situation was grim, river Bagmati at Benibad gauge site in Muzaffarpur, River Punpun at Sripalpur in Patna district and River Kosi at Baltara gauge site in Khagaria district was flowing above danger level. During fourth week flood waters started receding in all major rivers of Bihar, and the situation in the state was improved. Almost 8.36 lakh hectare area covering almost 33 districts of Bihar was observed to be affected by floods. Patna, Bhagalpur, Katihar, Bhojpur, Saran, Madhubani, Darbhanga, Khagaria and Nalanda are the worst affected districts. Figure 14 shows the floods in River Ganga in Bihar.

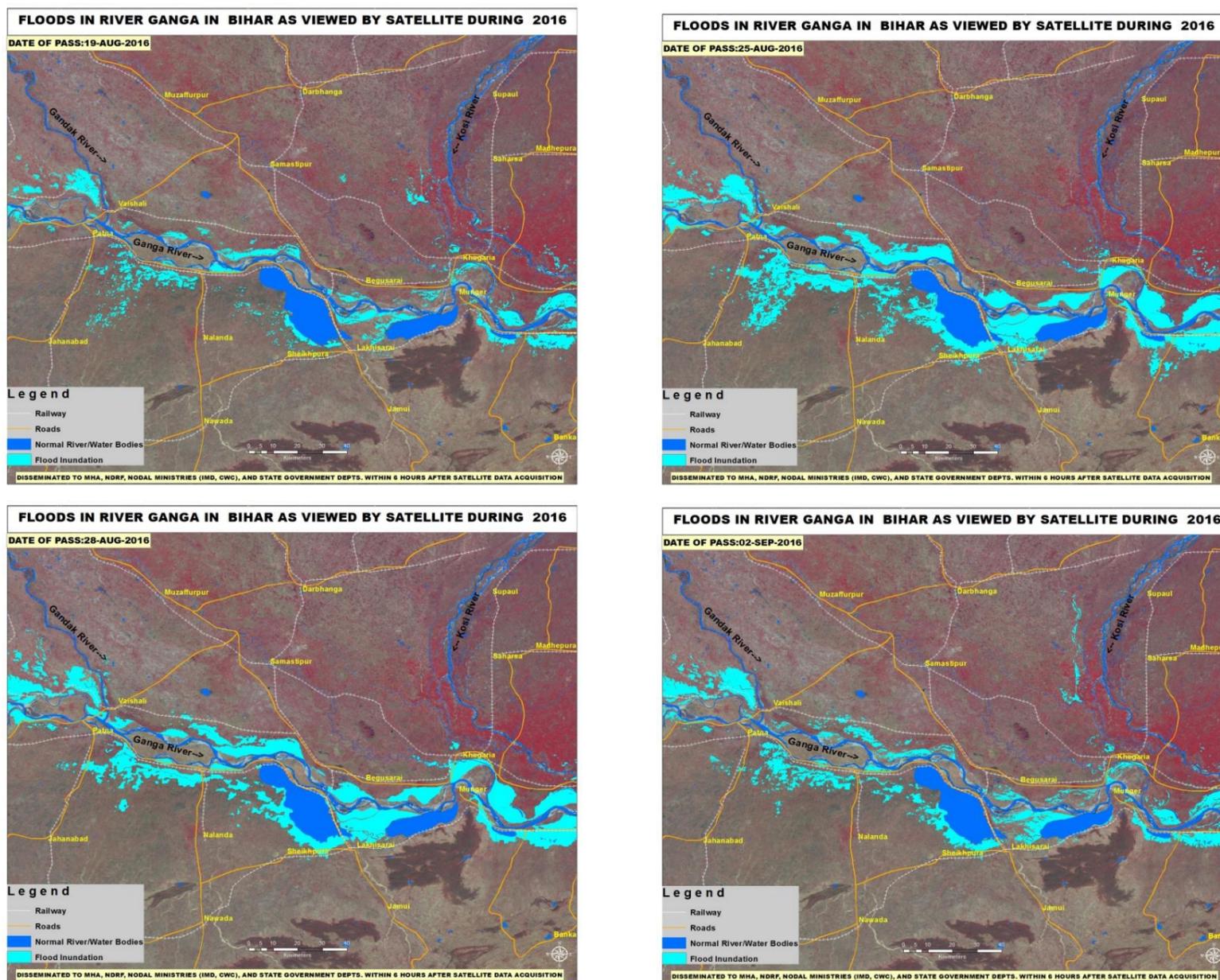


Fig.14: Satellite images showing flood inundation in parts of Bihar State (2016)

2.2.1.4 Floods in 2013

In 2013, Floods were reported in Bihar during the second and third week of July 2013 due to heavy incessant rains and leading to rise in water levels of all the major rivers. Rivers Kosi at Basua, Bagmati at Benibad, Mahananda at Dhenraghat and Jhawa, Ghaghra River at Darauli site in Siwan district were flowing above danger level. Flood waters have inundated over 100 villages in the districts of Purnea, Araria, Kishanganj, Muzaffurpur and Katihar districts. Heavy rains continued in the first week of August, 2013 over the upstream areas of all major rivers in Bihar leading to severe floods. Ganga river at Bhagalpur was flowing in high flood situation and Mahananda river at Dhenraghat in Purnia district, Kosi river at Kursela in Katihar district, river Sone at Maner in Patna district and Ganga river at hatidah in Patna district were flowing above danger level. During the last week of August, 2013, River Ganga has inundated several villages in Bihar and was reported to be flowing at high flood situation at Bhagalpur and above danger mark at Buxar, Colgong, Munger, Mirzapur, Hathidah, Gandhighat & Patna. In addition, River Ghaghra over flown above danger mark at Chhapra, Gangpur Siwan. Flood situation was grim during first week of September 2013. River Ganga at Bhagalpur in Bhagalpur district and Patna in Hathidah continued to flow in high flood situation during the second week of September, 2013. Figure.15 Satellite images showing flood inundation in parts of Bihar.

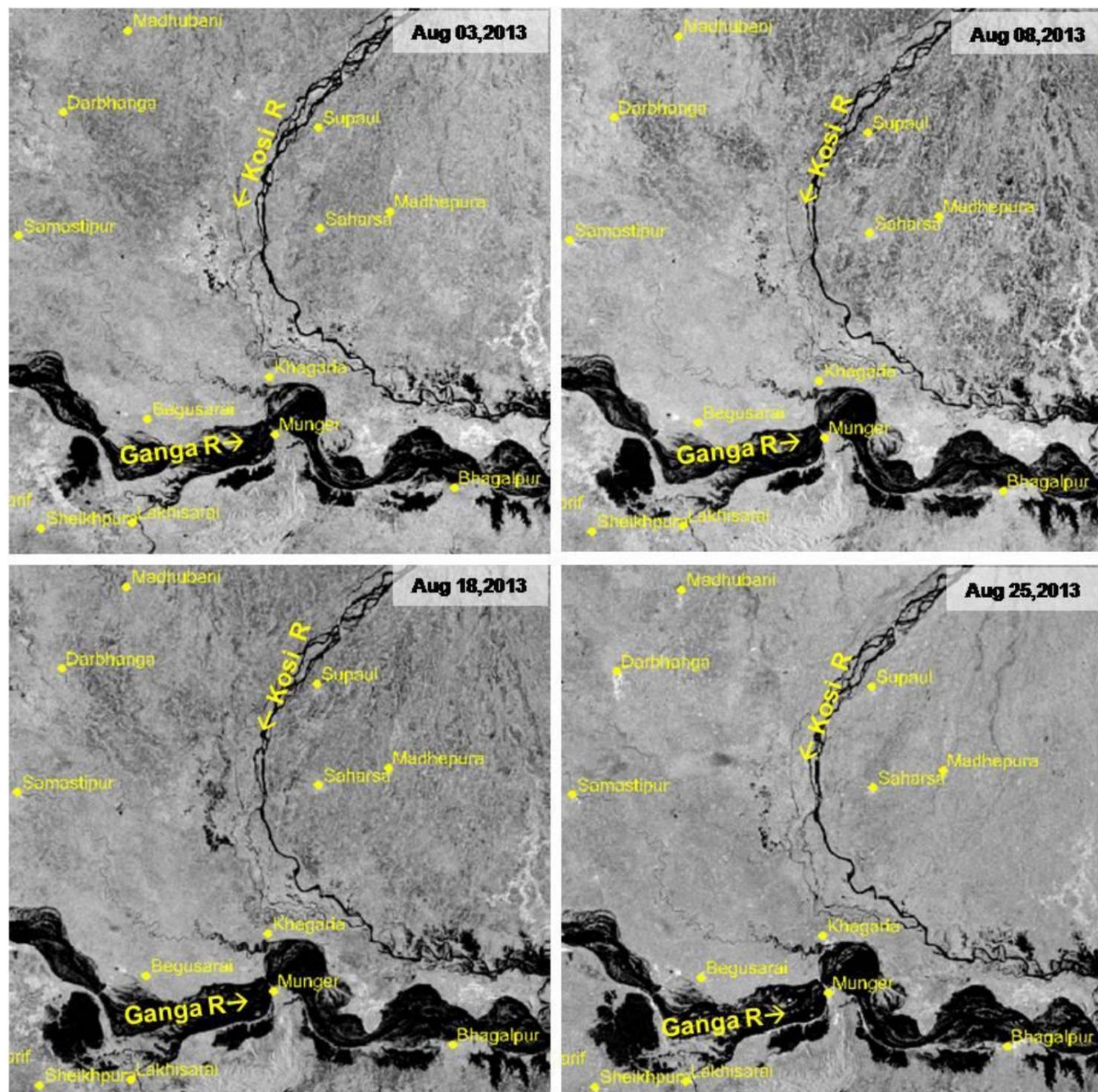


Fig.15: Satellite images showing flood inundation in parts of Bihar (2013)

2.2.1.5 Floods in 2011

In 2011, Heavy rains and heavy discharge of water in catchment areas of rivers flowing into Bihar state from Nepal were reported during the last week of June 2011, as a result all major rivers Kosi, Mahananda, Gandak, Bodhi and Bagmati witnessed heavy increase in water levels. During first week of July 2011 parts of Darbhanga, West Champaran, Gopalganj, Muzaffarpur, Araria and Saharsa districts were reported to be affected due to heavy rainfall in the catchment areas of Gandak River. During first week of August swelling waters of Gandak, Ganga, Kosi and Bagmati rivers were reported to be putting pressure on the embankments in West Champaran, Bhagalpur, Khagaria and Gopalganj districts. During second week of August, River Ganga at Colgong/Kahalgaon, Hathidah and Patna (Gandhighat), river Burhi Gandak at Khagaria, river Kosi at Kursela, river Son at Maner and river Punpun are at moderate flood situation as per CWC reports. Floods were mapped in the State of Bihar 6 times during July, 10 times during August, 6 times during September and 3 times during October. About 93 flood maps were prepared at different scales using 25 satellite datasets and disseminated to the user departments for carrying out relief and rescue operations. Sitamarhi, Darbhanga, Patna and Bhojpur were the worst affected districts.

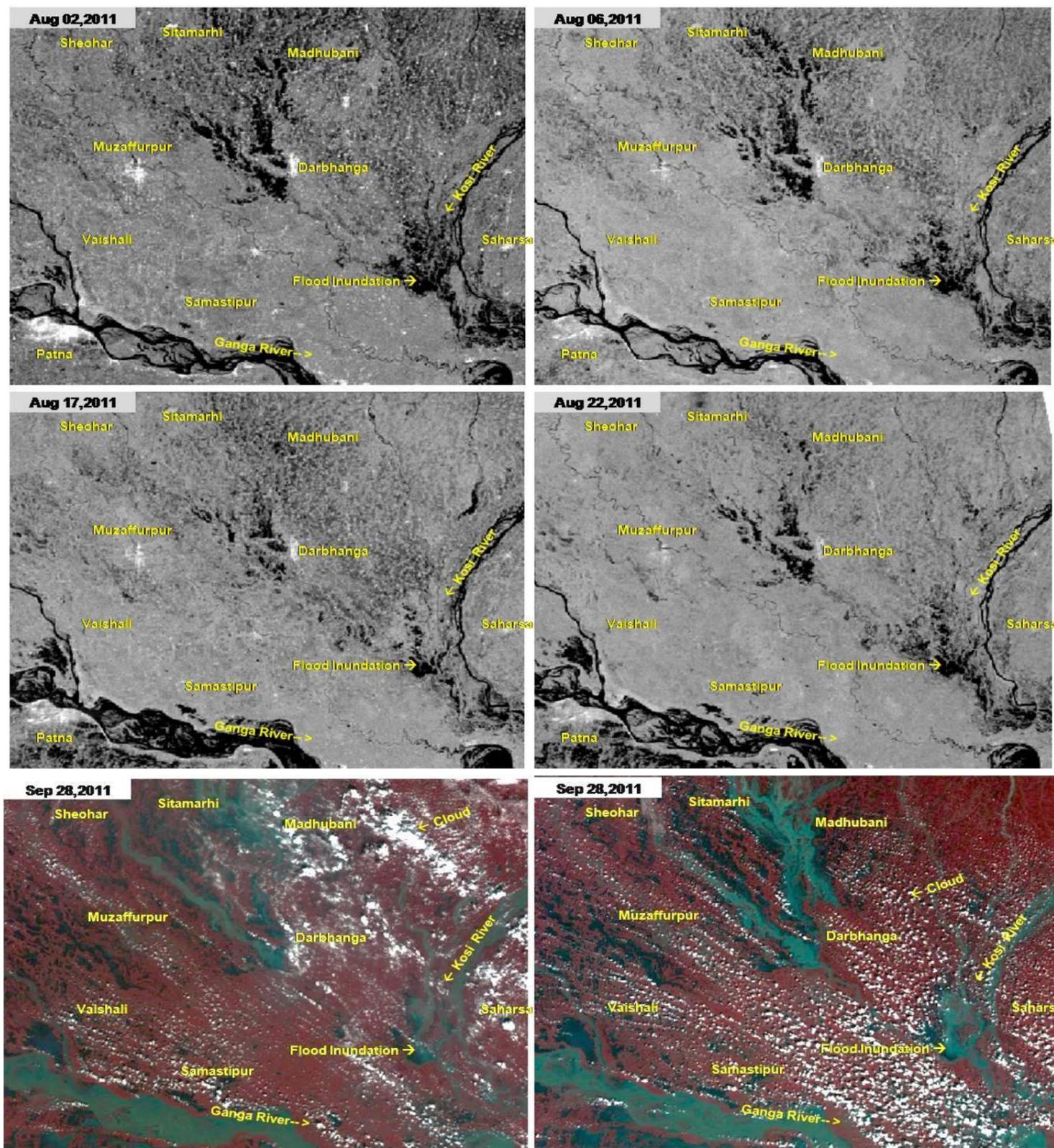


Fig.16: Satellite images showing flood inundation in parts of Bihar (2011)

2.2.1.6 Floods in 2008

In 2008, the flood due to Kosi embankment breach of August, 18, 2008 was one of the worst flood disaster events that the country had witnessed during 2008. The breach took place about 12 km upstream of Birpur barrage, near Kusaha in Nepal (Figure 17) and led to severe flooding in many districts of northern Bihar, which were considered to be relatively 'flood-safe'. Extensive flooding was observed in Supaul, Madhepura, Saharsa, Purnia, Katihar, Khagaria and Araria districts. Madhepura and Supaul were the worst affected districts. Hundreds of villages were submerged and infrastructural facilities were seriously damaged due to the floods. Figure 18 shows the pre and post event changes due to the breach in the Kosi river eastern embankment. The flood event was monitored for about two months using 27 satellite datasets (optical and microwave) acquired during August to October, 2008. Figure 19 shows the progression and recession of flood waters during August-October, 2008.

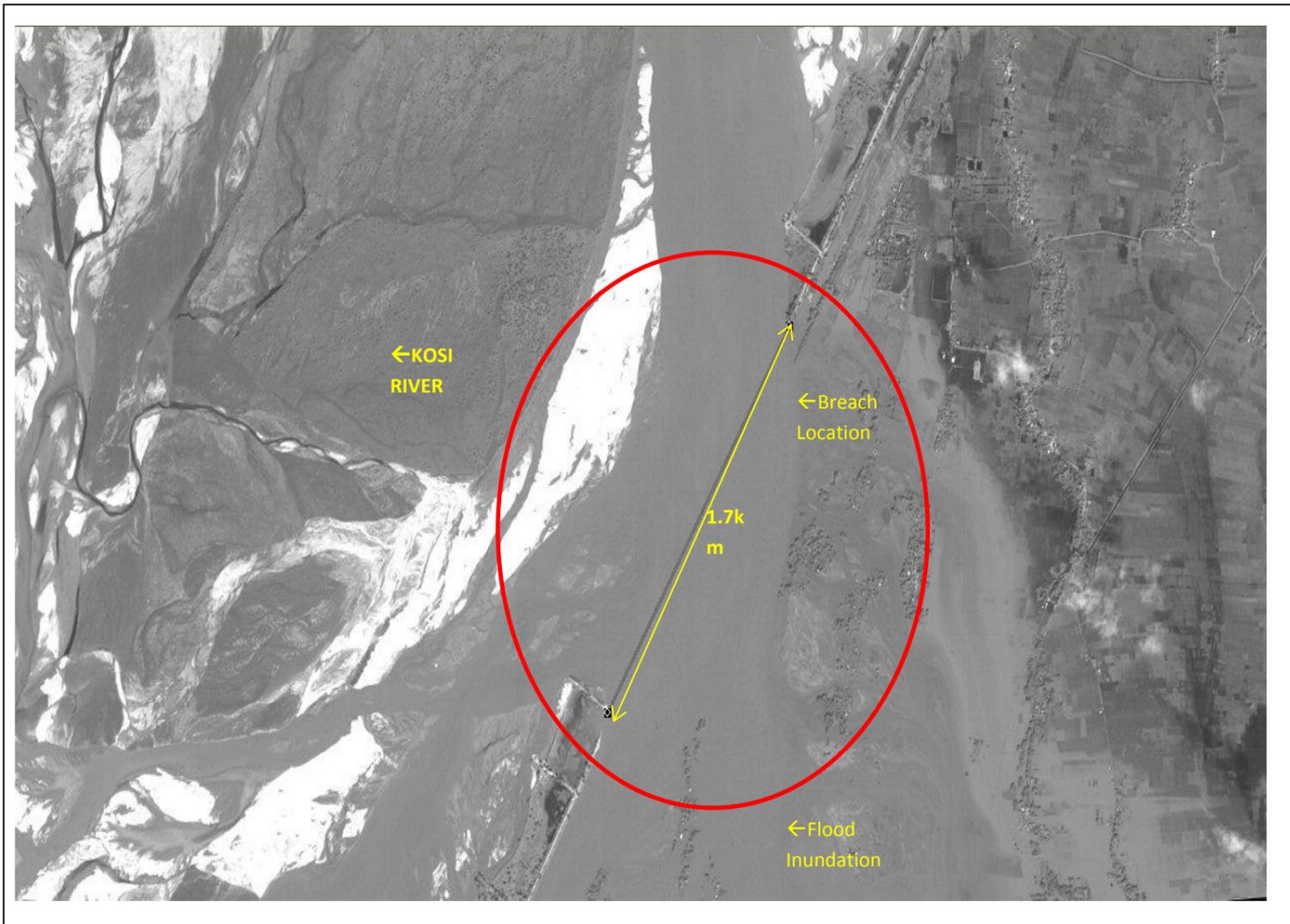


Fig.17. Cartosat-2 satellite image of Sept.8, 2008 showing breach location

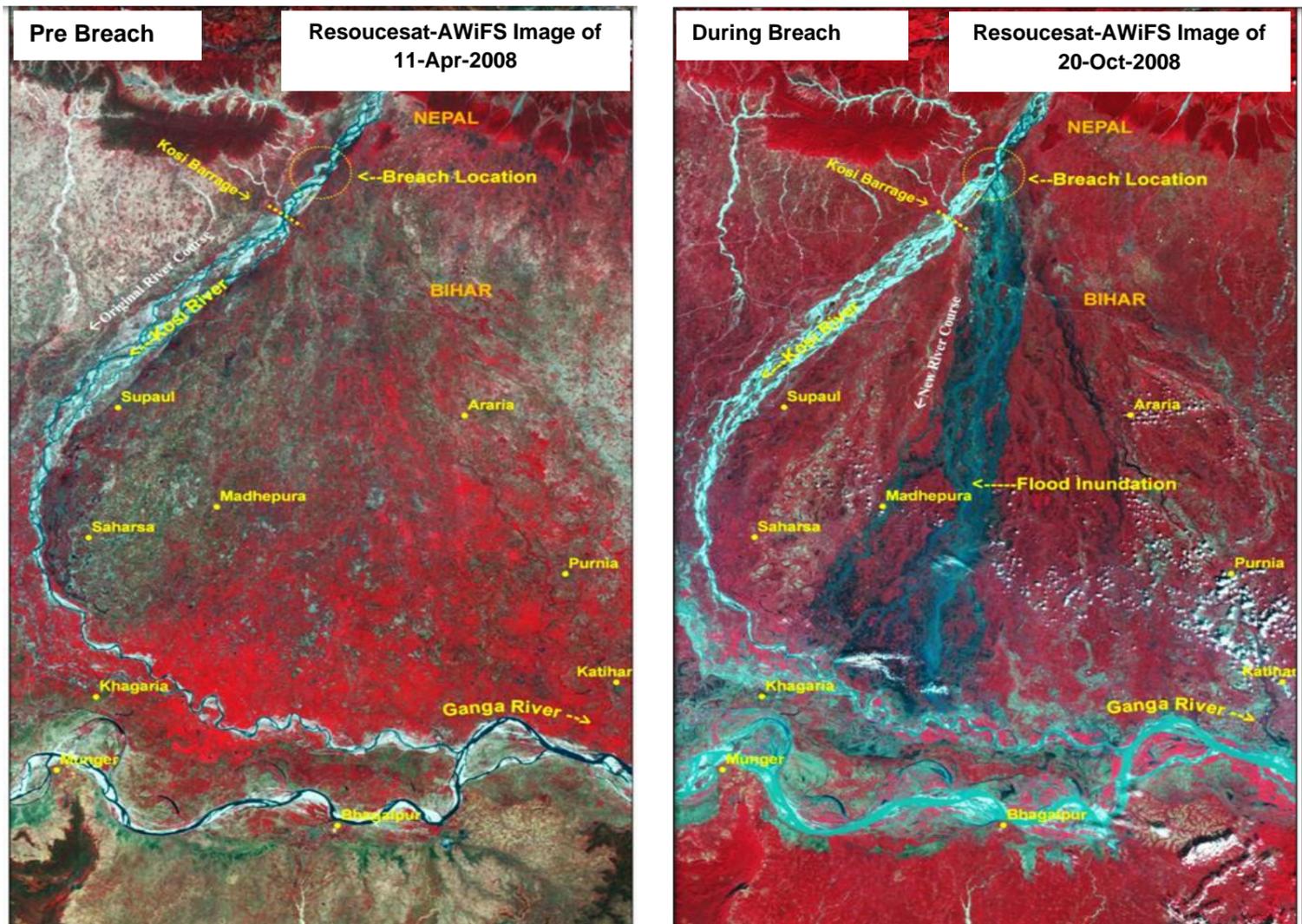


Fig.18. Pre and post event changes due to breach in Kosi river embankment

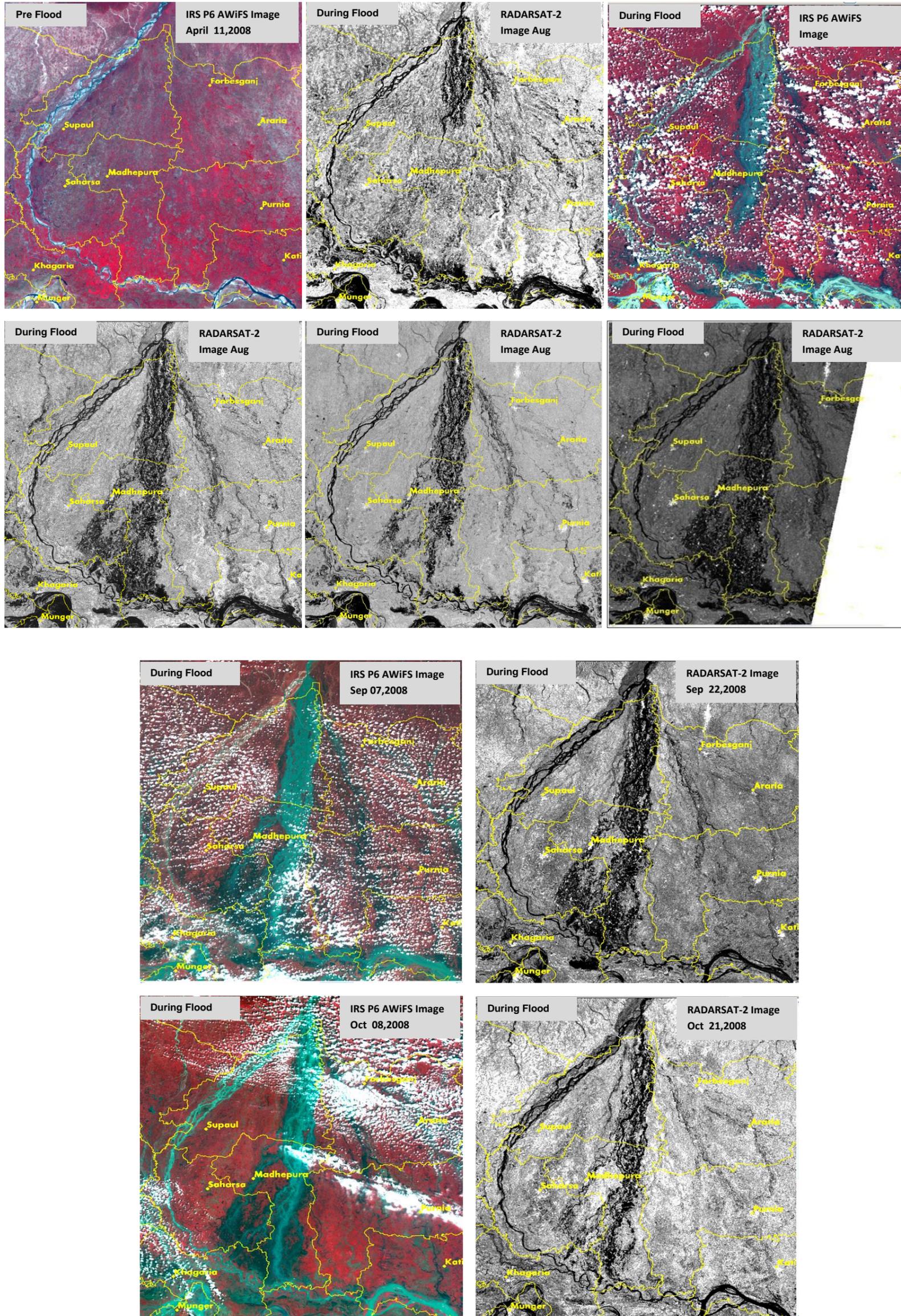
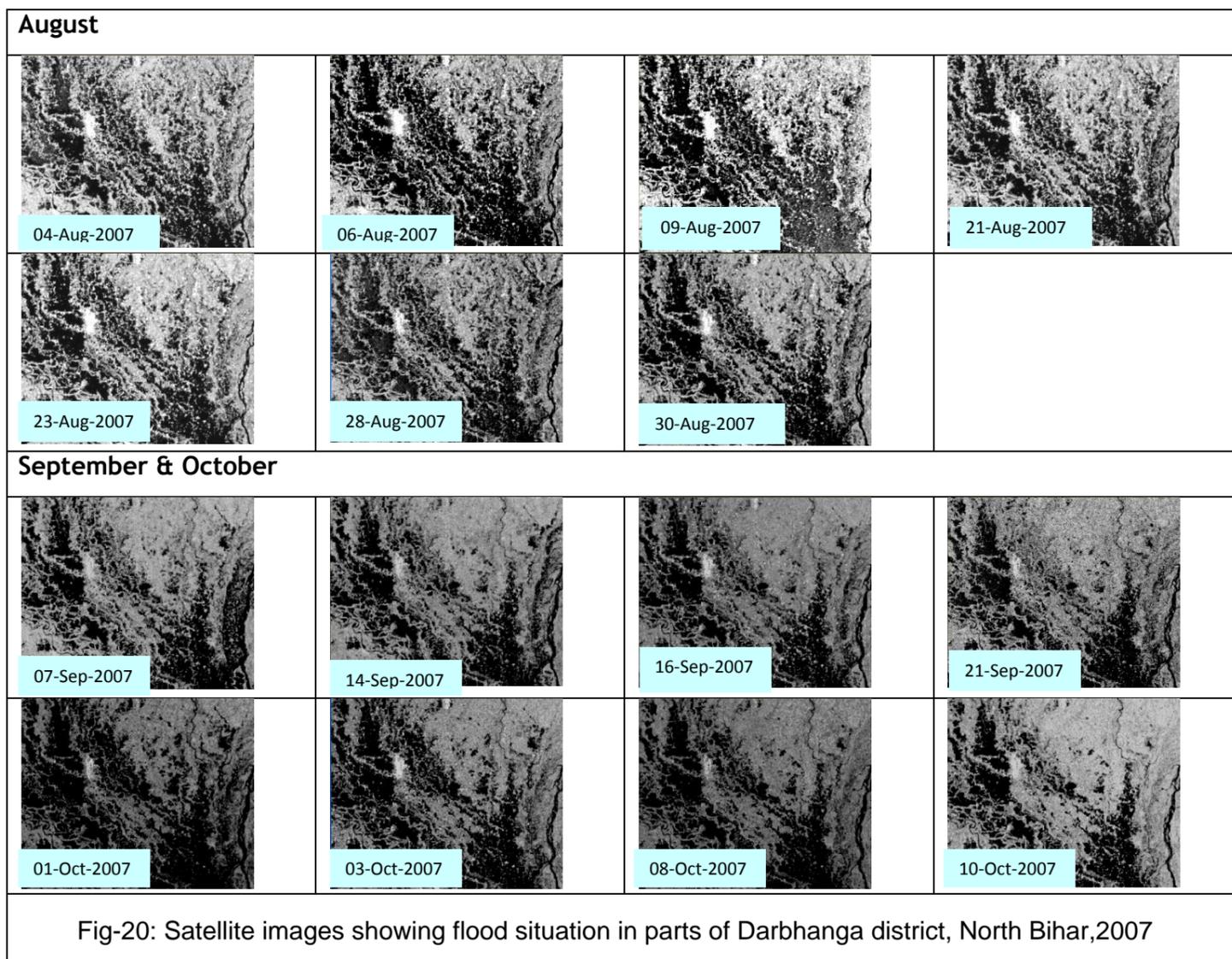


Fig 19 Satellite images showing progression and recession of flood waters during August-October, 2008

2.2.1.7 Floods in 2007

In 2007, Bihar reeled under floods during June-October 2007. Severe floods hit during July and August 2007 with many breaches in the embankments of River Bagmati, Kamla Balan, Burhi-Gandak etc. About 20 districts were severely affected namely Darbhanga, Samastipur, Khagaria, Muzaffarpur, Madhubani, East Champaran, Patna, Nalanda, Rohtas, Katihar, Sitamarhi, Saran, Madhepura Jehanabad, Siwan, Buxar, Begusarai, Samastipur, Bhagalpur, Saharsa, Nawada, and West Champaran besides few south Bihar districts. Figure 20 shows flood situation during August-October, 2007 in parts of Darbhanga district, and north Bihar.



2.3 ROLE OF IMD IN FLOOD MONITORING IN BIHAR

Flood Meteorological Offices (FMOs, 14 in all over India) of India Meteorological Department provide Meteorological (IMD) support to Flood Forecasting Divisions (FFDs) of Central Water Commission (CWC) to help them issue “Flood warnings/Flood alerts”, since CWC is the nodal agency for issuing Flood Forecast and IMD is the nodal agency for issuing Quantitative Precipitation Forecast (QPF). Figure 21 shows the flood meteorological offices in India. The meteorological support is provided in terms of ‘Quantitative Precipitation Forecast (QPF)’ through Hydromet Bulletins.

Input comprises in terms of Hydromet Bulletin which contains the following;

- Synoptic situations,
- Spatial and temporal distribution of rainfall,
- Sub-basin wise categorical QPF (0, 0.1-10, 11-25, 26-50, 51-100 and > 100mm) for day-1, day-2 and day-3, outlook for the subsequent four days
- Station wise recorded significant rainfall
- Heavy rainfall warnings, Sub-basin wise past 24 hr realized rainfall.

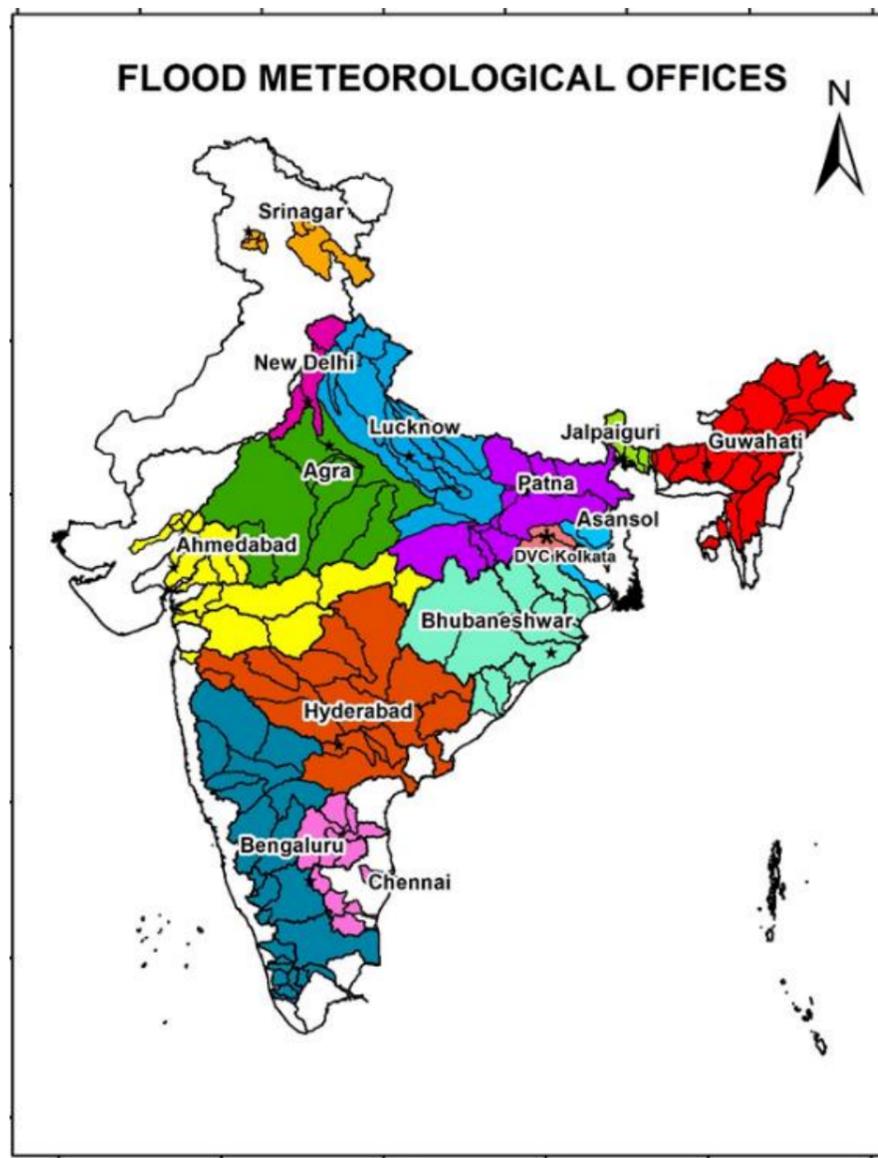


Fig. 21 Flood Meteorological Offices in India. (Source: IMD, Delhi)

IMD established 14 Flood Meteorological Offices (FMOs) at different parts of flood prone areas of the country which are located at Agra, Ahmedabad, Asansol, Bhubaneswar, Guwahati, Hyderabad, Jalpaiguri, Lucknow, New Delhi, Srinagar, Chennai, Bengaluru and Patna in the flood prone areas which caters to the river catchments Yamuna, Narmada, Tapi, Ajoy, Mayuraksi and Kangasbati, Mahanandi, Brahmani and Subernarekha, Brahmaputra, Dhansiri and Barak, Godavari and Krishna, Cauvery, Teesta, Ganga and Sharada, and Sahibi, Kosi, Baghmata, Gandak etc. IMD also provides similar support to Damodar Valley Corporation (DVC) for the river basins Barakar and Damodar. The performance of QPF is verified for the monsoon season annually. The river sub basins under the jurisdiction areas of FMO, Patna for issuing QPF are shown in Table 6 and Figure 22 shows the river sub basin under the jurisdiction of FMO, Patna.

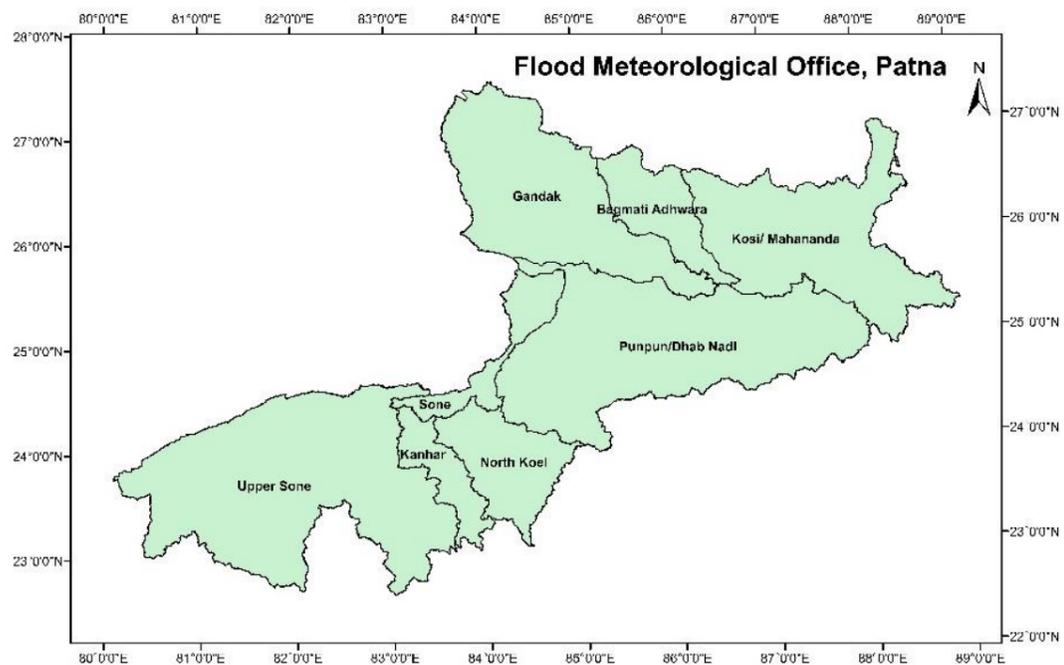


Fig. 22 River Sub basin under the jurisdiction of FMO, Patna

Table-6. River sub basins and their areas under FMO, Patna

Sub-Basin	Area (Sq. Km.)
Kosi/Mahananda	27212.33
Bagmati Adhwara	8256.36
Gandak	27709.29
Sone	6144.3
Upper Sone	45069.53
Kanhar	5509.92
North Koel	10761.26
Punpun/Dhab Nadi	41035.31

2.3.1 Analysis of Rainfall over Bihar

Seasons and normal rainfall: Southwest monsoon season is the principle rainy season in this state. More than 85% of rainfall occurs during southwest monsoon season. Contribution of winter, pre-monsoon, post monsoon seasonal rainfall is 2%, 7% and 6% respectively (Figure-23). The mean monthly rainfall is maximum during the month of July and is minimum in the month of December. The normal rainfall distribution during southwest monsoon and annual are shown in Figures 24- 25 respectively. Table-7 shows the seasonal normal Rainfall

Normally south west monsoon covers the state of Bihar by 15th June and can be quite severe in some parts of the state during the season. The rainy season is fairly humid but it gets hot when there is a let up in the rains for days together. The southwest Monsoon withdraws from the state normally in early October.

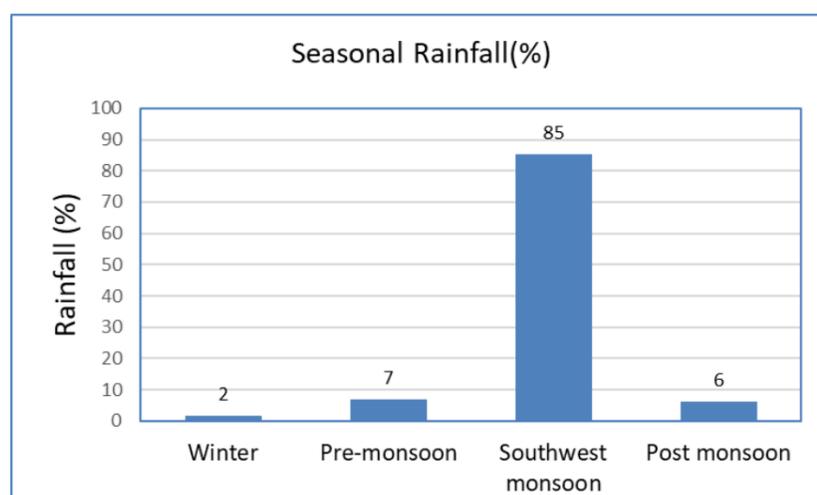


Fig.-23. Seasonal Rainfall (% of annual) over the state Bihar (Source: IMD, Delhi)

Table-7. Seasonal normal Rainfall

Season	Month	Seasonal normal Rainfall (mm)
Winter	January to February	20.1
Pre-monsoon	March to May	81.7
Southwest monsoon	June to September	1017.2
Post monsoon	October to November	73.0
Annual	January to December	1192.0

(Source : IMD, Delhi)

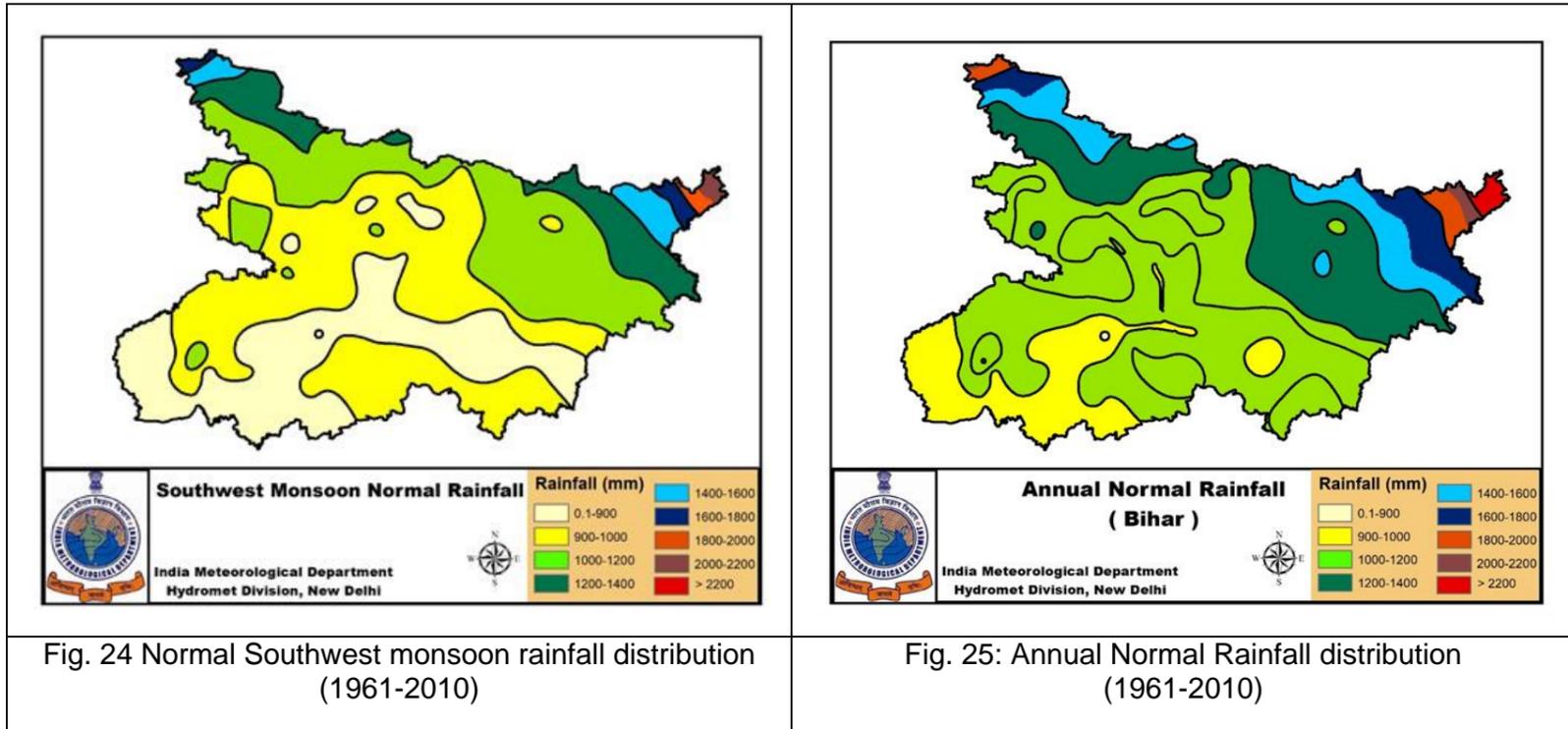


Fig. 24 Normal Southwest monsoon rainfall distribution (1961-2010)

Fig. 25: Annual Normal Rainfall distribution (1961-2010)

2.3.2 Main Synoptic features for Rainfall

Main synoptic features responsible for southwest monsoon rain over Bihar are as follows:

- (i) The monsoon trough at foothills: When the monsoon trough is oriented East-West along the foothills of the Himalayas (called break/weak monsoon condition), Bihar gets very heavy rainfall. Intense rainfall also occurs during break/weak monsoon under influence of westerly troughs.
- (ii) Lows/Depressions over Bihar: Lows/Depressions form over Head Bay of Bengal, near Gangetic West Bengal/ Odisha coasts, move inland taking a west north westerly course and affect the weather over Bihar depending on their nearness to the state areas. Lows moving into Bihar or forming in “situ” over Bihar cause intense rainfall. Rarely a low forms in “Situ” over land.
- (iii) Upper air troughs/cyclonic circulations: Upper air troughs/cyclonic circulations move from west to east during weak monsoon condition and affect weather over Jammu & Kashmir, Ladakh, Himachal Pradesh, U.P., Bihar, Sikkim and Assam. North- South oriented troughs in monsoon-westerlies formed east of 80°E, affect the weather over Bihar frequently in the month of July than in other months. Westerly troughs affect west U.P. in all months but they affect east U.P. and Bihar during weak monsoon conditions in late August and September months causing heavy rainfall.

2.3.2.1 Seasonal Rainfall Variation

The actual and normal rainfall for winter, pre-monsoon, southwest monsoon, post monsoon seasons and annual are shown in Figure 26. It is seen from figures that actual seasonal rainfall in the period 1998 to 2019 is always in lower sides as compared to normal rainfall which indicates the decreasing trend of rainfall over the region during the last two decades.

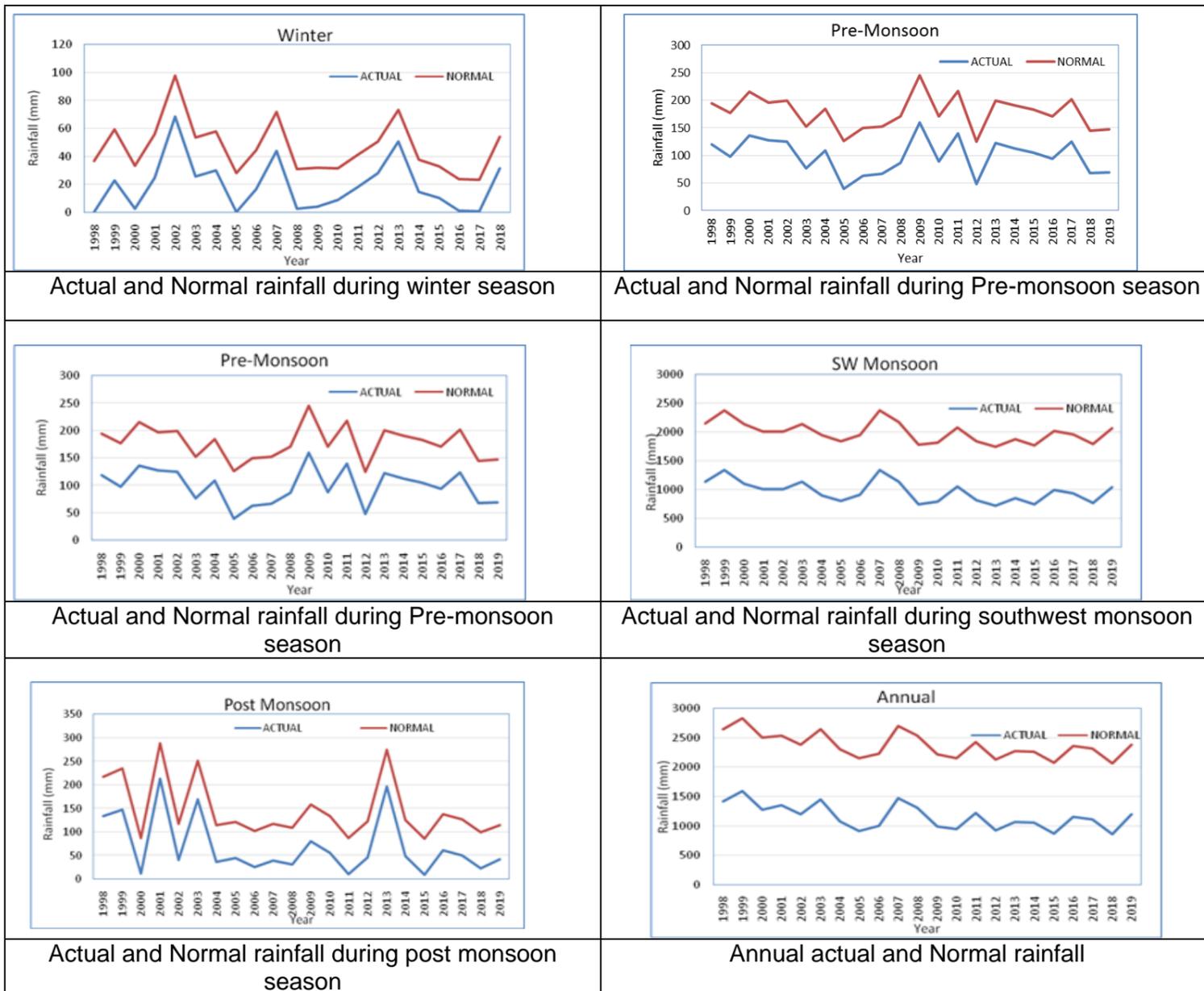
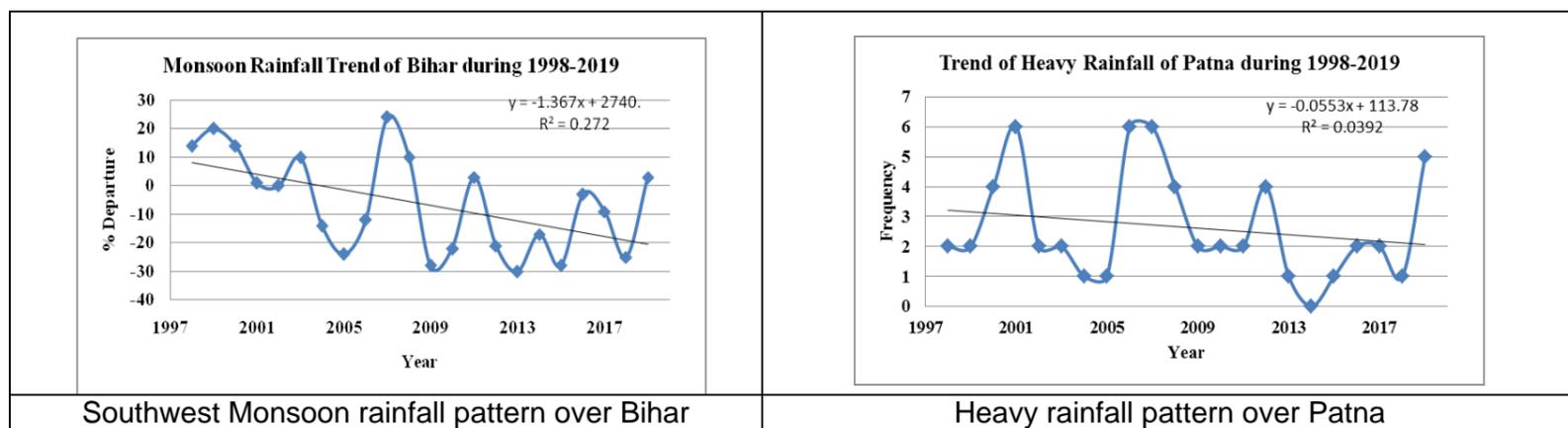
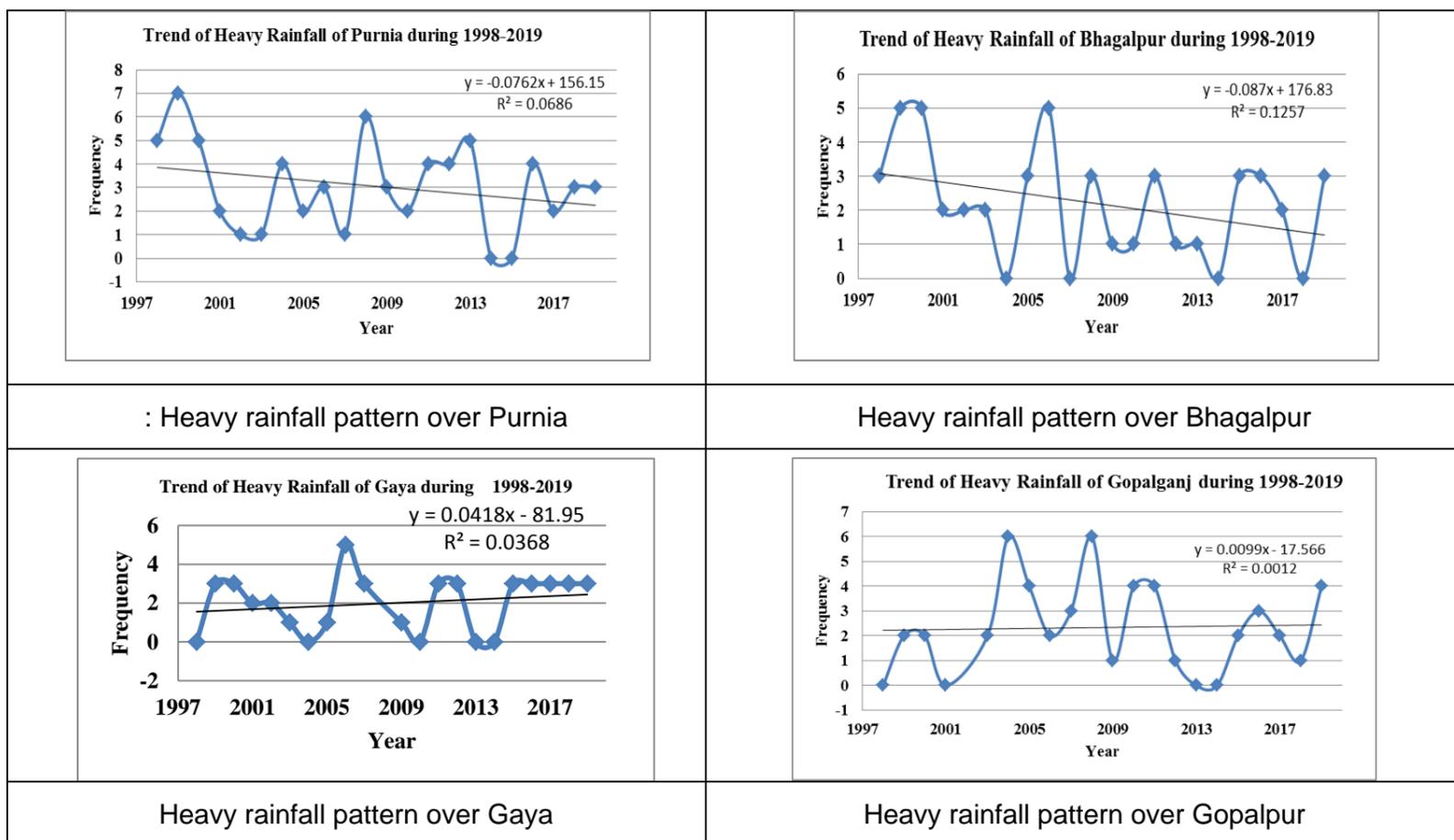


Fig. 26 Seasonal distribution of rainfall in Bihar State (Source: IMD, Delhi)

2.3.2.2 Rainfall Pattern of Bihar

Rainfall pattern of 22 years (1998-2019) of Bihar and daily heavy rainfall pattern (> 64.5 cm and above) of five different stations lying in different regions of Bihar namely Patna, Purnia, Bhagalpur, Gaya and Gopalganj has been analyzed during the southwest monsoon season. It has been observed from the analysis that southwest monsoon rainfall has been decreasing significantly during this period (Figure 27).





(Source: IMD, Delhi)

Fig. 27 Rainfall Pattern of Bihar State

2.4 ROLE OF CWC IN FLOOD MONITORING

2.4.1 Flood Monitoring in Bihar

Central Water Commission is maintaining 40 Level Flood Forecast Stations in Bihar in main Ganga and its tributaries in North and South Bank. Almost all rivers prone to floods in Bihar flow from other country (Nepal) or States (Uttar Pradesh, Jharkhand). Central Water Commission is having bilateral arrangement with Nepal for sharing of Hydrometeorological Data of rivers common to India and Nepal. Besides, CWC is maintaining Hydrological Observation (HO) Stations in almost all the tributaries within India in the upper riparian States through which water enters Bihar. During the designated flood season (i.e. from 1st June to 31st October) hourly water level observations are taken from the HO Stations maintained by CWC and these are used for formulation of Level Forecast using Statistical correlation techniques.

Alerts through Common Alerting Protocol (CAP) using Google CAP alerts are also being done from 2015 onwards for use of general populace at large. Social Media such as Facebook and Twitter are also being used for dissemination of such alerts from 2018 onwards. Figure 28 shows locations of CWC flood forecasting stations in Bihar. Table 8 is list of CWC maintained level forecast stations in Bihar.

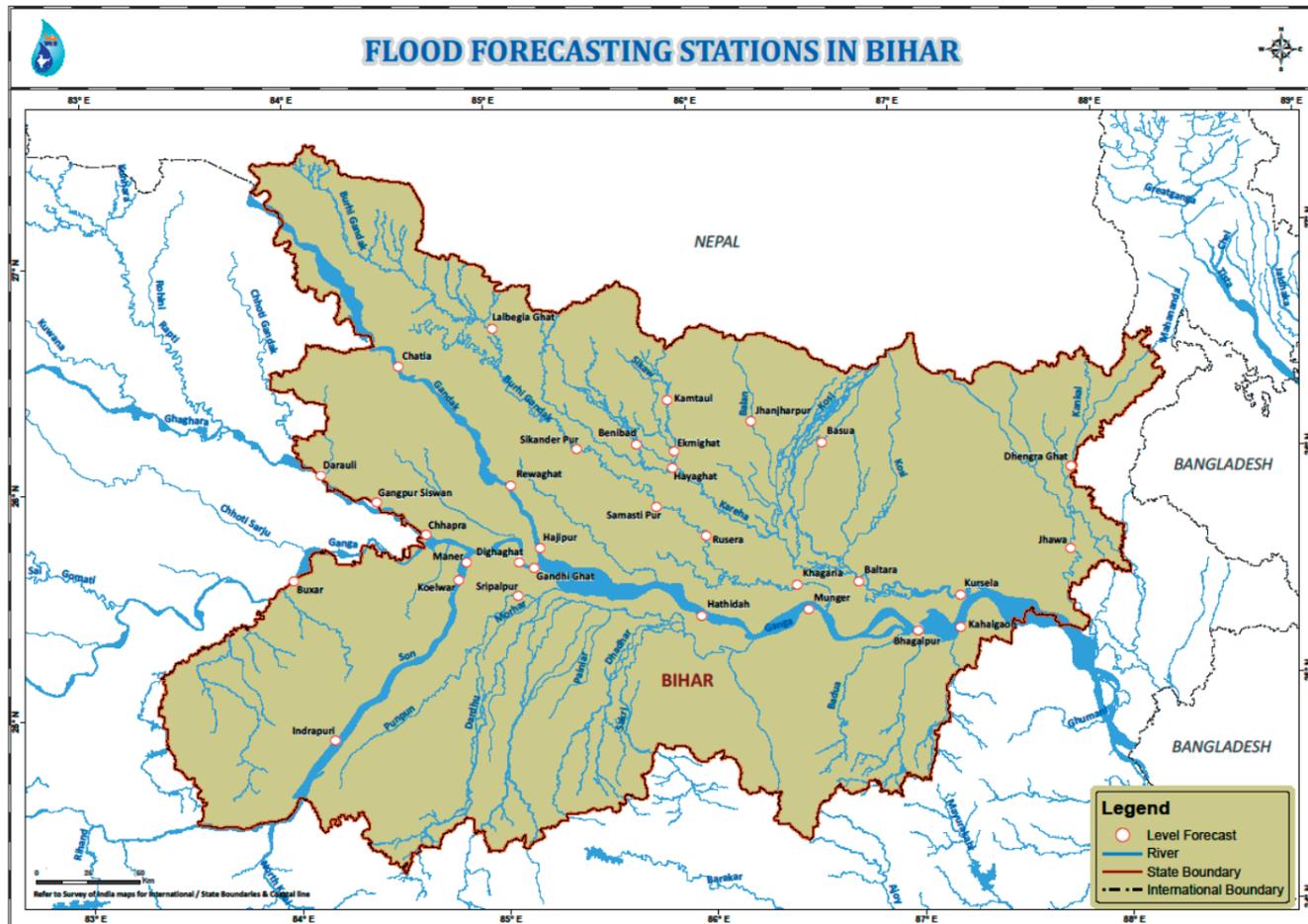


Fig-28: Locations of CWC flood forecasting stations in Bihar (Source: CWC, Delhi)

Table 8: List of CWC maintained Level Forecast Stations in Bihar

Sl. No	Local River	Station Name	District
1	Ganga	Buxar	Buxar
2		Patna Dighaghat	Patna
3		Patna Gandhighat	Patna
4		Hathidah	Patna
5		Munger	Munger
6		Bhagalpur	Bhagalpur
7		Kahalgao	Bhagalpur
8	Ghaghra	Darauli	Siwan
9		GangpurSiswan	Siwan
10		Chhapra	Chhapra
11	Gandak	Chatia	West Champaran
12		Rewaghat	Muzzafarpur
13		Hazipur	Vaishali
14	Burhi Gandak	Lalbeghiaghat	Motihari
15		MuzzafarpurSikandarpur	Muzzafarpur
16		Samastipur	Samastipur
17		Rosera	Samastipur
18		Khagaria	Khagaria
19	Bagmati	Benibad	Muzzafarpur
20		Hayaghat	Darbhanga
21	Adhwara Group	Kamtaul	Darbhanga
22		Eknight	Darbhanga

Sl. No	Local River	Station Name	District
23	KamlaBalan	Jhanjarpur	Madhubani
24	Kosi	Basua	Supaul
25		Baltara	Khagaria
26		Kursela	Katihar
27	Mahananda	Dhengraghat	Purnea
28		Jhawa	Katihar
29	Gandak	Dumariaghat	Gopalganj
30	Burhigandak	Ahirwalia	Muzzafarpur
31	Sone	Inderpuri	Rohtas
32		Koelwar	Bhojpur
33		Maner	Patna
34	PunPun	Sripalpur	Patna
35	Bagmati	Dheng Bridge	Sitamarhi
36		Runisaidpur	Sitamarhi
37	Kamla Balan	Jainagar	Madhubani
38	Adhwara	Sonebarsa	Sitamarhi
39	Parwan	Araria	Araria
40	Mahananda	Taibpur	Kishanganj

(Source : CWC, Delhi)

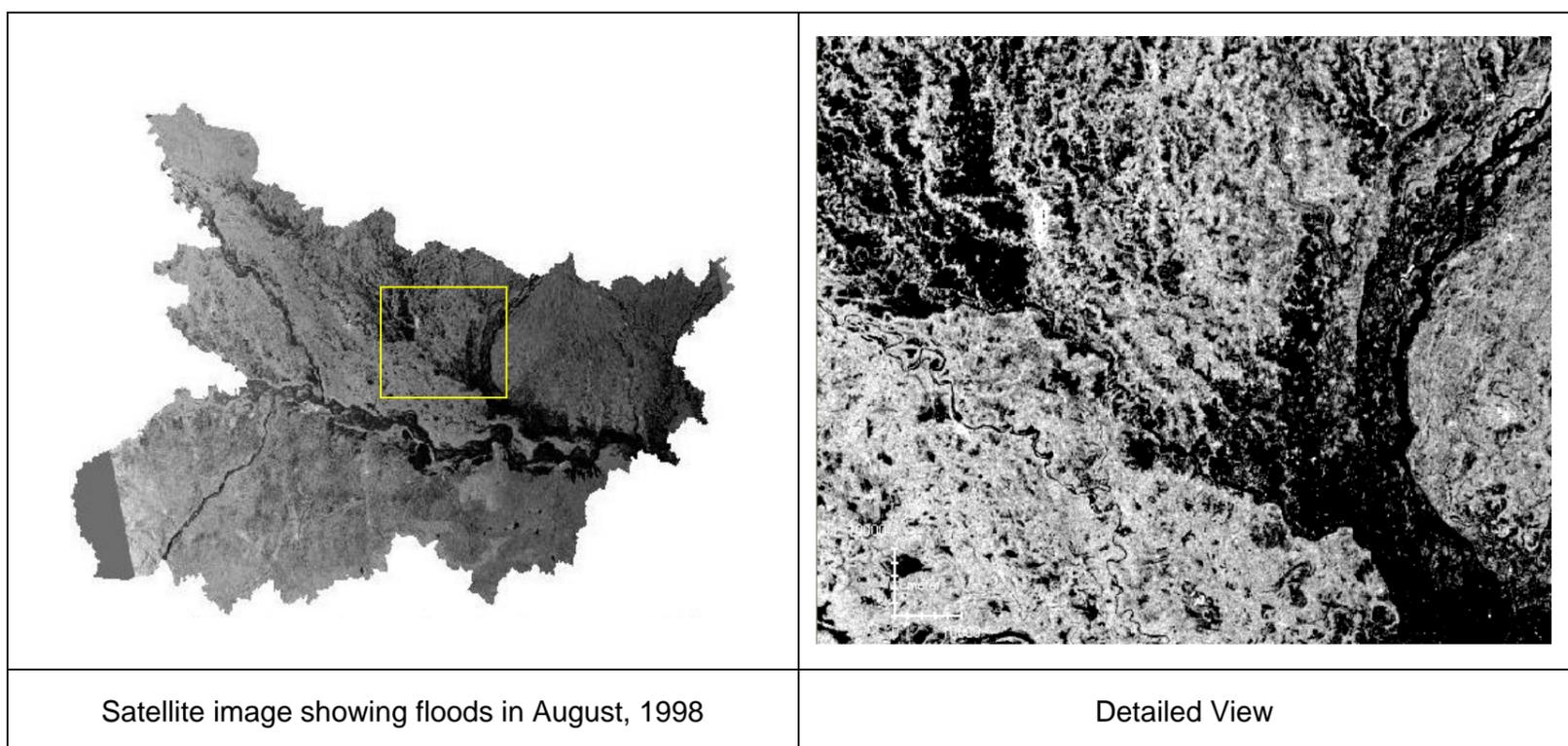
3.0 FLOOD HAZARD ZONATION USING SATELLITE REMOTE SENSING

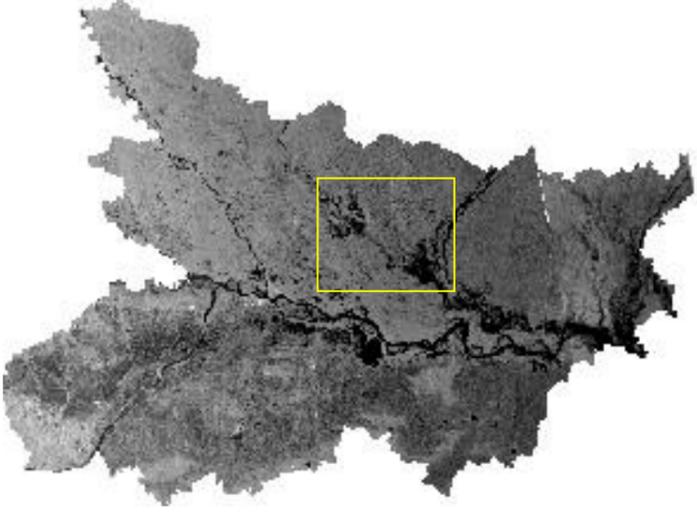
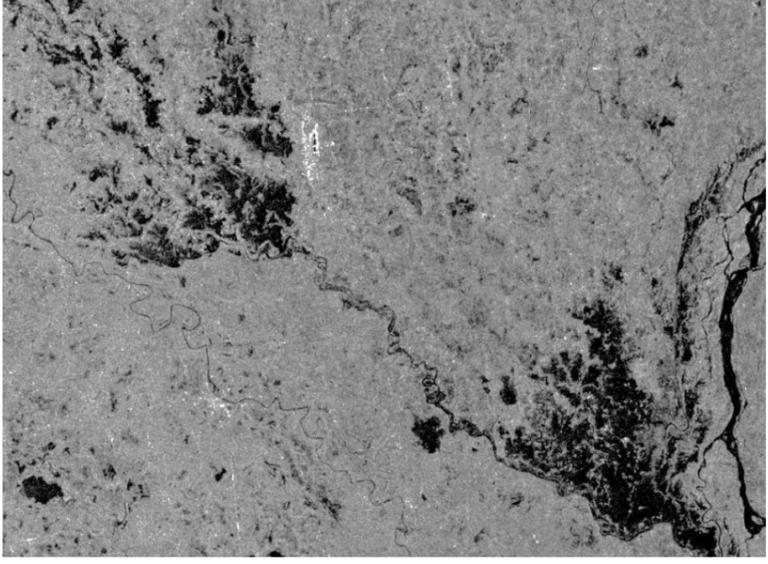
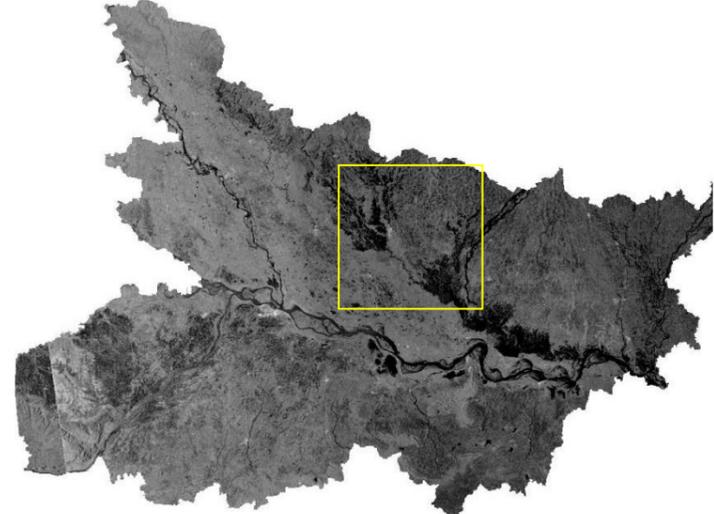
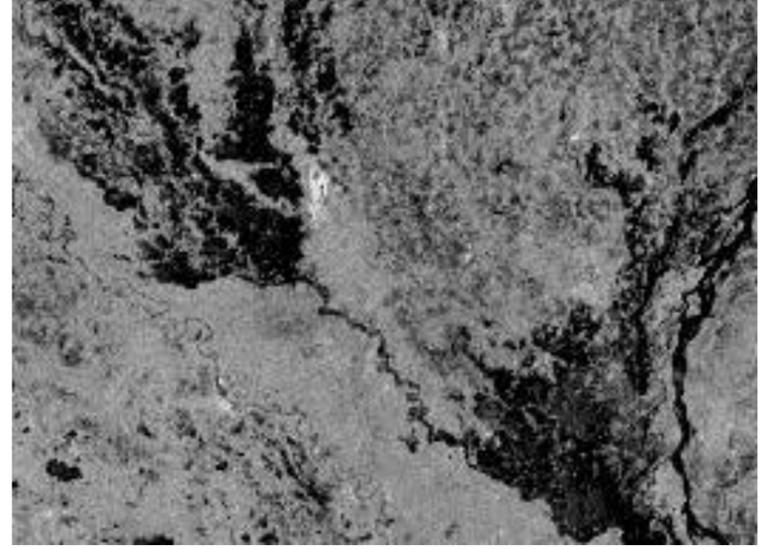
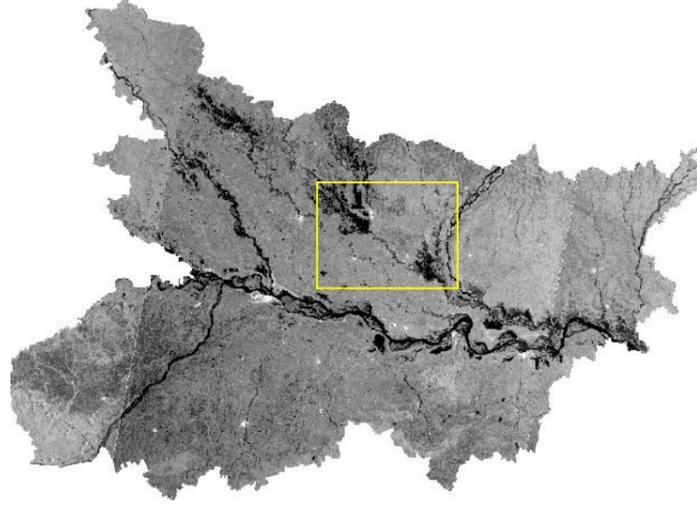
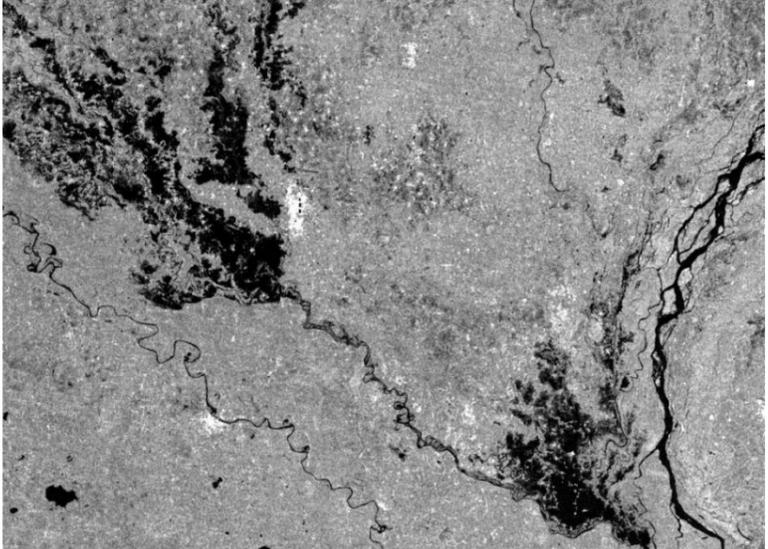
As the flood maps are prepared using long period historic flood layers derived from satellite remote sensing data, flood hazard maps are used to delineate areas of land which are at risk of flooding with different frequencies. Hazard maps show a flood boundary based on different magnitudes of flood with various specific frequencies. These maps can be used to regulate developmental activities within the floodplain, so that damages can be minimized. Flood hazard maps can be used for planning of relief, rescue, and health centres in floodplains. These maps can be used as an input to promote flood tolerant crops in the floodplains. It can be very vital information in basin level disaster management plans and in disaster risk reduction activities.

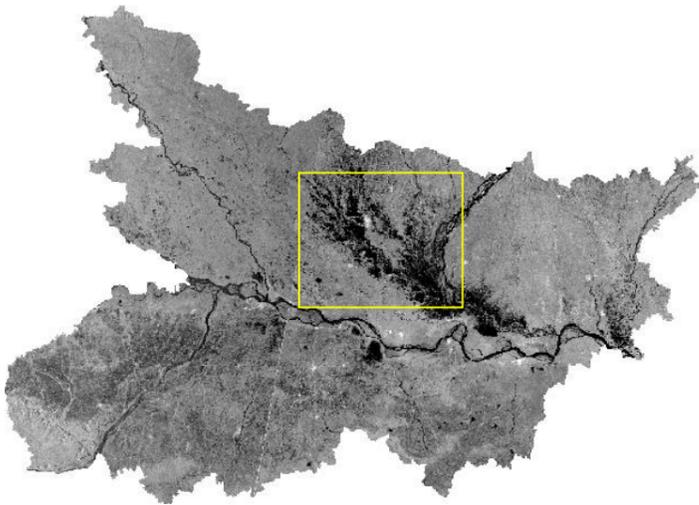
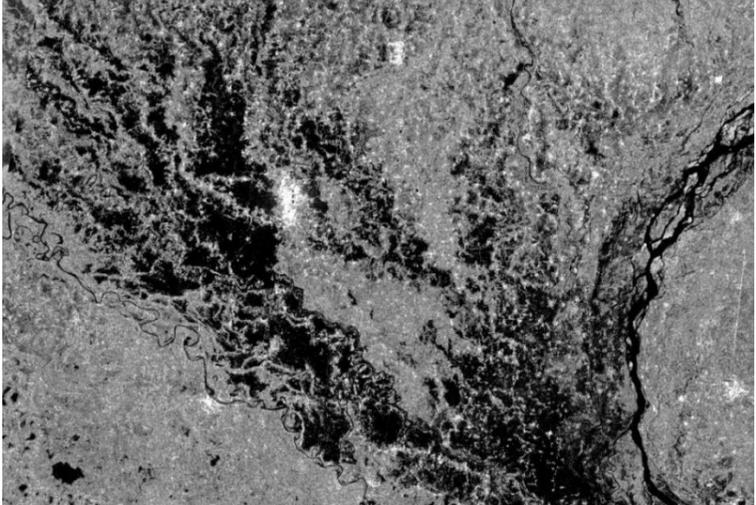
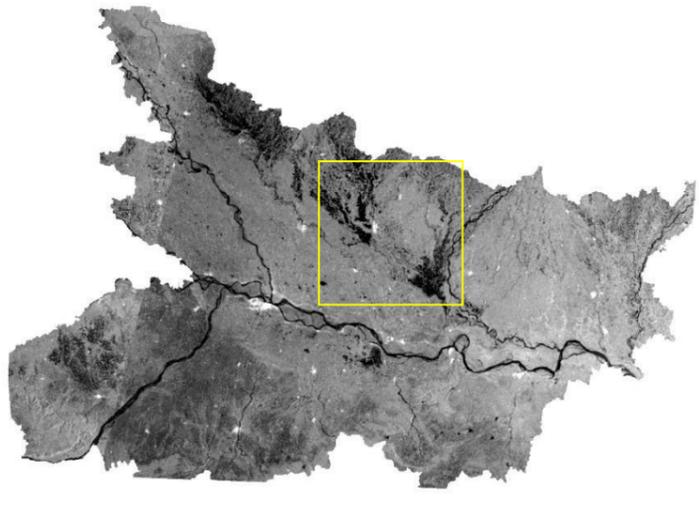
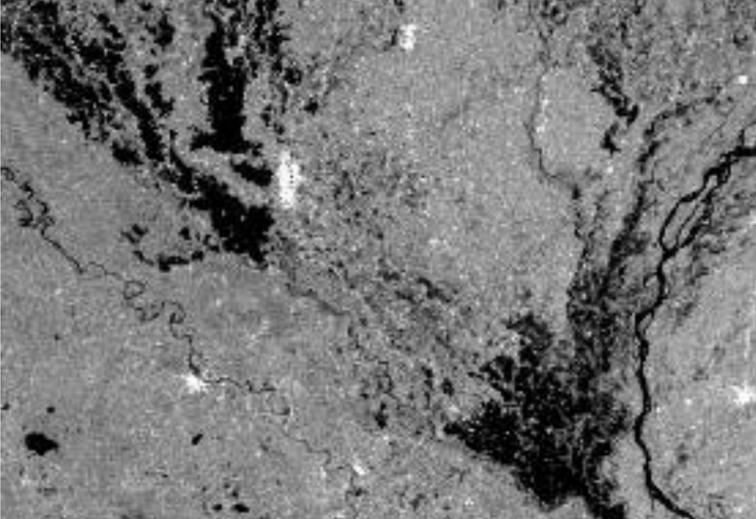
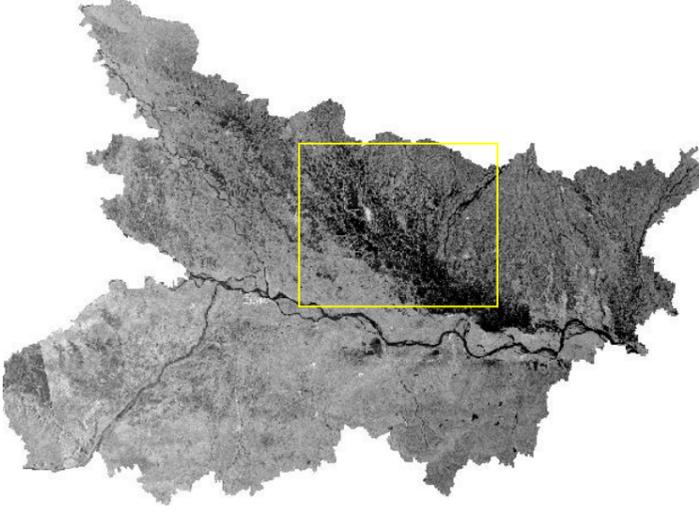
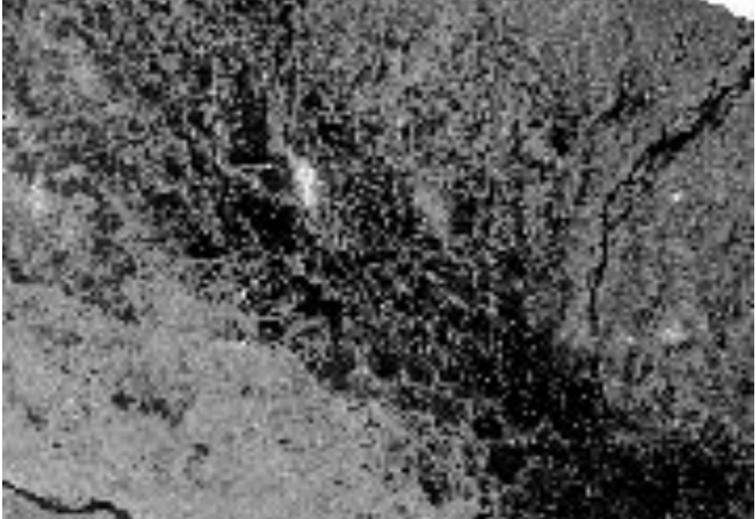
Satellite remote sensing from their vantage position has unambiguously demonstrated their capability in providing important information and services for flood disaster management. Satellites provide synoptic and frequent coverage of flood affected areas and thus become valuable for monitoring flood disaster. Thus satellite data can be directly used for deriving the flood inundation extent. If satellite data sets during flood times are available over a period of time for a floodplain, they can be conveniently used for hazard zone mapping. In addition, latest land use/land cover, infrastructure, settlements, etc. can also be generated from satellite data.

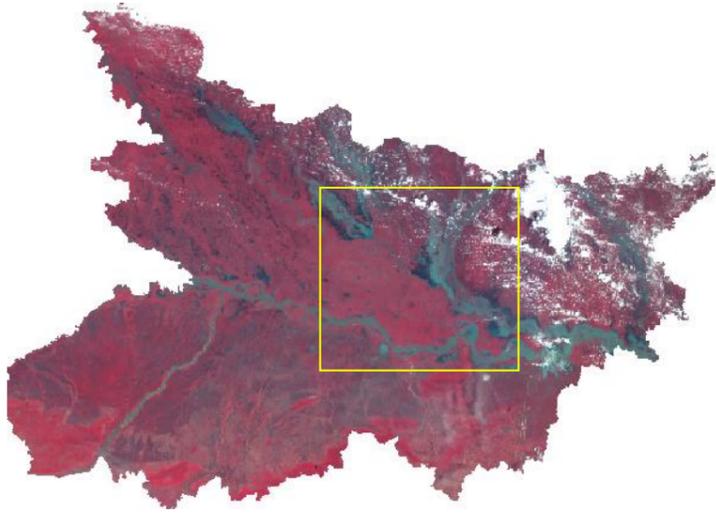
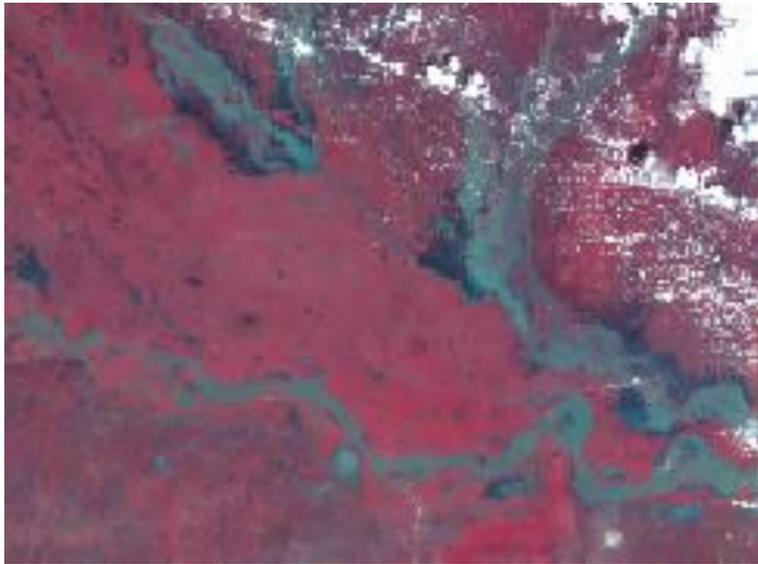
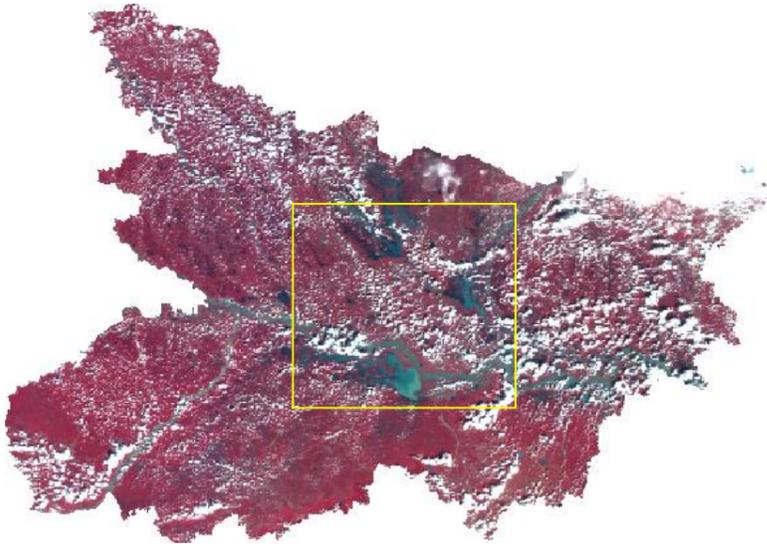
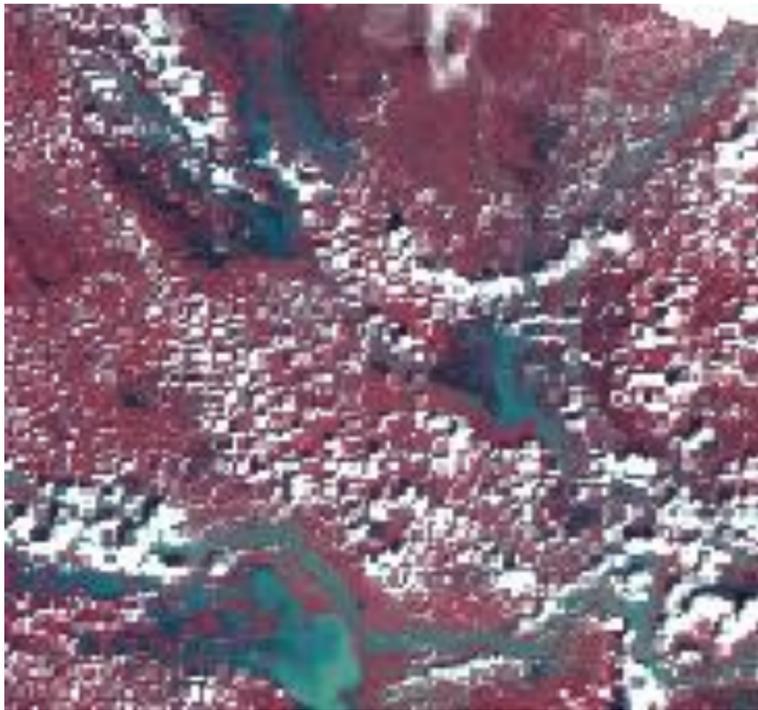
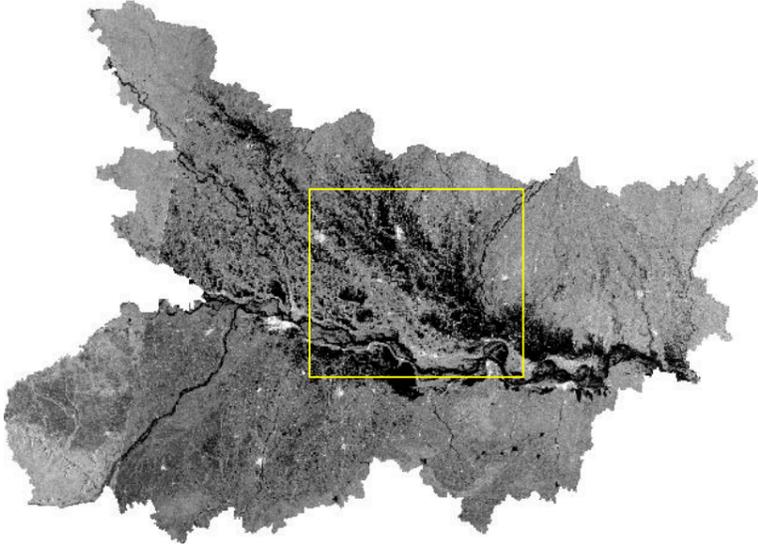
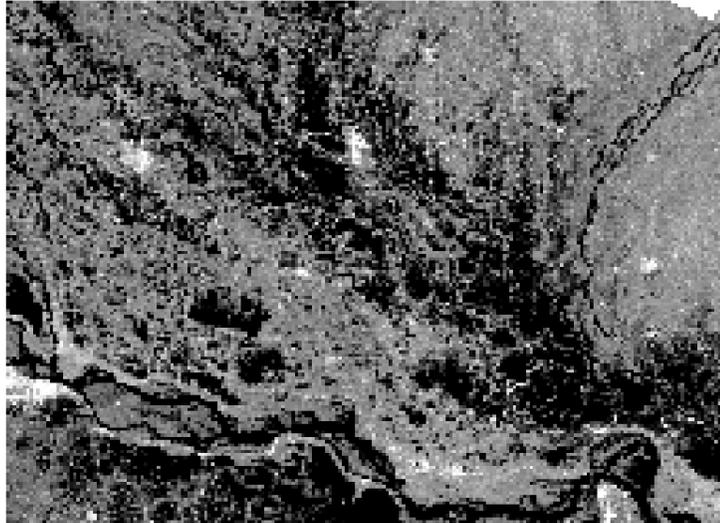
3.1 SATELLITE DATA USED

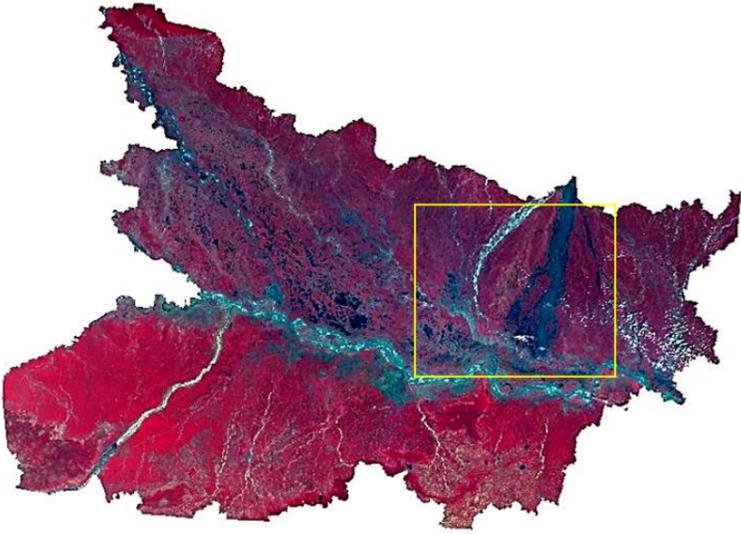
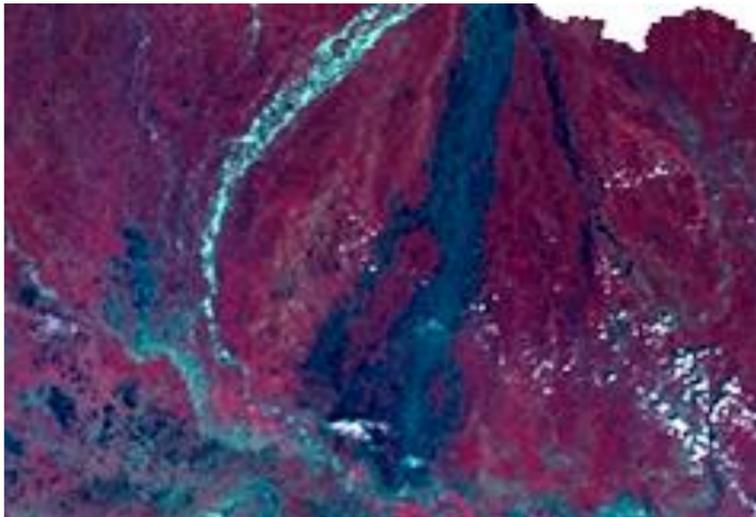
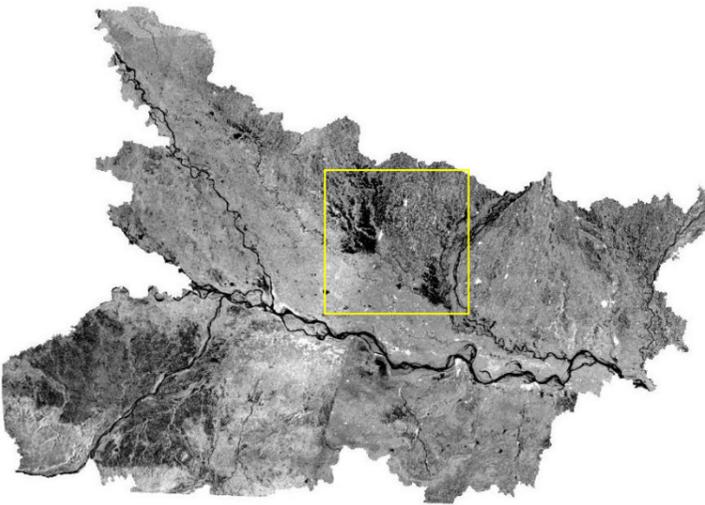
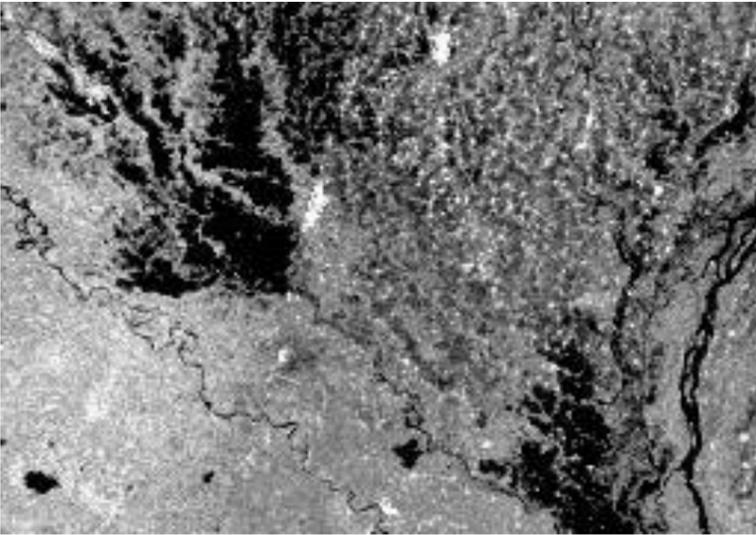
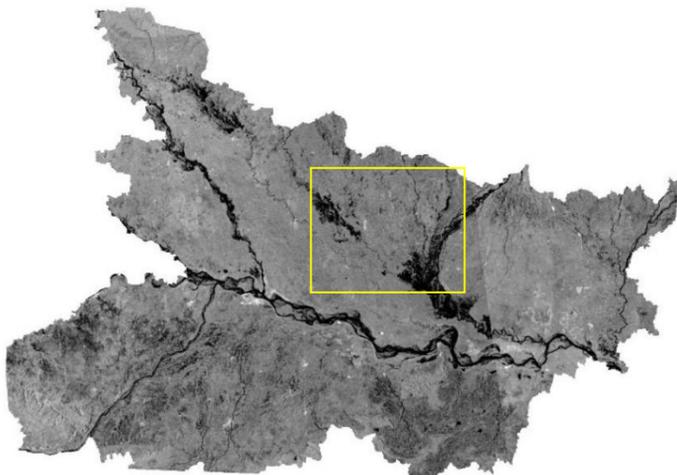
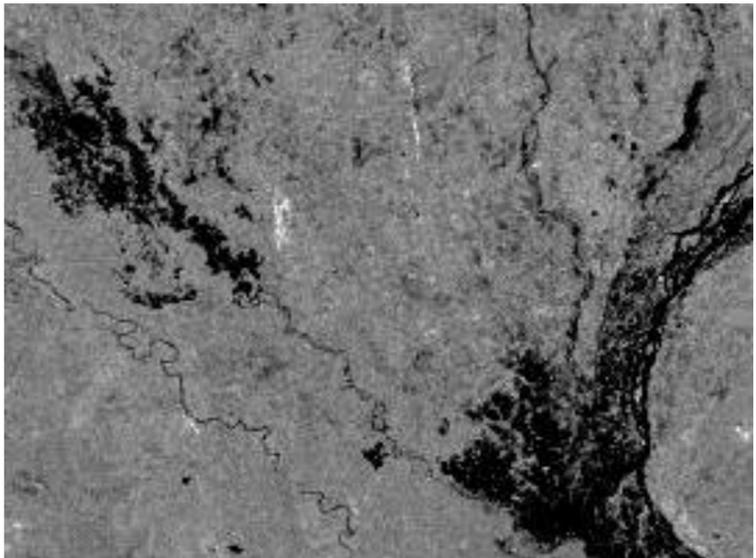
Satellite data sets (274 in number) acquired during flood season between 1998 and 2019 (22 years) covering Bihar state have been used for the preparation of flood hazard zonation map. Optical data from IRS satellite of varying resolutions and microwave SAR data of SCANSAR WIDE & NARROW beam modes from RISAT and Radarsat satellites are mostly used in flood mapping during various flood events. Sentinel 1 SAR data and data acquired through International Charter during some major disasters were also used in flood mapping. Figure 29 shows satellite images with overview and detailed view of the flood situation during 1998 to 2019. Table-9 shows satellite datasets acquired during the floods of 1998-2019.

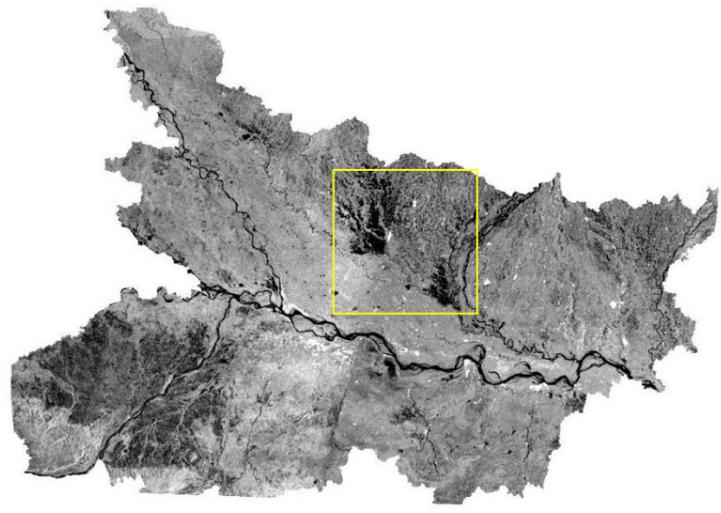
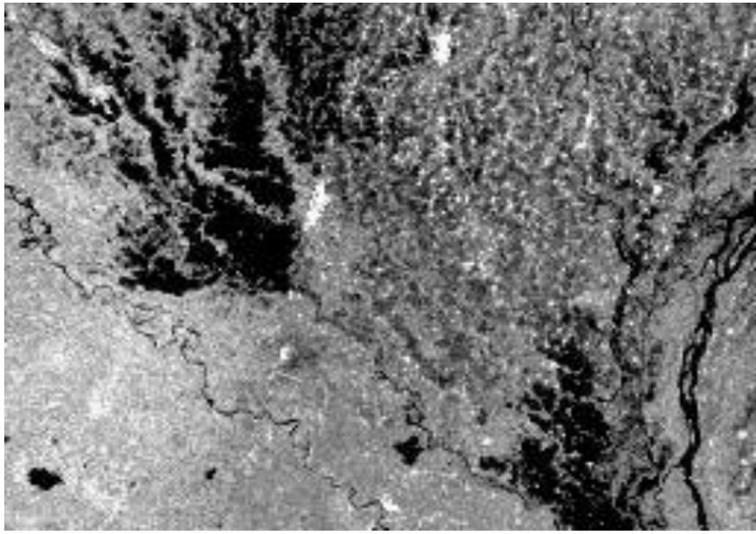
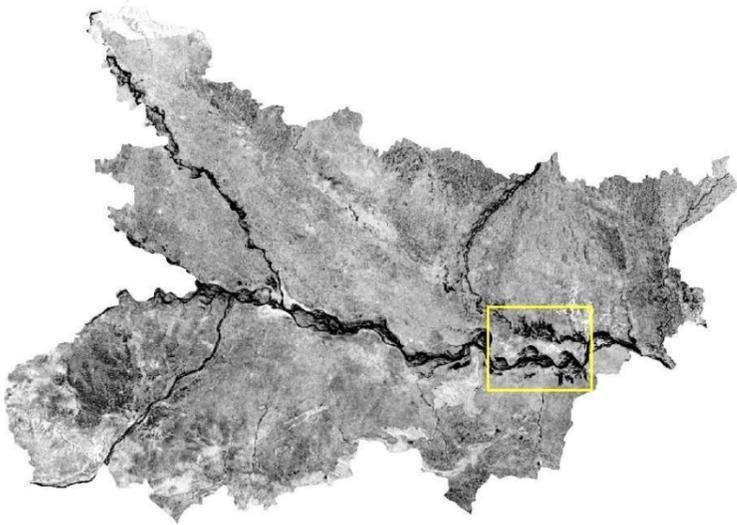
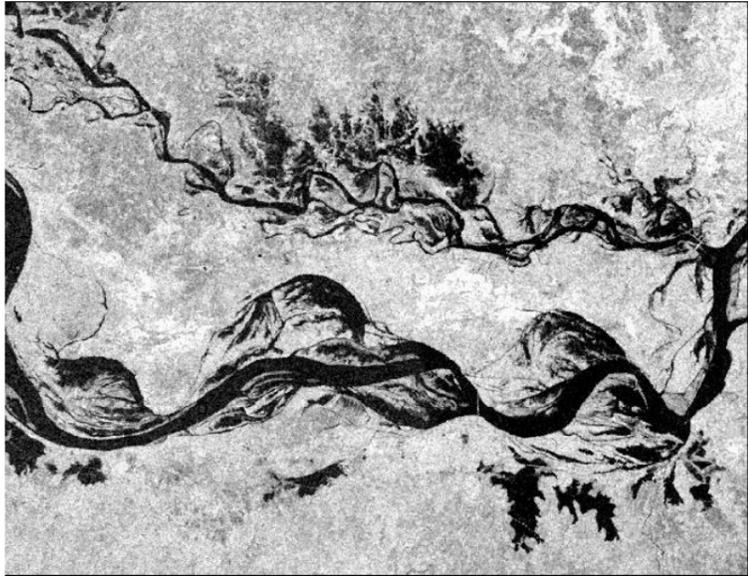
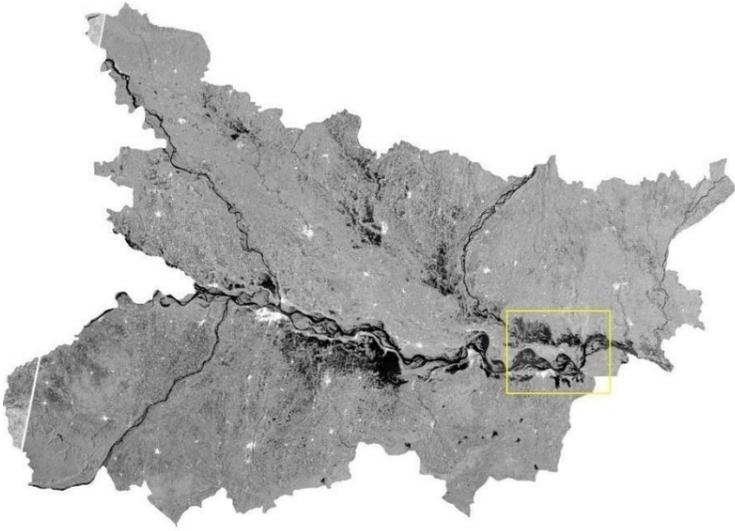


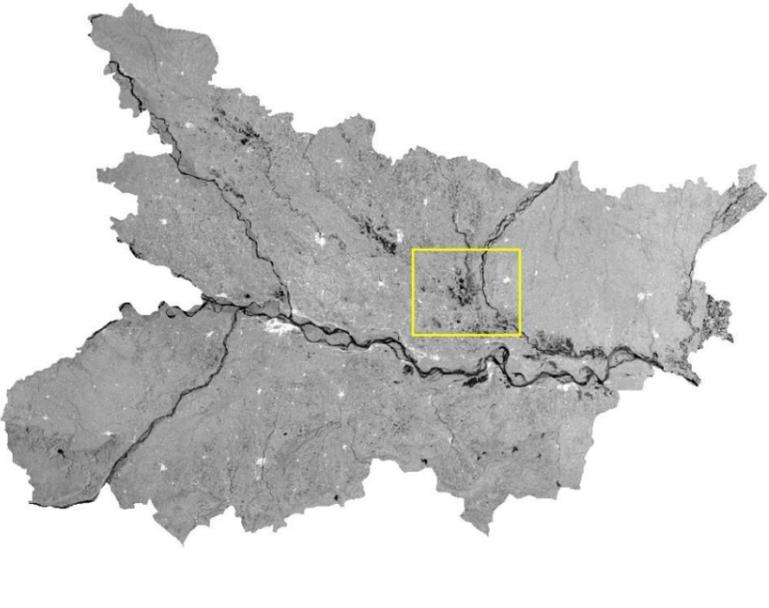
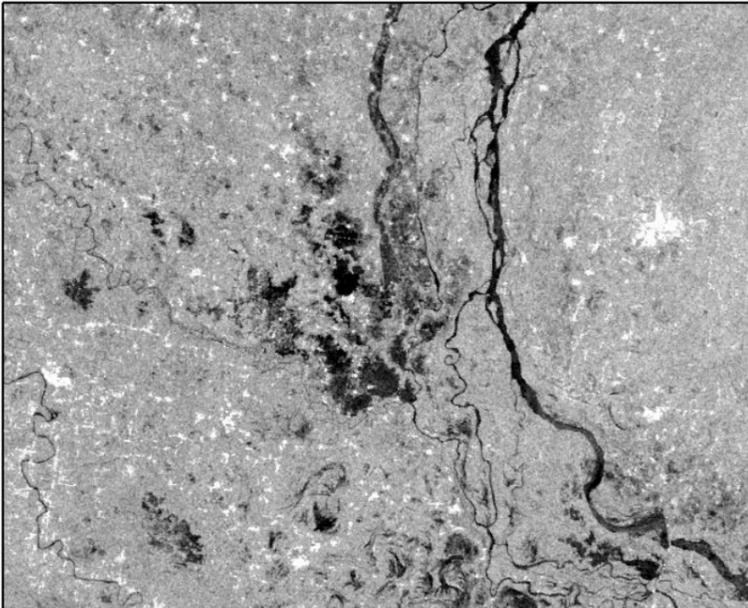
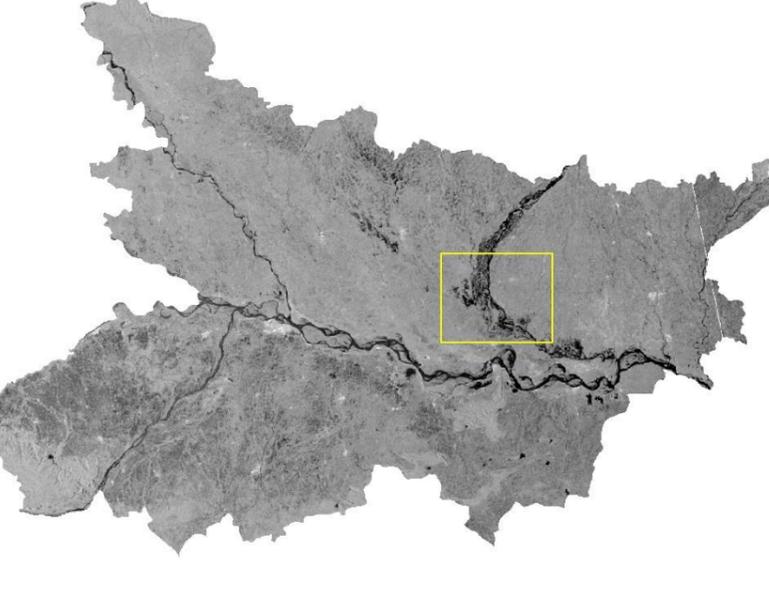
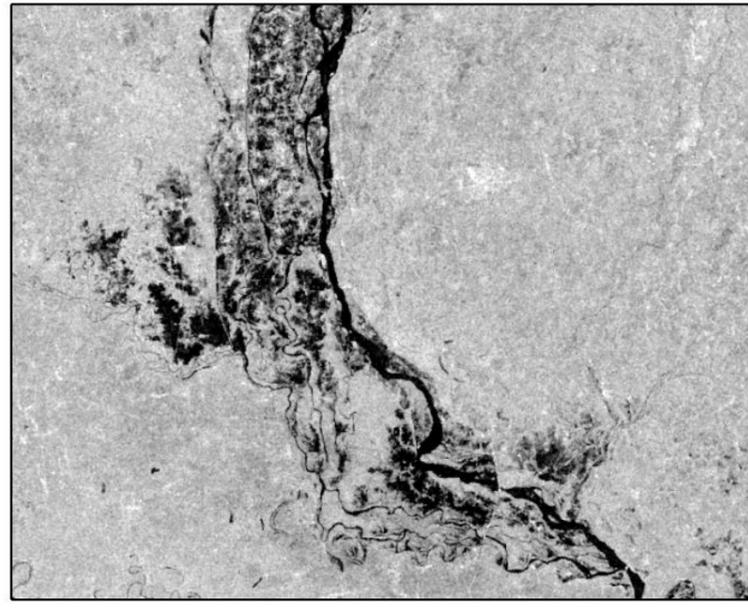
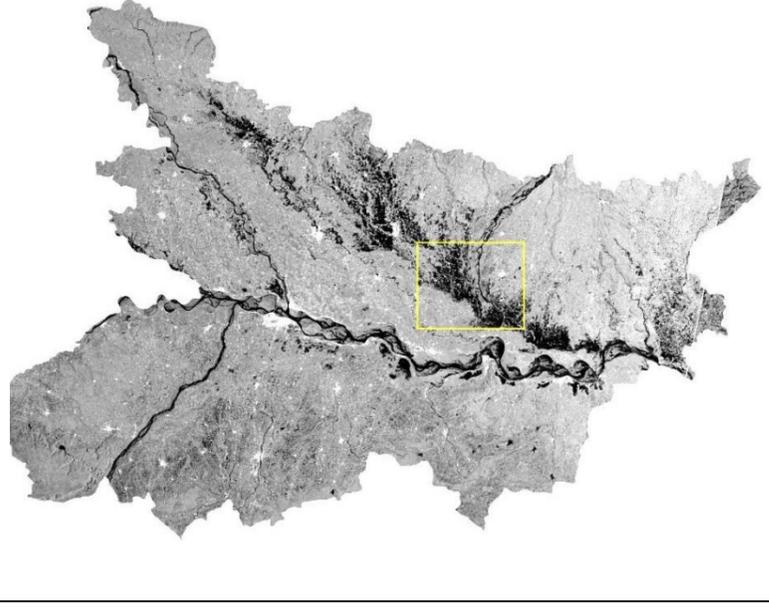
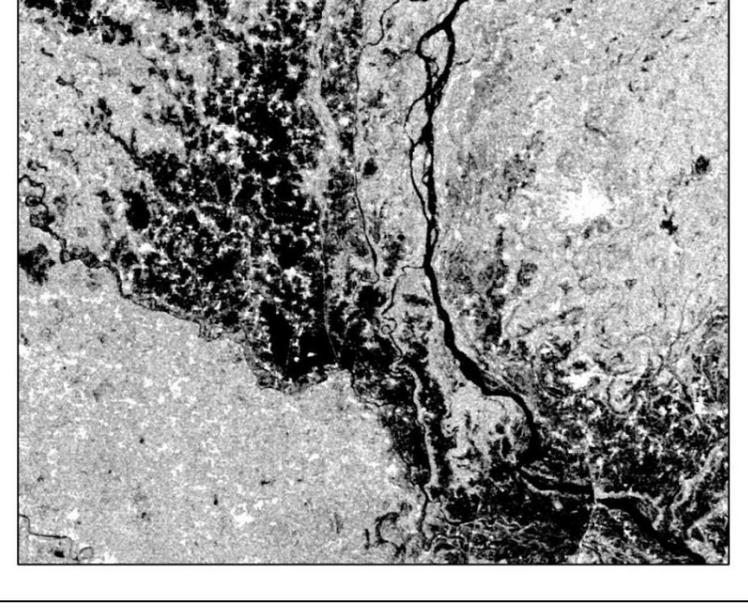
	
<p>Satellite image showing floods in September ,1999</p>	<p>Detailed View</p>
	
<p>Satellite image showing floods in August, 2000</p>	<p>Detailed View</p>
	
<p>Satellite image showing floods in August , 2001</p>	<p>Detailed View</p>

	
<p>Satellite image showing floods in August , 2002</p>	<p>Detailed View</p>
	
<p>Satellite image showing floods in July , 2003</p>	<p>Detailed View</p>
	
<p>Satellite image showing floods in July,2004</p>	<p>Detailed View</p>

	
<p>Satellite image showing floods in August , 2005</p>	<p>Detailed View</p>
	
<p>Satellite image showing floods in October, 2006</p>	<p>Detailed View</p>
	
<p>Satellite image showing floods in October, 2007</p>	<p>Detailed View</p>

 A satellite image of Bihar, India, showing extensive flooding in August 2008. The flooded areas are depicted in shades of red and cyan, contrasting with the brown and green of the land. A yellow rectangular box highlights a specific region in the central part of the state.	 A detailed satellite view of the region highlighted in the 2008 image, showing a large, dark blue water body surrounded by flooded land in red and cyan.
<p>Satellite image showing floods in August , 2008</p>	<p>Detailed View</p>
 A satellite image of Bihar, India, showing extensive flooding in August 2009. The flooded areas are depicted in shades of red and cyan, contrasting with the brown and green of the land. A yellow rectangular box highlights a specific region in the central part of the state.	 A detailed satellite view of the region highlighted in the 2009 image, showing a large, dark blue water body surrounded by flooded land in red and cyan.
<p>Satellite image showing floods in August 2009</p>	<p>Detailed View</p>
 A satellite image of Bihar, India, showing extensive flooding in August 2010. The flooded areas are depicted in shades of red and cyan, contrasting with the brown and green of the land. A yellow rectangular box highlights a specific region in the central part of the state.	 A detailed satellite view of the region highlighted in the 2010 image, showing a large, dark blue water body surrounded by flooded land in red and cyan.
<p>Satellite image showing floods in August , 2010</p>	<p>Detailed View</p>

	
<p>Satellite image showing floods in July , 2011</p>	<p>Detailed View</p>
	
<p>Satellite image showing floods in July , 2013</p>	<p>Detailed View</p>
	
<p>Satellite image showing floods in August, 2014</p>	<p>Detailed View</p>

	
<p>Satellite image showing floods in September , 2015</p>	<p>Detailed View</p>
	
<p>Satellite image showing floods in August, 2016</p>	<p>Detailed View</p>
	
<p>Satellite image showing floods in August , 2017</p>	<p>Detailed View</p>

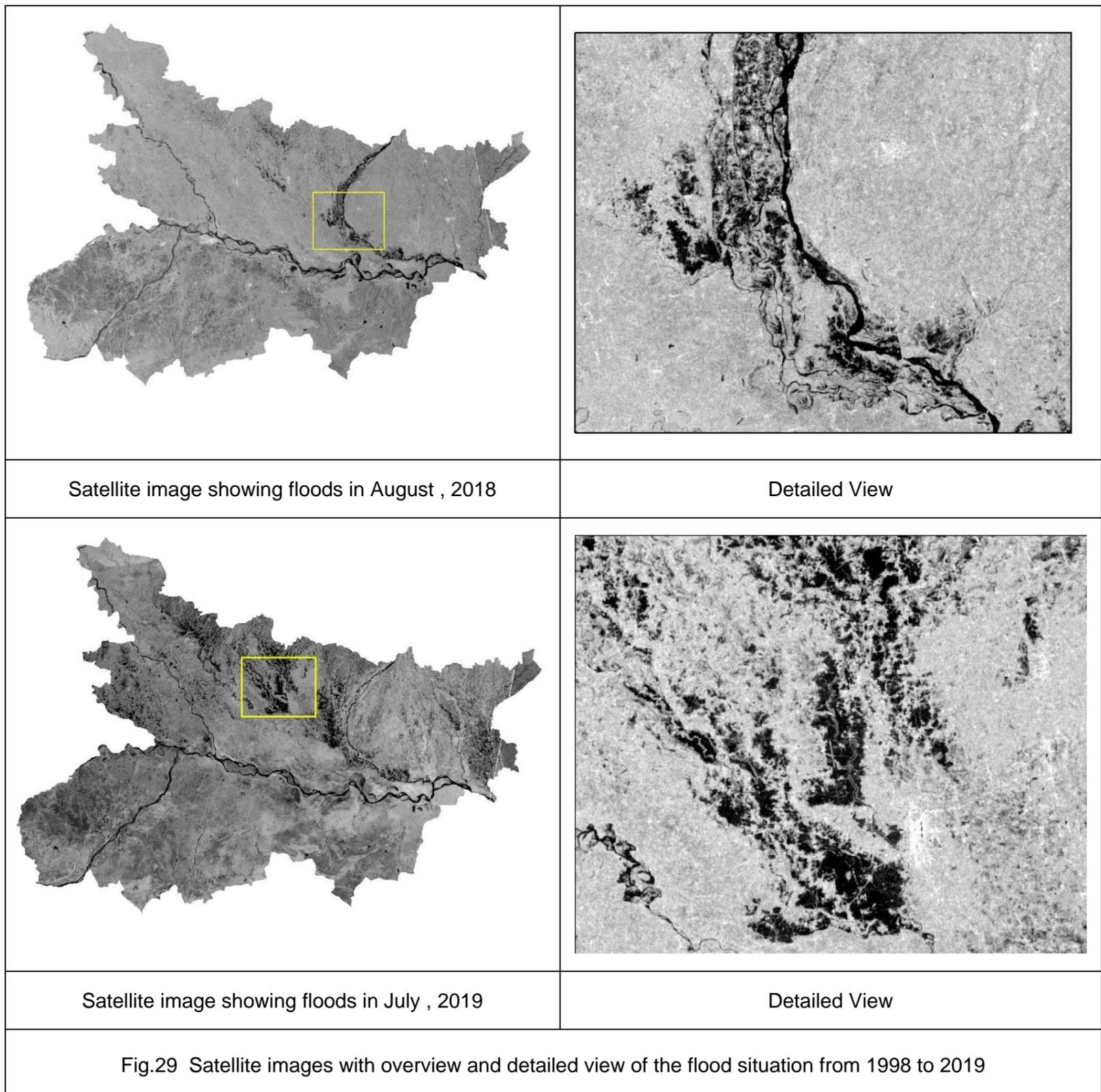


Table 9: Satellite data sets used for flood hazard zonation

S. No	Date	Satellite/ Sensor	S. No	Date	Satellite/ Sensor
1998			36	28-Sep-06	RADARSAT
1	20-Aug-98	RADARSAT	37	29-Sep-06	RADARSAT
1999			38	03-Oct-06	RADARSAT
2	08-Aug-99	RADARSAT	2007		
3	08-Sep-99	RADARSAT	39	20-Jun-07	RADARSAT
2000			40	18-Jul-07	RADARSAT
4	23-Jul-00	RADARSAT	41	21-Jul-07	RADARSAT
5	09-Aug-00	RADARSAT	42	28-Jul-07	RADARSAT
2001			43	31-Jul-07	RADARSAT
6	06-Aug-01	RADARSAT	44	04-Aug-07	RADARSAT
7	30-Aug-01	RADARSAT	45	06-Aug-07	RADARSAT
8	21-Sep-01	RADARSAT	46	07-Aug-07	RADARSAT
2002			47	21-Aug-07	RADARSAT
9	13-Jul-02	RADARSAT	48	23-Aug-07	RADARSAT
10	08-Aug-02	RADARSAT	49	30-Aug-07	RADARSAT
11	09-Aug-02	RADARSAT	50	31-Aug-07	RADARSAT
2003			51	07-Sep-07	RADARSAT
12	25-Jul-03	RADARSAT	52	14-Sep-07	RADARSAT
13	03-Jul-03	RADARSAT	53	16-Sep-07	RADARSAT
14	13-Jul-03	RADARSAT	54	21-Sep-07	RADARSAT
15	25-Aug-03	RADARSAT	55	23-Sep-07	RADARSAT
16	28-Aug-03	RADARSAT	56	24-Sep-07	RADARSAT
17	13-Sep-03	RADARSAT	57	01-Oct-07	RADARSAT
18	30-Sep-03	RADARSAT	58	03-Oct-07	RADARSAT
2004			59	08-Oct-07	RADARSAT
19	27-Jun-04	RADARSAT	60	10-Oct-07	RADARSAT
20	14-Jul-04	RADARSAT	61	15-Oct-07	RADARSAT
21	19-Jul-04	RADARSAT	2008		
22	21-Jul-04	RADARSAT	62	21-Jun-08	RADARSAT
23	29-Jul-04	RADARSAT	63	28-Jun-08	RADARSAT
24	31-Jul-04	RADARSAT	64	30-Jun-08	RADARSAT
2005			65	07-Jul-08	RADARSAT
25	21-Jul-05	RADARSAT	66	17-Jul-08	RADARSAT
26	24-Jul-05	RADARSAT	67	22-Jul-08	RADARSAT
27	24-Aug-05	RADARSAT	68	24-Jul-08	RADARSAT
28	31-Aug-05	RADARSAT	69	03-Aug-08	RADARSAT
29	09-Sep-05	RADARSAT	70	05-Aug-08	RADARSAT
2006			71	08-Aug-08	RADARSAT
30	10-Jun-06	RADARSAT	72	12-Aug-08	RADARSAT
31	15-Jun-06	RADARSAT	73	13-Aug-08	RADARSAT
32	16-Jul-06	RADARSAT	74	20-Aug-08	RADARSAT
33	18-Jul-06	RADARSAT	75	22-Aug-08	RADARSAT
34	23-Jul-06	RADARSAT	76	24-Aug-08	RADARSAT
35	26-Sep-06	RADARSAT	77	27-Aug-08	RADARSAT

S. No	Date	Satellite/ Sensor	S. No	Date	Satellite/ Sensor
78	29-Aug-08	RADARSAT	120	29-Aug-10	RADARSAT
79	03-Sep-08	RADARSAT	121	30-Aug-10	RADARSAT
80	05-Sep-08	RADARSAT	122	05-Sep-10	RADARSAT
81	07-Sep-08	RADARSAT	123	08-Sep-10	RADARSAT
82	08-Sep-08	RADARSAT	124	12-Sep-10	RADARSAT
83	10-Sep-08	RADARSAT	125	19-Sep-10	RADARSAT
2008			126	20-Sep-10	RADARSAT
84	13-Sep-08	RADARSAT	127	22-Sep-10	RADARSAT
85	15-Sep-08	RADARSAT	128	24-Sep-10	RADARSAT
86	18-Sep-08	RADARSAT	2011		
87	20-Sep-08	RADARSAT	129	02-Aug-2011	RADARSAT
88	22-Sep-08	RADARSAT	130	09-Oct-2011	RADARSAT
89	27-Sep-08	RADARSAT	131	04-Oct-2011	RADARSAT
90	29-Sep-08	RADARSAT	132	01-Oct-2011	RADARSAT
91	30-Sep-08	RADARSAT	133	30-Sep-2011	Resourcesat-2
92	02-Oct-08	RADARSAT	134	28-Sep-2011	Resourcesat-2
93	04-Oct-08	RADARSAT	135	10-Sep-2011	RADARSAT
94	07-Oct-08	RADARSAT	136	05-Sep-2011	RADARSAT
95	09-Oct-08	RADARSAT	137	03-Sep-2011	RADARSAT
96	14-Oct-08	RADARSAT	138	02-Sep-2011	RADARSAT
97	21-Oct-08	RADARSAT	139	29-Aug-2011	RADARSAT
98	28-Oct-08	RADARSAT	140	26-Aug-2011	RADARSAT
2009			141	24-Aug-2011	RADARSAT
99	05-Jul-09	RADARSAT	142	22-Aug-2011	RADARSAT
100	29-Jul-09	RADARSAT	143	20-Aug-2011	RADARSAT
101	03-Aug-09	RADARSAT	144	17-Aug-2011	RADARSAT
102	05-Aug-09	RADARSAT	145	12-Aug-2011	RADARSAT
103	07-Aug-09	RADARSAT	146	10-Aug-2011	RADARSAT
104	10-Aug-09	RADARSAT	147	06-Aug-2011	RADARSAT
105	15-Aug-09	RADARSAT	148	29-Jul-2011	RADARSAT
106	20-Aug-09	RADARSAT	149	22-Jul-2011	RADARSAT
107	27-Aug-09	RADARSAT	150	19-Jul-2011	RADARSAT
108	29-Aug-09	RADARSAT	151	09-Jul-2011	RISAT-2
109	01-Sep-09	RADARSAT	152	05-Jul-2011	RADARSAT
110	05-Sep-09	RADARSAT	153	02-Jul-2011	RADARSAT
111	08-Sep-09	RADARSAT	2012		
112	10-Sep-09	RADARSAT	154	18-Jul-2012	RADARSAT
113	13-Sep-09	RADARSAT	155	20-Jul-2012	RADARSAT
114	15-Sep-09	RADARSAT	156	22-Jul-2012	RADARSAT
115	10-Oct-09	RADARSAT	157	23-Jul-2012	RADARSAT
2010			158	25-Jul-2012	RADARSAT
116	17-Jul-10	RADARSAT	159	08-Aug-2012	RADARSAT
117	24-Jul-10	RADARSAT	160	20-Sep-2012	RADARSAT
118	26-Aug-10	RADARSAT	161	23-Sep-2012	RADARSAT
119	27-Aug-10	RADARSAT			

S. No	Date	Satellite/ Sensor	S. No	Date	Satellite/ Sensor
2013			203	08-Sep-2016	RISAT
162	13-Jul-2013	RADARSAT	204	09-Sep-2016	RISAT
163	15-Jul-2013	RADARSAT	205	10-Sep-2016	RISAT
164	17-Jul-2013	RADARSAT	206	13-Sep-2016	RISAT
165	23-Jul-2013	RISAT	207	14-Sep-2016	RISAT
166	25-Jul-2013	RADARSAT	208	15-Sep-2016	RISAT
167	08-Aug-2013	RADARSAT	209	19-Sep-2016	RADARSAT
168	11-Aug-2013	RADARSAT	210	21-Sep-2016	RISAT
169	18-Aug-2013	RADARSAT	211	22-Sep-2016	RISAT
170	24-Aug-2013	RADARSAT	2017		
171	25-Aug-2013	RADARSAT	212	02-Sep-2017	RADARSAT
172	28-Aug-2013	RADARSAT	213	04-Jul-2017	RADARSAT
173	30-Aug-2013	RADARSAT	214	04-Sep-2017	SENTINEL
174	04-Sep-2013	RADARSAT	215	07-Aug-2017	RADARSAT
175	06-Sep-2013	RISAT	216	08-Aug-2017	SENTINEL
176	07-Sep-2013	RISAT	217	13-Aug-2017	RADARSAT
177	11-Sep-2013	RADARSAT	218	17-Aug-2017	RESOURCESAT
2014			219	21-Aug-2017	RADARSAT
178	01-Sep-2014	RADARSAT	220	23-Aug-2017	RADARSAT
179	17-Aug-2014	RADARSAT	221	27-Aug-2017	RADARSAT
180	22-Aug-2014	MODIS TERRA	222	28-Aug-2017	RADARSAT
181	25-Aug-2014	RISAT	223	30-Aug-2017	RADARSAT
182	26-Aug-2014	RISAT	2018		
183	27-Aug-2014	RADARSAT	224	06-Jul-2018	RADARSAT
2015			225	09-Jul-2018	RADARSAT
184	03-Sep-2015	RISAT	226	06-Aug-2018	SENTINEL
185	19-Aug-2015	RISAT	227	13-Aug-2018	RADARSAT
186	27-Aug-2015	RADARSAT	228	15-Aug-2018	SENTINEL
187	30-Aug-2015	RADARSAT	229	16-Aug-2018	RADARSAT
2016			230	30-Aug-2018	SENTINEL
188	02-Aug-2016	RADARSAT	231	08-Sep-2018	SENTINEL
189	21-Jul-2016	RISAT	232	09-Sep-2018	SENTINEL
190	22-Jul-2016	RISAT	233	11-Sep-2018	RADARSAT
191	26-Jul-2016	RISAT	234	13-Sep-2018	RADARSAT
192	28-Jul-2016	RADARSAT	235	15-Sep-2018	SENTINEL
193	04-Aug-2016	RADARSAT	236	17-Sep-2018	RADARSAT
194	15-Aug-2016	RISAT	237	18-Sep-2018	MODIS TERRA
195	16-Aug-2016	RADARSAT	238	21-Sep-2018	RADARSAT
196	21-Aug-2016	RISAT	239	23-Sep-2018	RADARSAT
197	23-Aug-2016	RADARSAT	240	25-Sep-2018	RADARSAT
198	25-Aug-2016	MODIS TERRA	2019		
199	28-Aug-2016	RISAT	241	20-Sep-2019	RESOURCESAT
200	29-Aug-2016	RISAT	242	21-Sep-2019	MODIS
201	31-Aug-2016	RISAT	243	24-Sep-2019	RESOURCESAT
202	07-Sep-2016	RADARSAT	244	25-Sep-2019	RADARSAT

S. No	Date	Satellite/ Sensor
245	27-Sep-2019	SENTINEL
246	28-Sep-2019	RADARSAT
247	29-Sep-2019	SENTINEL
248	30-Sep-2019	SENTINEL
249	07-Oct-2019	RADARSAT
250	13-Jul-2019	SENTINEL
251	15-Jul-2019	RADARSAT
252	17-Jul-2019	RESOURCESAT
253	18-Jul-2019	RADARSAT
254	20-Jul-2019	RADARSAT
255	21-Jul-2019	RESOURCESAT
256	22-Jul-2019	RADARSAT
257	24-Jul-2019	SENTINEL
258	25-Jul-2019	RADARSAT
259	27-Jul-2019	RADARSAT
260	28-Jul-2019	RADARSAT
261	31-Jul-2019	RESOURCESAT
262	01-Aug-2019	RADARSAT
263	03-Aug-2019	RADARSAT
264	04-Aug-2019	RADARSAT
265	05-Aug-2019	SENTINEL
266	03-Oct-2019	ALOS2-PALSAR
267	05-Oct-2019	SENTINEL
268	06-Oct-2019	RADARSAT
269	07-Oct-2019	RADARSAT
270	08-Oct-2019	RADARSAT
271	14-Oct-2019	RESOURCESAT
272	22-Aug-2019	RESOURCESAT
273	25-Aug-2019	SENTINEL
274	18-Sep-2019	RADARSAT

3.2 APPROACH

All satellite datasets were analyzed and flood layers were extracted. The flood layers corresponding to each year are combined and annual flood inundation layer was generated which represents maximum flooded area in that year. The annual flood layers for 22 years were integrated into a flood hazard layer representing the flood inundated areas with different frequencies. The flood hazard has been classified into 5 categories based on the frequency of inundation as finalized by the expert committee constituted by NDMA, Delhi. The flood hazard area under each category for each district was also estimated. State and district-wise flood hazard maps are composed showing the various flood hazard categories. Further, to assess the severity of flood in each district with respect to flood hazard category, hazard area and intra annual variations (the number of flood peaks in a year), a flood hazard index is computed. Major steps involved in preparation of flood hazard zonation maps are described below.

Satellite data Acquisition: Satellite data acquired from Indian Remote Sensing Satellites (IRS) and other satellites as mentioned in previous section during the flood season in Bihar from 1998-2019 have been used. The water levels observed at different gauge stations were closely monitored during floods and attempts were made to program the satellite data during near peak situations. Satellite data was also programmed and procured during progression and recession of the flood wave for studying the impact of the flood.

Rectification: The acquired satellite datasets were rectified to a defined projection system for positional accuracy.

Flood inundation layer: Using image processing classification algorithms water layer was classified from the satellite data and integrated with the pre-flood river and water bodies layer to extract flood inundation layer.

Annual Flood Layer: The flood inundation layers generated for different flood waves in a calendar year were integrated to generate the cumulative flood inundation extent in that year.

Hazard layer: The annual cumulative flood inundation layers corresponding to 22 years (1998-2019) were integrated for assessing the frequency of inundation and subsequent generation of hazard layer. Hazard map has been classified into five classes as recommended by the expert committee constituted by NDMA.

Database integration: The hazard layer was further integrated with the database consisting of administrative boundaries, landuse/ landcover, infrastructure, etc. for impact assessment and statistics generation.

Map Composition: Flood hazard maps were composed at State and District levels comprising of base details and hazard layer.

Intra Annual Variations: The number of flood waves/peaks for each year has been calculated based on the water level data of 40 gauge stations collected from Central Water Commission. The affected districts for each flood wave in a particular year have been examined by correlating with satellite data observation and annual flood wave index was provided for each district.

Flood Hazard Index: Considering the flood hazard category, hazard area and intra annual variations (the number of flood peaks in a year), a flood hazard index is computed for each district.

The methodology adopted for generation of flood hazard index is shown in Figure 30

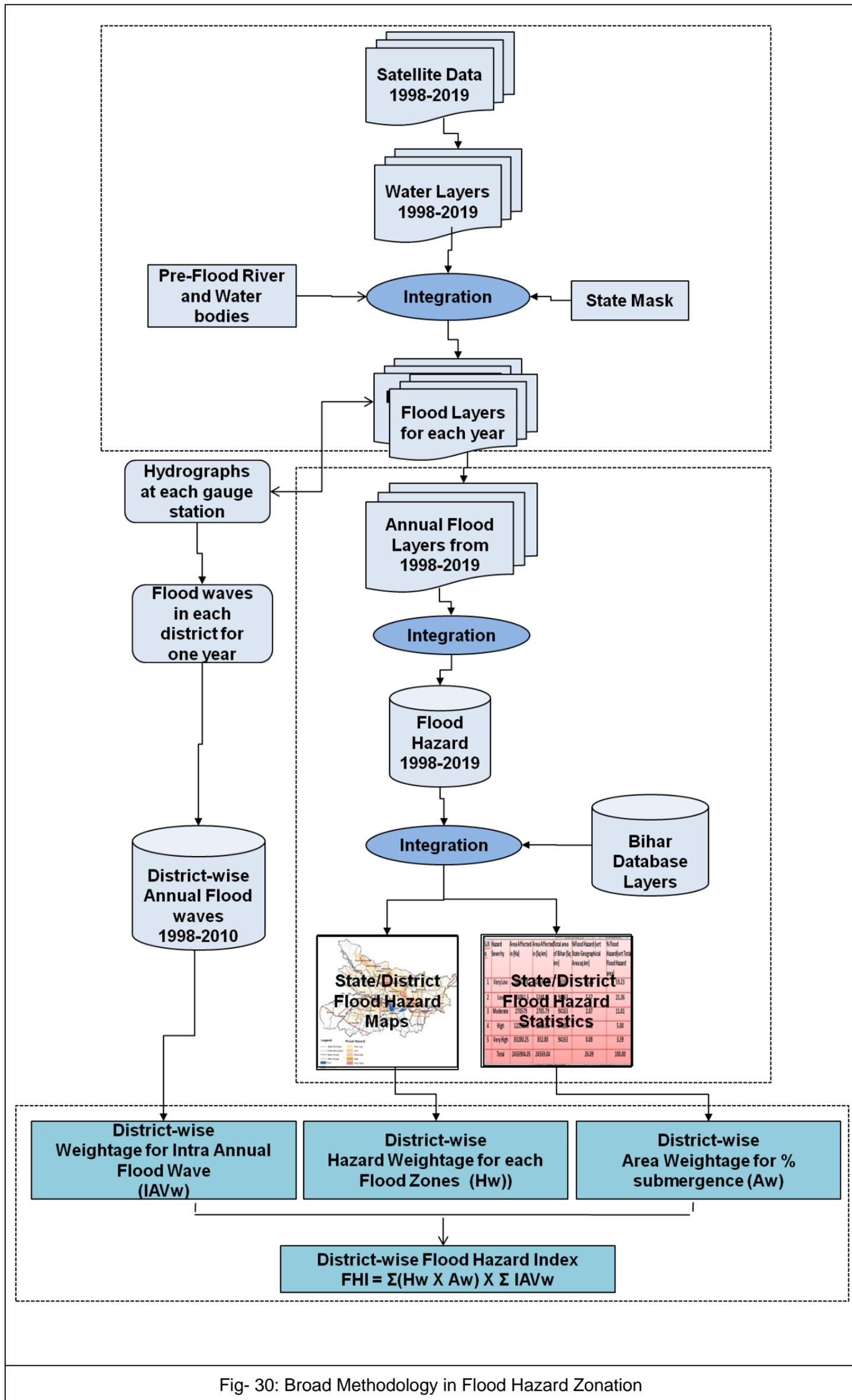


Fig- 30: Broad Methodology in Flood Hazard Zonation

3.3 FLOOD HAZARD ZONATION SCHEMA

To normalize Flood Hazard classes at national level, National Disaster Management Authority (NDMA) conducted an expert committee meeting in 2019 to define the classification schema. Based on suggestions given by the expert committee, flood hazard layer has been classified into 5 classes. Twenty two years of satellite data was used for deriving the flood hazard layer. The hazard layer highlights the frequency of flooding in any area during last 22 years. The flood hazard has been classified into 5 categories based on frequency of inundation. Very Low category indicates the areas, which are inundated once or twice during the 22-year period. Similarly, Low indicates three to five times, Moderate indicates six to nine times, High indicates ten to thirteen times and Very High indicates greater than thirteen times. To facilitate better visualization, colour coding scheme has been adopted for different hazard zones as shown in the table 10.

Table 10: Flood Hazard Zonation Schema

Sl.No	Flood Hazard Classification	Colour coding scheme	Number of times / years the area was subjected to flood inundation during 1998-2019
1	Very Low		1-2 times
2	Low		3-5 times
3	Moderate		6-9 times
4	High		10-13 times
5	Very High		>13 times (almost every year)

3.4 INTRA ANNUAL FLOOD VARIATIONS

The intra annual flood variations have been considered for calculation of final Flood Hazard Index for each district in Bihar. The flood variations for each year are estimated based on the number of flood waves in each year. Daily water level data of about 40 gauge stations for the said 22 years has been collected from Central Water Commission and analysed thoroughly. The hydrographs for each river at each gauge station were drawn to calculate the number of flood waves /peaks. The affected districts for each flood wave in a particular year have been examined by correlating with satellite data observation and annual flood wave index was provided for each district. Other collateral information was used to estimate the flood waves where ever hydrographs are not available. Figure 31 shows the hydrograph of Adhwara group of rivers at Kamtaul from 2001 to 2018 as an example.

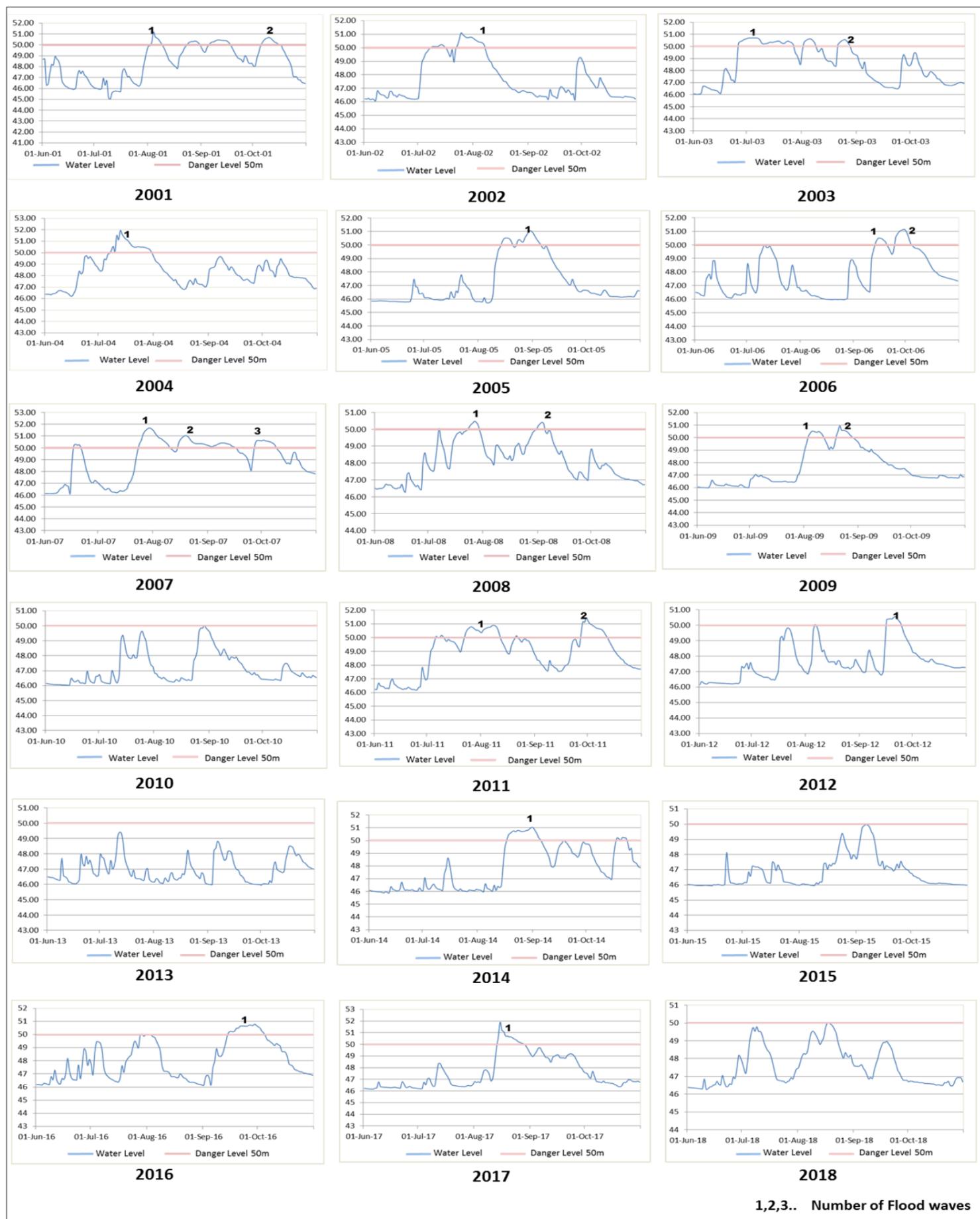


Fig. 31 Hydrograph for Adhwara group of rivers at Kamtaul from 2001 to 2018.

3.5 FLOOD HAZARD INDEX

Flood hazard index (FHI) for each district is calculated using the following formula

$$\text{Flood Hazard Index} = \sum (\text{Hazard Category (Hw)} \times \text{Hazard Area (Aw)}) \times \sum \text{Intra Annual Variations (IAVw)}$$

1. Weightages were given to each category of flood hazard (H) and are shown in Table 11
2. Weightages were given as per the percentage of flood hazard area (A) in the district as shown in the Table 12
3. Weightages were also given to the number of times a particular district is affected by flood waves (F) annually as shown in the Table 13
4. Flood hazard index is derived for each district by using above formula. Further the flood hazard index obtained has been regrouped into five classes (Refer Table 14)

Hazard Zones	Weightage for Hazard Zones (Hw)
Very High	5
High	4
Moderate	3
Low	2
Very Low	1

Percentage of District Hazard area	Weightage (Aw)
0-10 %	1
11-20%	2
21-30%	3
31-40%	4
41-50%	5
51-60%	6
61-70%	7
71-80%	8
81-90%	9
91-100%	10

Intra Annual Variations 1998-2019	Weightage for Intra Annual Variations (IAVw)
>25	6
25 to 20	5
19 to 15	4
14 to 10	3
9 to 5	2
<5	1

Flood Hazard Index (H*A*F)	Flood Hazard Index
>150	I (Very High)
150 to 100	II (High)
100 to 75	III (Moderate)
75 to 50	IV (Low)
<50	V (Very Low)

3.5.1. Computation of Flood Hazard Index for Darbhanga District

Computation of Flood Hazard Index for Darbhanga ditrict is explained below as an example. Hazard weightages (Hw) are given to each category of flood hazard and are shown in Table 15. Area weightages (Aw) are given as per the percentage of flood hazard area in each category for the district as shown in Table 15.

Table 15: Flood Hazard Index for Darbhanga District

District	Geographical Area (Hectares)	Flood Hazard Zones (H)	Hazard Weightage for each Flood Zones (Hw)	Percentage of Area Submerged (A)	Area Weightage for % submergence (Aw)	Hw*Aw	Total Σ Hw*Aw
Darbhanga	227900	Very High	5	14.65	2	10	
		High	4	8.97	1	4	
		Moderate	3	16.45	2	6	29
		Low	2	23.56	3	6	
		Very Low	1	23.48	3	3	

Weightages were also given to the number of times a particular district is affected by flood waves (IAVw) annually as shown in the Table16.

Table 16 Intra Annual Flood waves for Darbhanga District

District	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	Toatal Flood waves (Σ IAV)	Annual Flood Wave (Σ IAVw)
Darbhanga	9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	9	9	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	43	6

Flood hazard index is derived for Darbhanga district by using $(\Sigma(H_w \times A_w) \times \Sigma IAV_w) = 29 \times 6 = 174$. Similar approach is followed for other remaining 37 districts.

3.6 LIMITATIONS OF THE STUDY

The flood hazard zonation was carried out with available satellite data with NRSC. The satellite coverage may not correspond to the peak flooding in all cases. Further, all river gauge stations need not record the peak situation on a single day. For states like Bihar where the topography is quite gentle, the flood inundation remains same for few days, even after the peak has passed. Hence, in most of the cases, satellite data acquired even after the flood peak resembles the peak situation. Observed flood inundation may include flooding due to embankment breaches and also due to rainwater accumulation in low lying areas. Some flash floods and minor floods that were not covered by satellite data during this period are not represented in the hazard atlas.

4.0 OBSERVATIONS

4.1 FLOOD HAZARD ZONES

Based on the analysis of 274 satellite datasets, acquired during the floods of 1998-2019, the flood hazard layer of the Bihar State is derived as shown in the figure 32. Table 17 shows the flood hazard area computed under various hazard categories. The observations made from the flood hazard analysis are;

It is observed that about 37.24% (35.06 lakh hectares) of land in Bihar state is affected by flood during 1998-2019 out of the total state geographical area 94.16 lakh hectares (Table 17).

Out of total 35.06 lakh hectares of flood affected area, about 1.21 lakh hectares of land falls under very high (greater than 13 times), 1.71 lakh hectares under high (inundated 10-13 times) flood hazard categories. Figure 33 shows the percentage distribution of the flood hazard area under different categories with respect to the total geographical area.

About 3.99 lakh hectares is under moderate (inundated 6-9 times) flood hazard category, whereas 9.22 lakh hectares under low (inundated 3-5 times) hazard and about 21.11 lakh hectares under very low (inundated 1-2 times) flood hazard. Figure 34 shows the Flood Hazard Ranking Index Map.

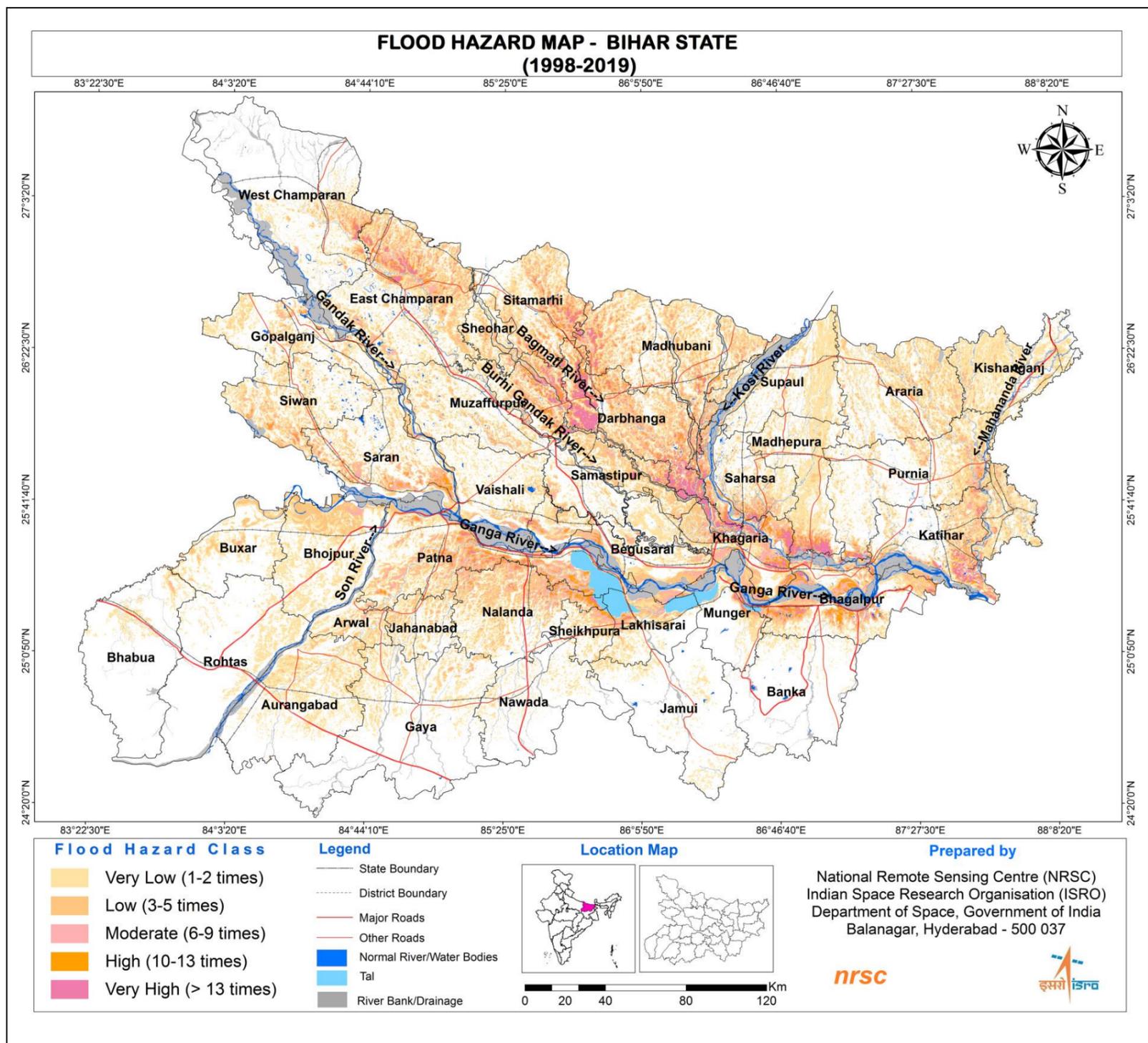


Fig. 32 Flood Hazard map of Bihar

Table 17: Flood Hazard Area under Various Categories

Sl. No	Hazard Severity	Flood Hazard Area (ha)	% Flood Hazard (wrt State Geographic Area)	% Flood Hazard (wrt Total Flood Hazard Area)
1	Very High	113481	1.21	3.24
2	High	160952	1.71	4.59
3	Moderate	376118	3.99	10.73
4	Low	867740	9.22	24.75
5	Very Low	1987890	21.11	56.70
	TOTAL	3506181	37.24	100

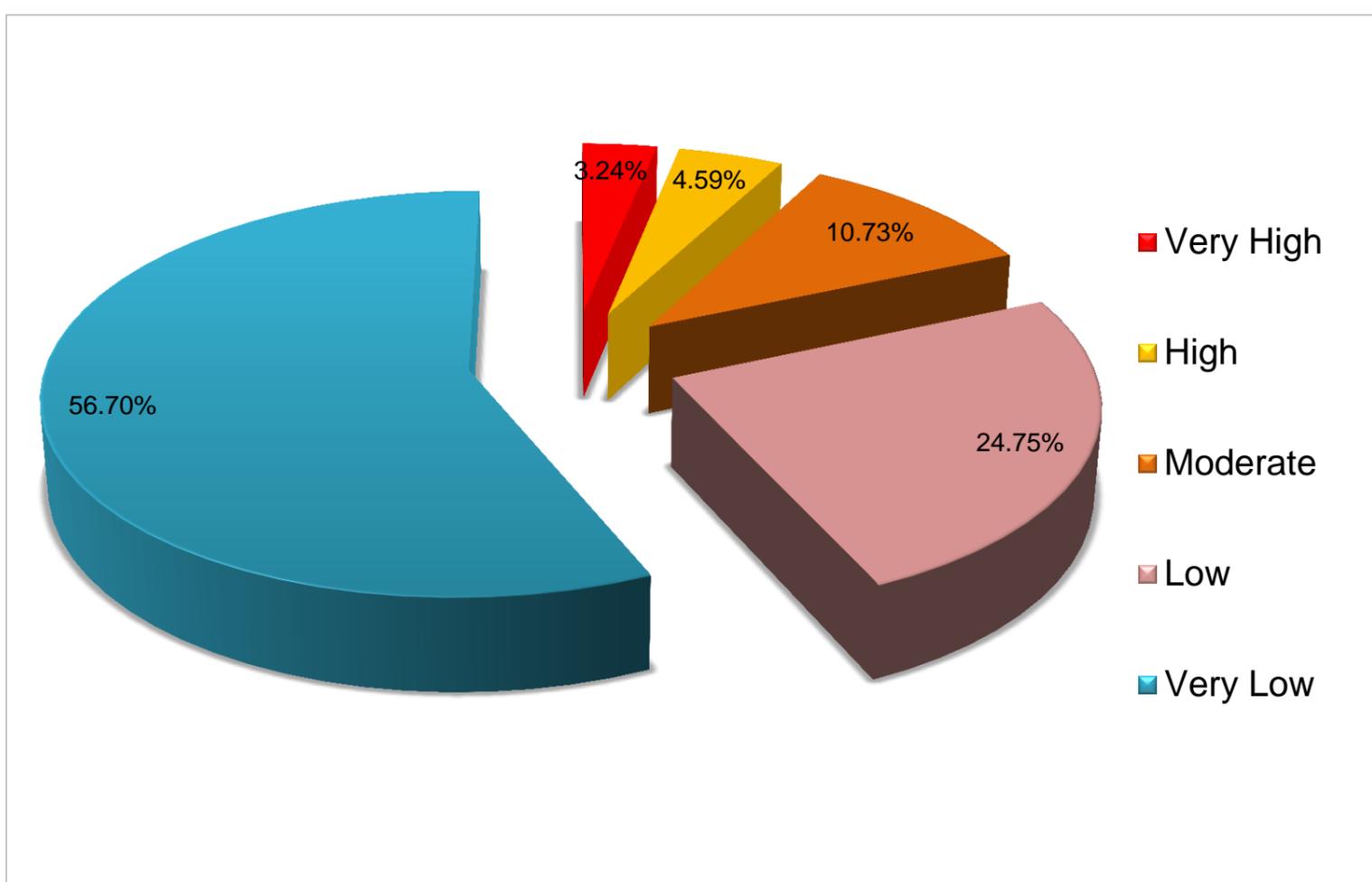


Fig. 33 Percentage of various hazard categories with respect to total geographical area in the state

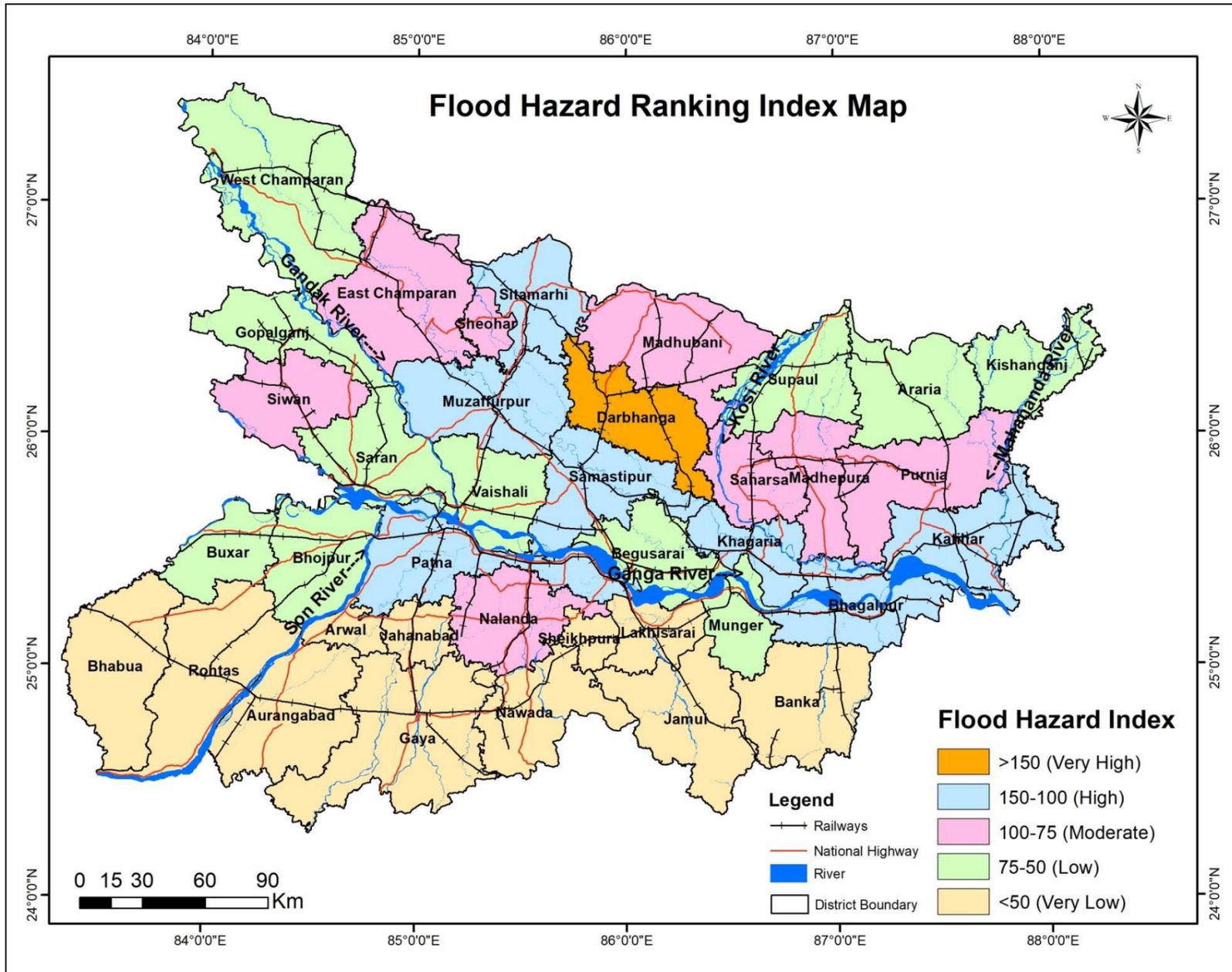
Darbhanga, Khagaria, Sitamarhi, Katihar, Muzaffarpur, Patna, Bhagalpur, Samastipur, East Champaran, Madhubani, Nalanda, Saharsa, Madhepura, Purnia and Sheohar are the fifteen worst flood affected districts in Bihar. Table 18 provides district-wise details of the flood hazard index

Annexure-1 shows district wise flood hazard maps and tables.

Table 18 District-wise Flood Hazard Index

District	District Area (Hectares)	Total Flood Inundated Area (Hectares)	% Flood Hazard Area	Flood Hazard Index FHI= $\Sigma (Hw*Aw) * \Sigma (IAVw)$
Darbhanga	227900	198559	87	174
Khagaria	148600	106314	72	126
Sitamarhi	220000	141752	64	120
Katihar	305700	154715	51	114
Muzaffarpur	317200	159812	50	114
Patna	320200	169725	53	110
Bhagalpur	256900	116133	45	108
Samastipur	290400	130926	45	108
East Champaran	396800	217660	55	95
Madhubani	350100	214910	61	95
Nalanda	235500	133094	57	95
Saharsa	170200	83734	49	95
Madhepura	178800	96348	54	90
Purnia	322900	114132	35	85
Sheohar	44300	23738	54	80
Siwan	221900	98363	44	76
Araria	283000	138003	49	72
Saran	264100	109878	42	72
Supaul	241000	93249	39	72
Begusarai	191800	83205	43	68
Gopalganj	203300	71648	35	68
Munger	141900	30448	21	64
Vaishali	203600	55570	27	64
West Champaran	522800	68285	13	60
Bhojpur	247400	111039	45	57
Kishanganj	188400	104972	56	57
Aurangabad	330500	91509	28	34
Buxar	162400	53226	33	51
Gaya	497600	63719	13	48
Bhabua	336200	20942	6	45
Nawada	249400	21875	9	45
Arwal	63800	31373	49	40
Sheikhpura	68900	33403	48	38
Jahanabad	156900	41261	26	32
Lakhisarai	122800	42629	35	32
Jamui	309800	25211	8	30
Rohtas	385100	36964	10	30
Banka	302000	11376	4	15

Fig. 34 Flood Hazard Ranking Index Map



4.2 CROPPED AREA INUNDATED BY FLOODING

The cropped area (consisting of kharif, double/triple crop categories) was extracted from the landuse / land cover information (generated under ISRO-NRC project using 2018-19 satellite data) and integrated with the various flood hazard categories. District-wise crop area under each flood hazard category has been computed. From the district-wise cropped area in different flood hazard zones it can be observed that about 30.90 lakh hectares of cropped area is under various categories of flood hazard. Out of which about 2.52 lakh hectares of land falls under very high to high flood hazard and 3.47 lakh hectares under the moderate flood hazard category. District-wise details of cropped area in different flood hazard zone are given in Table 19. It is found that Darbhanga, Khagaria, Katihar and Muzaffarpur districts have maximum cropped area under very high to high flood hazard categories.

Table 19: District-wise cropped area (in hectares) in different flood hazard zones

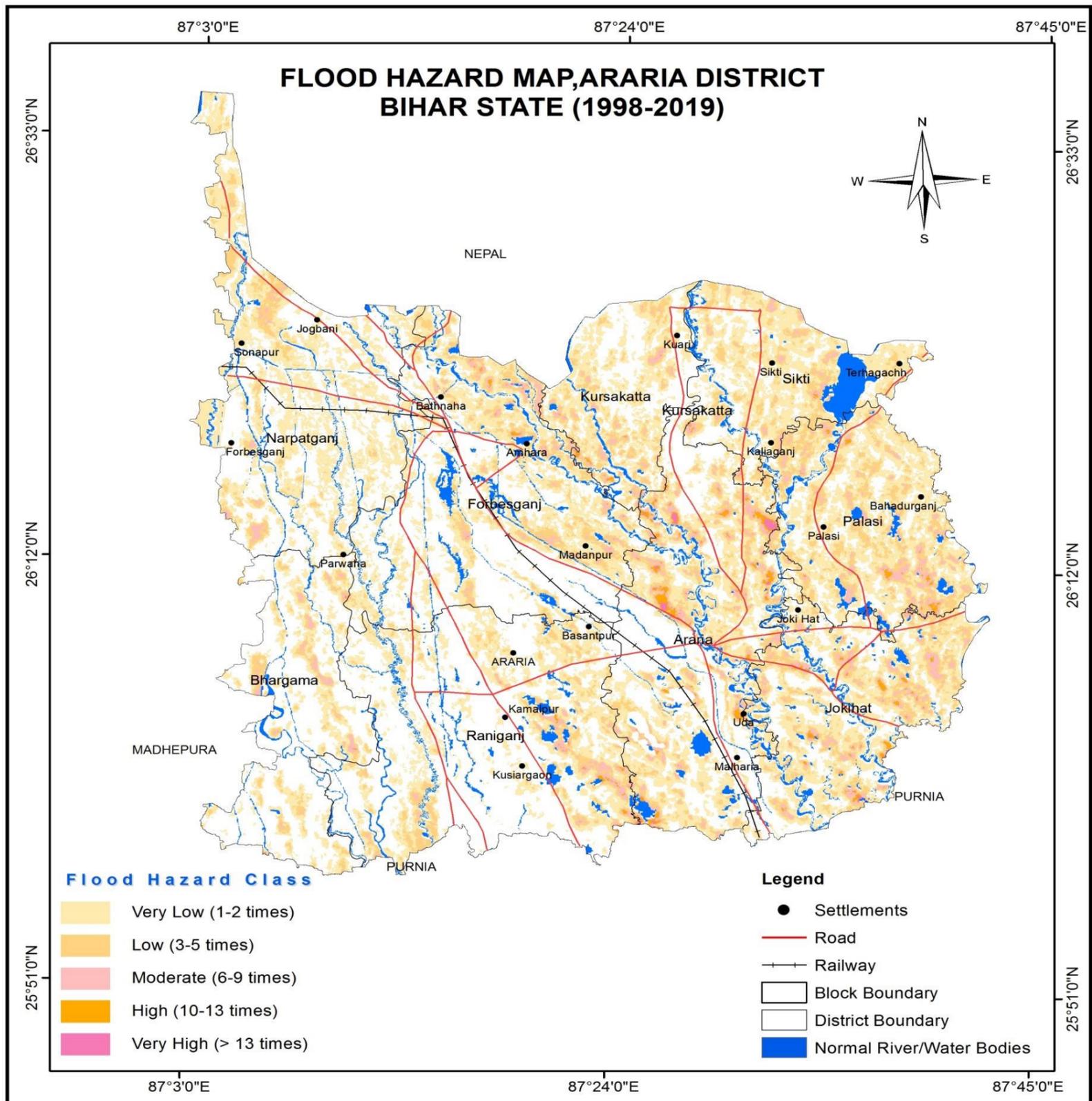
District	Very High	High	Moderate	Low	Very Low	Total
Darbhanga	30811	19133	33114	47316	40258	170632
Khagaria	12192	12704	20904	25864	21572	93237
Katihar	7618	8029	17915	36543	66329	136434
Muzaffarpur	7032	9654	17381	36824	68790	139680
Madhepura	6606	3678	4656	11528	61689	88157
Madhubani	6127	10024	24592	55373	92855	188971
Samastipur	5976	5076	11842	45369	49089	117352
East Champaran	5910	9832	28494	61821	90576	196633
Sitamarhi	5345	9423	19044	30902	54426	119141
Saharsa	4787	6598	11561	16897	33841	73683
Bhagalpur	4151	13766	20254	25985	35083	99239
Patna	2047	13058	33067	44607	52413	145191
Purnia	1891	2582	7000	24460	65397	101329
Nalanda	1447	6202	21225	44921	52448	126244
West Champaran	1400	2027	5246	14487	40403	63564
Munger	485	1331	4001	6525	12338	24681
Siwan	280	1806	7032	25190	58082	92389
Lakhisarai	239	784	4758	12454	22701	40936
Vaishali	167	439	2587	10095	35062	48350
Saran	157	6190	17436	29020	46387	99191
Begusarai	134	1573	10618	18129	41127	71581
Araria	90	730	5003	30285	85076	121185
Sheohar	81	575	2482	9313	17543	29993
Sheikhpura	47	1038	3025	7036	11744	22891
Gopalganj	33	464	3566	11300	49623	64987
Supaul	25	329	2281	10192	67980	80808
Arwal	0	4	1706	9643	19605	30958
Aurangabad	0	0	132	11143	71063	82337
Banka	0	0	0	241	10058	10299
Bhabua	0	0	239	1415	19374	21028
Bhojpur	0	0	2239	29125	69619	100984
Buxar	0	0	490	10065	33033	43589
Gaya	0	0	382	6399	47090	53871
Jahanabad	0	0	1400	11914	25766	39080
Jamui	0	0	0	445	11573	12018
Kishanganj	0	46	1402	10958	76643	89049
Nawada	0	0	0	364	16330	16694
Rohtas	0	0	0	50	34230	34280
TOTAL	105079	147096	347077	784195	1707219	3090666

4.3 GROUND VALIDATION

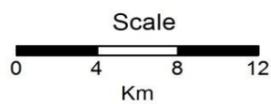
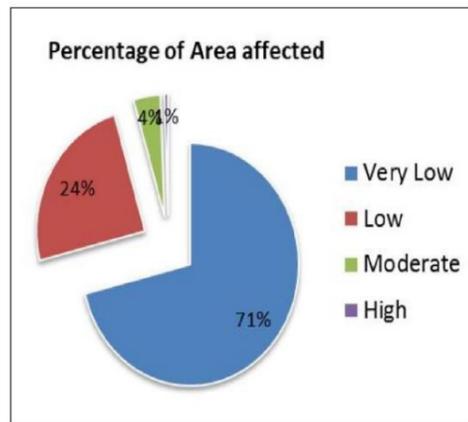
Ground Validation is a vital process before the product is used by end user. The flood hazard map, District, Block villages under different flood hazard categories were provided to Disaster Management Department, Government of Bihar (Patna) for ground validation.

Disaster Management Department has done extensive ground validation of the satellite based observations through its concerned Govt officers. Minor suggestions/modifications provided by Disaster management department officials based on ground report is incorporated in the flood hazard atlas and accordingly in the district level maps.

ANNEXURE - I
DISTRICT-WISE FLOOD HAZARD MAPS & TABLES

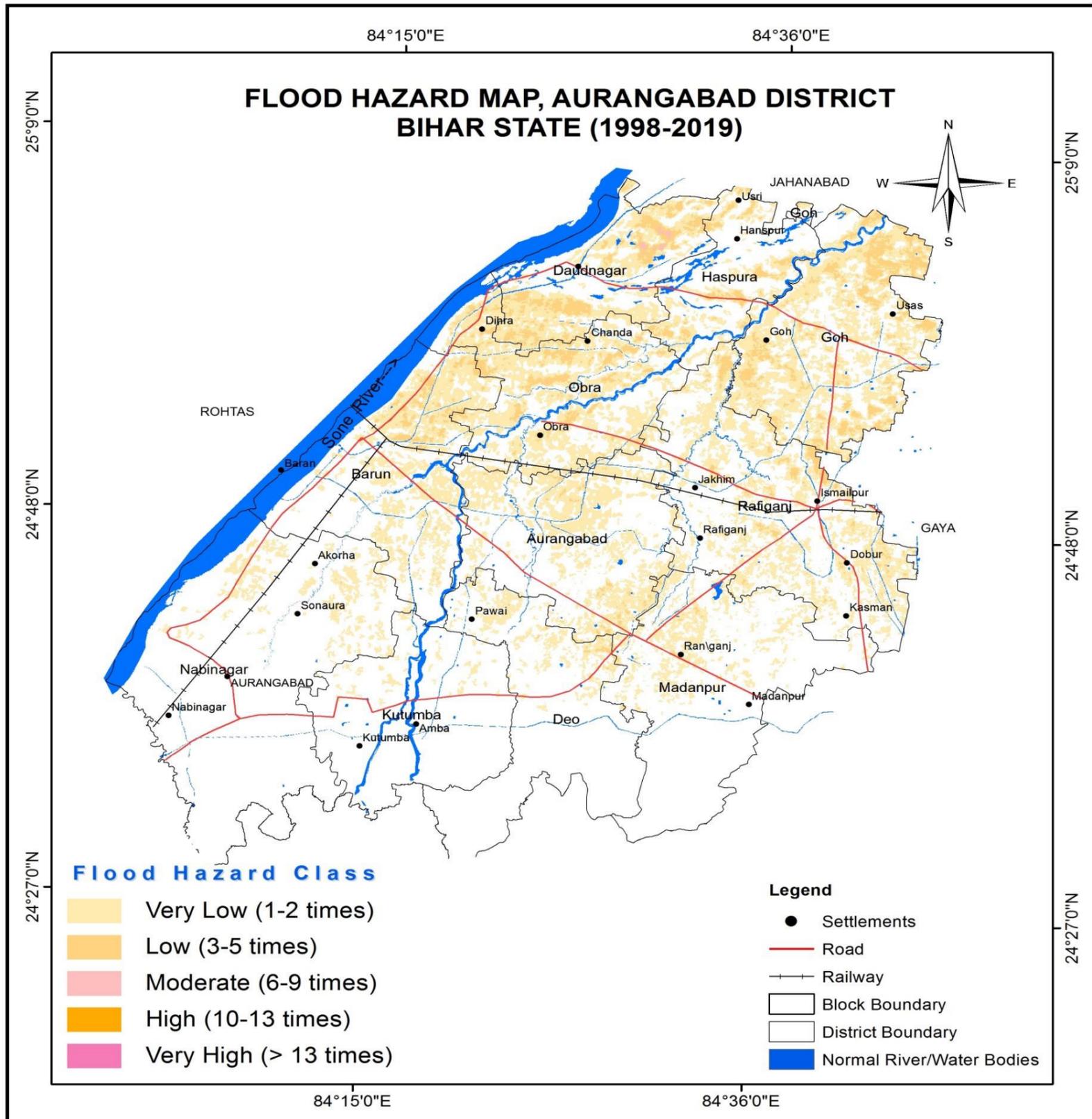


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	98425
2	Low	33647
3	Moderate	5559
4	High	769
5	Very High	97
Total		138497

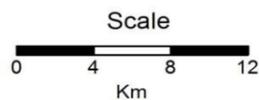
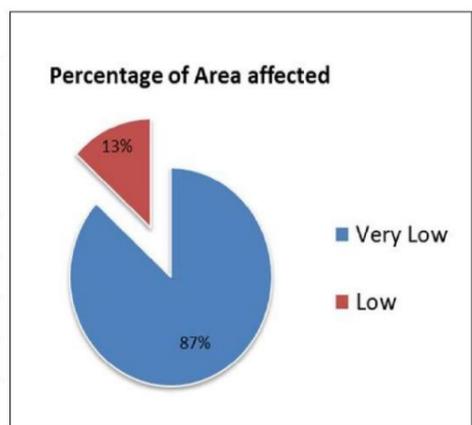


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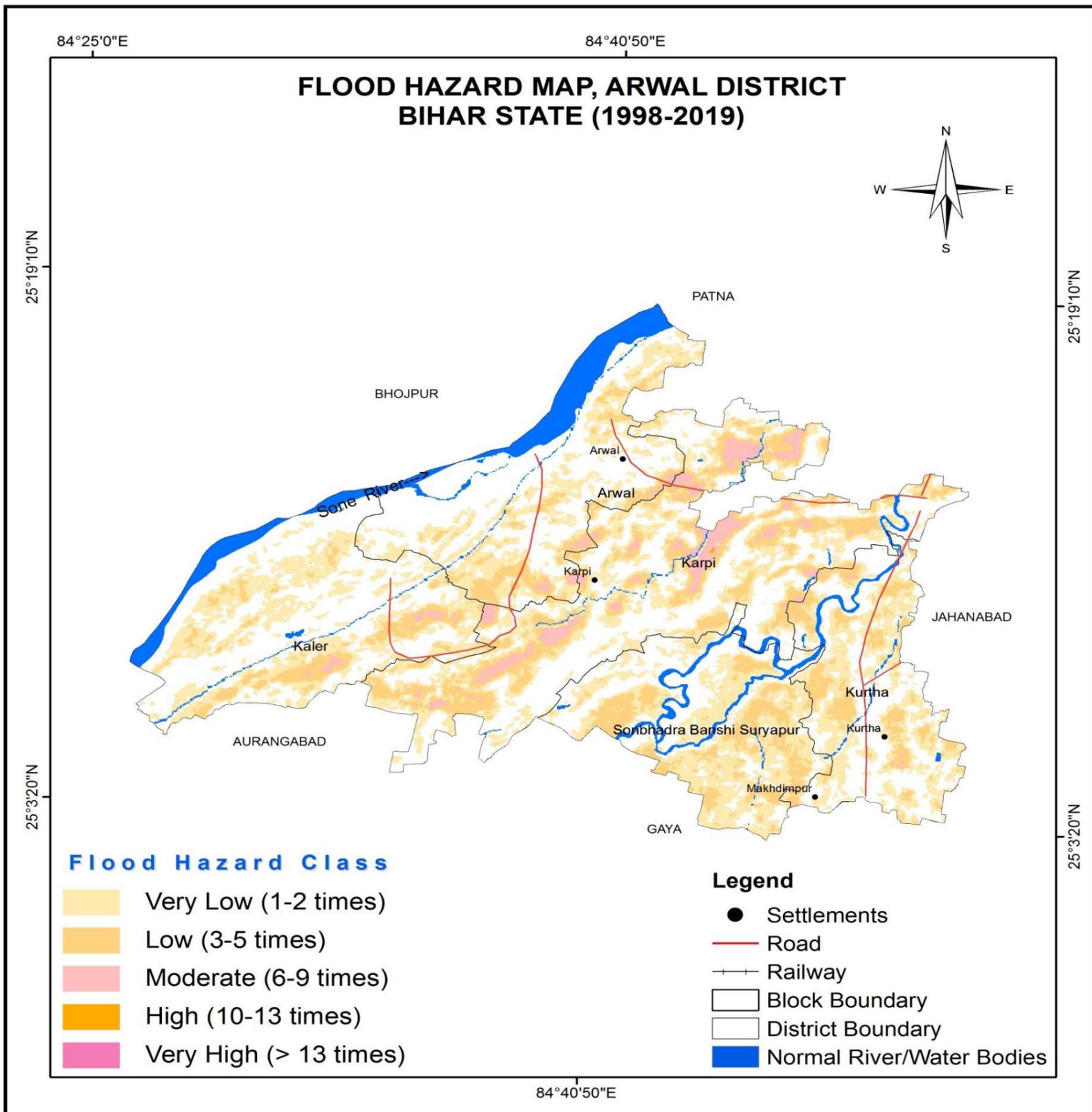


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	79665
2	Low	12326
3	Moderate	140
4	High	0
5	Very High	0
Total		92131

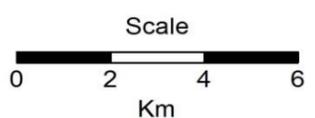
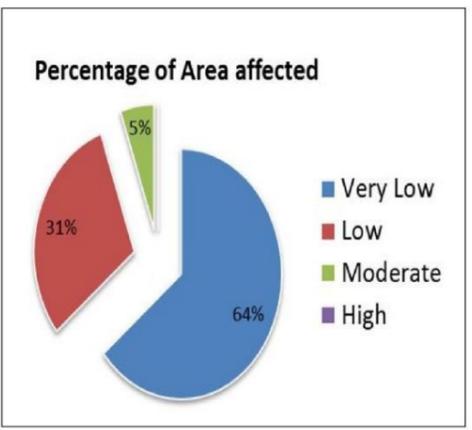


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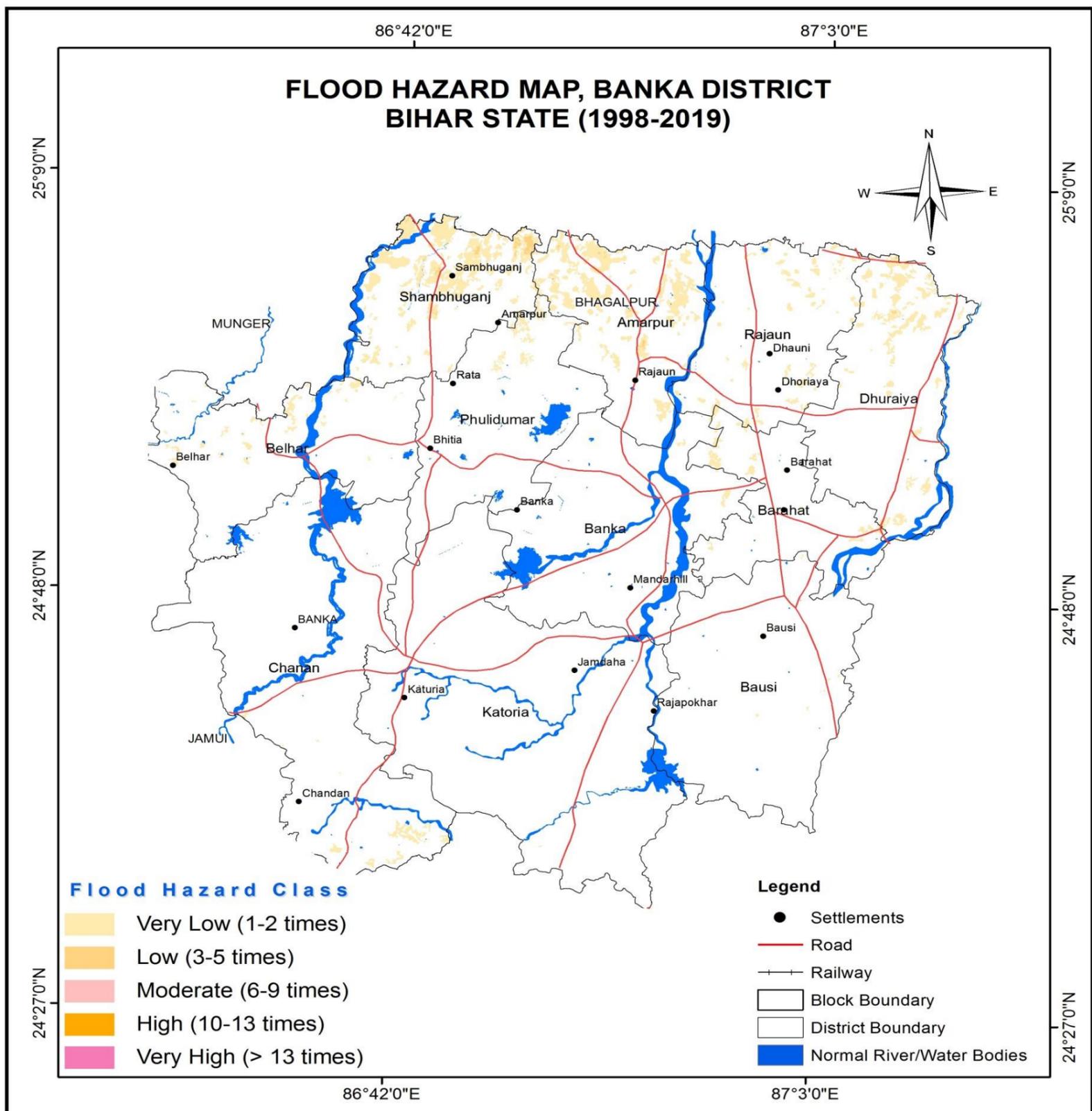




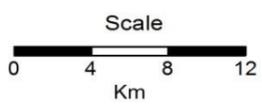
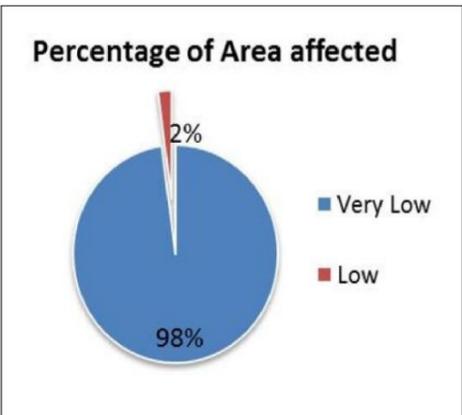
S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	20854
2	Low	9928
3	Moderate	1759
4	High	5
5	Very High	0
Total		32545



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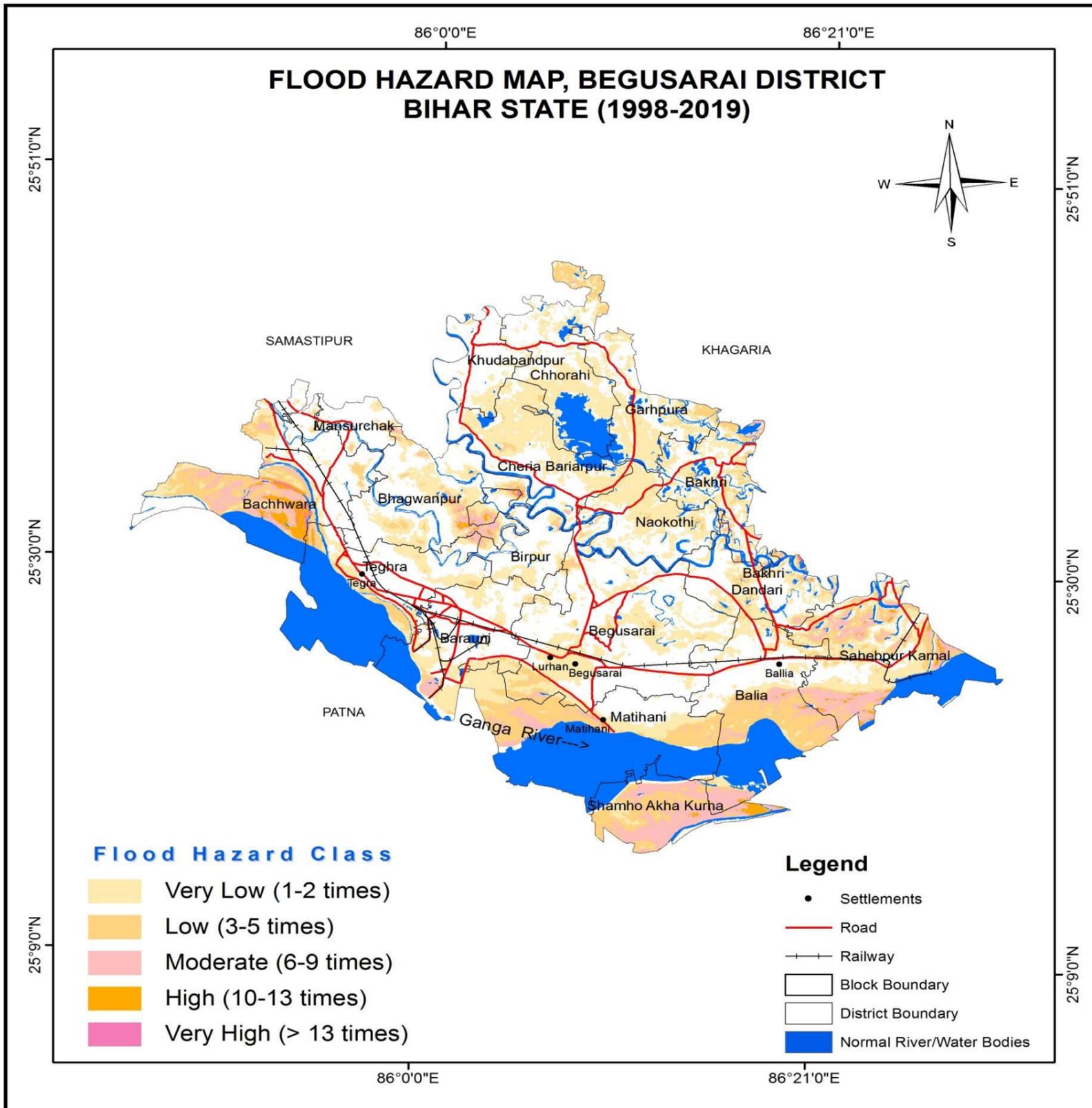


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	11550
2	Low	255
3	Moderate	0
4	High	0
5	Very High	0
Total		11805

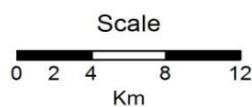
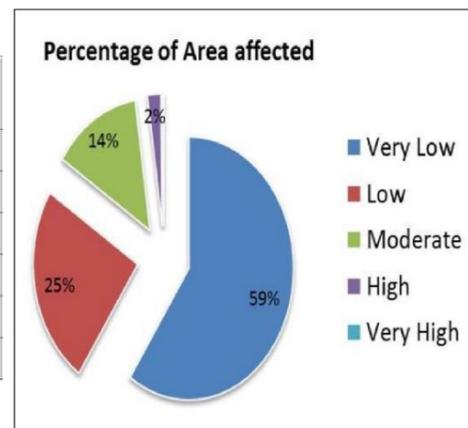


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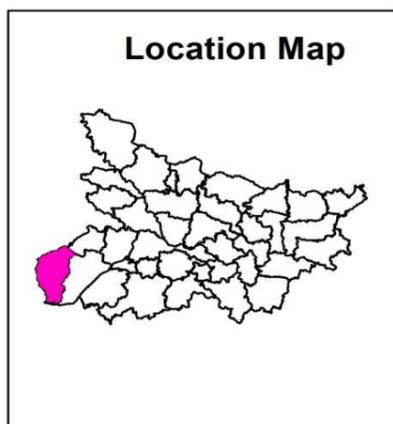
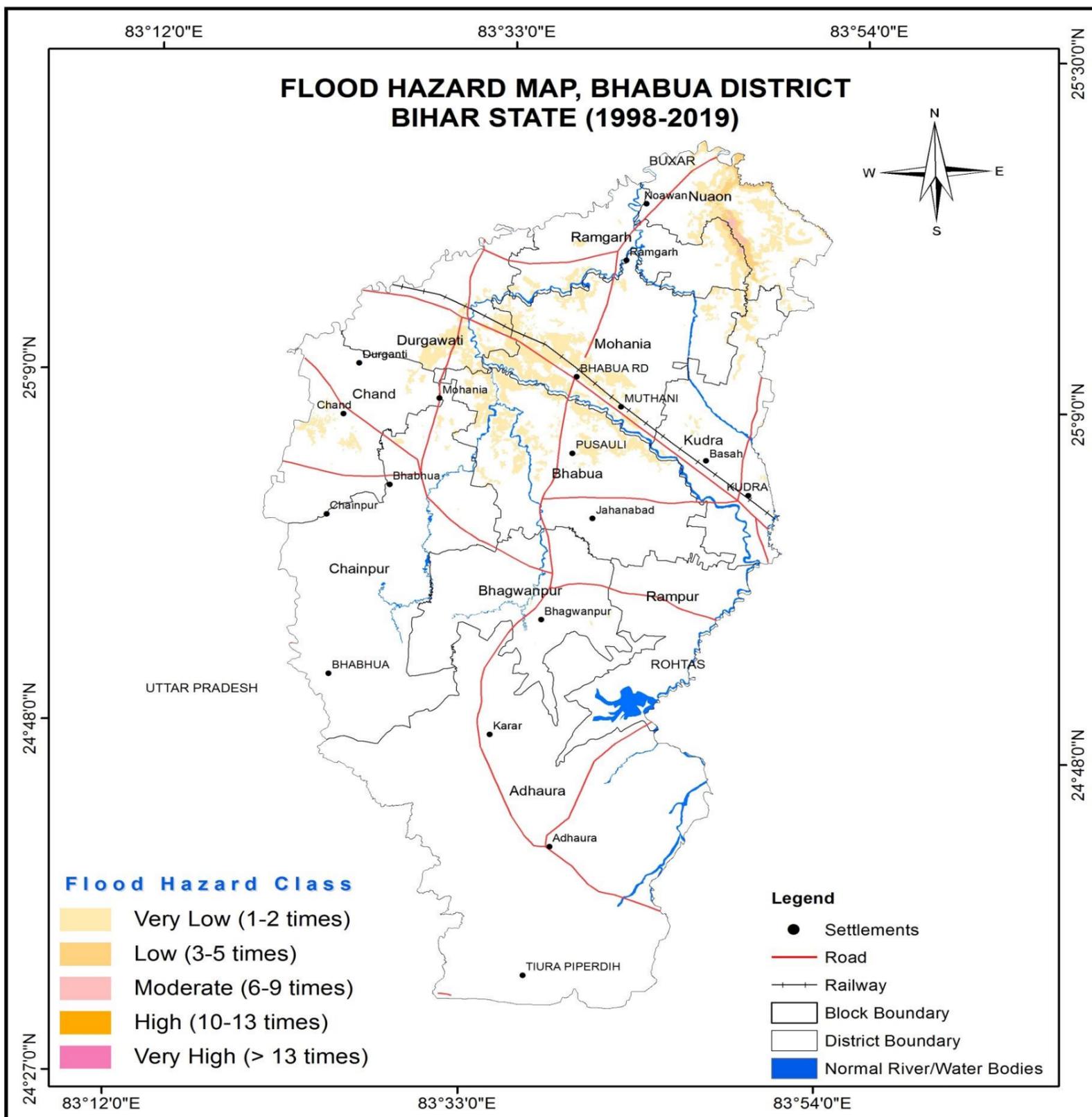


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	49323
2	Low	20429
3	Moderate	11261
4	High	1722
5	Very High	163
Total		82897

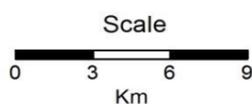
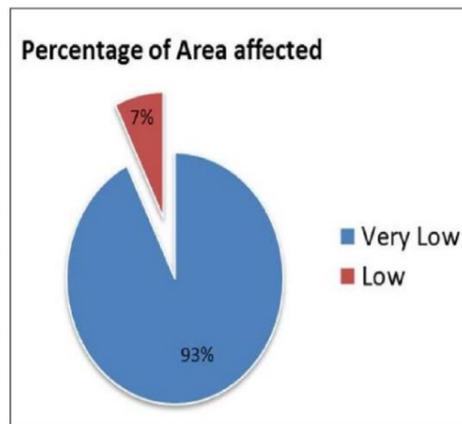


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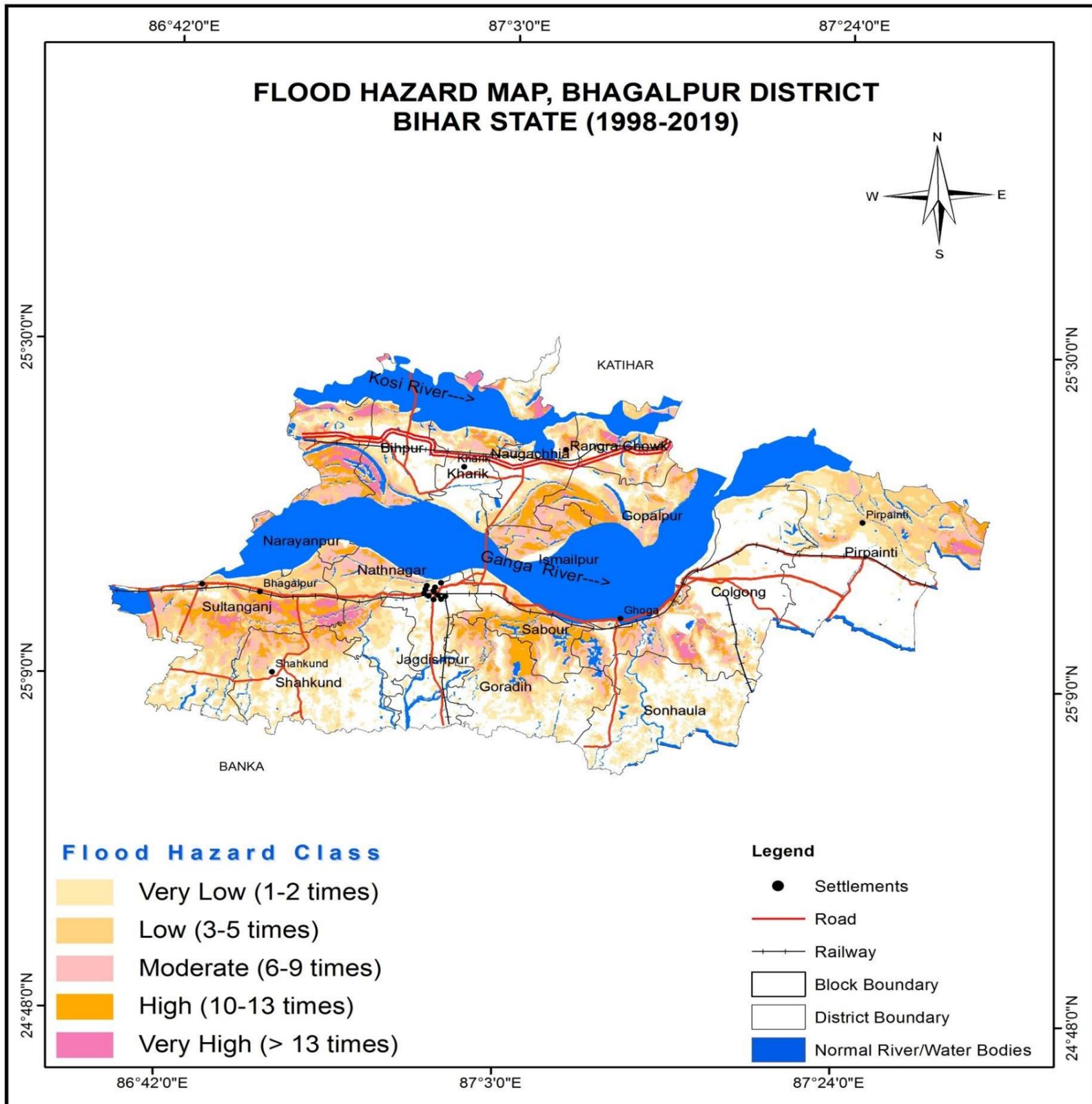


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	20544
2	Low	1617
3	Moderate	259
4	High	0
5	Very High	0
Total		22420

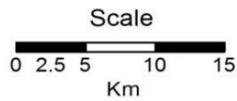
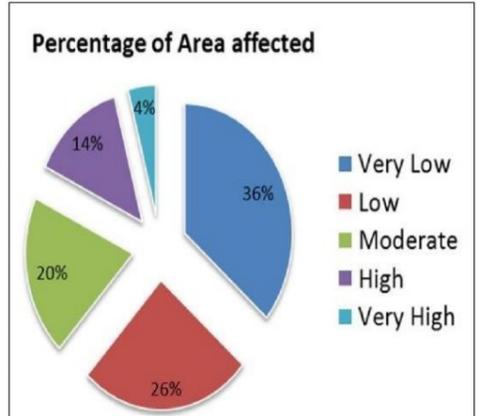


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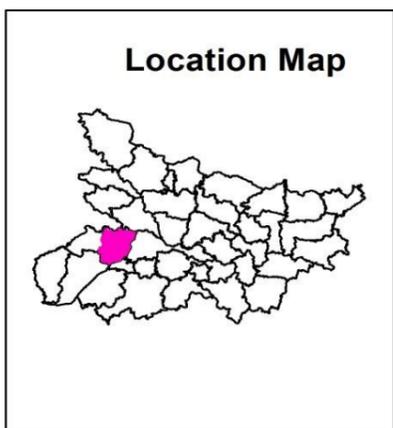
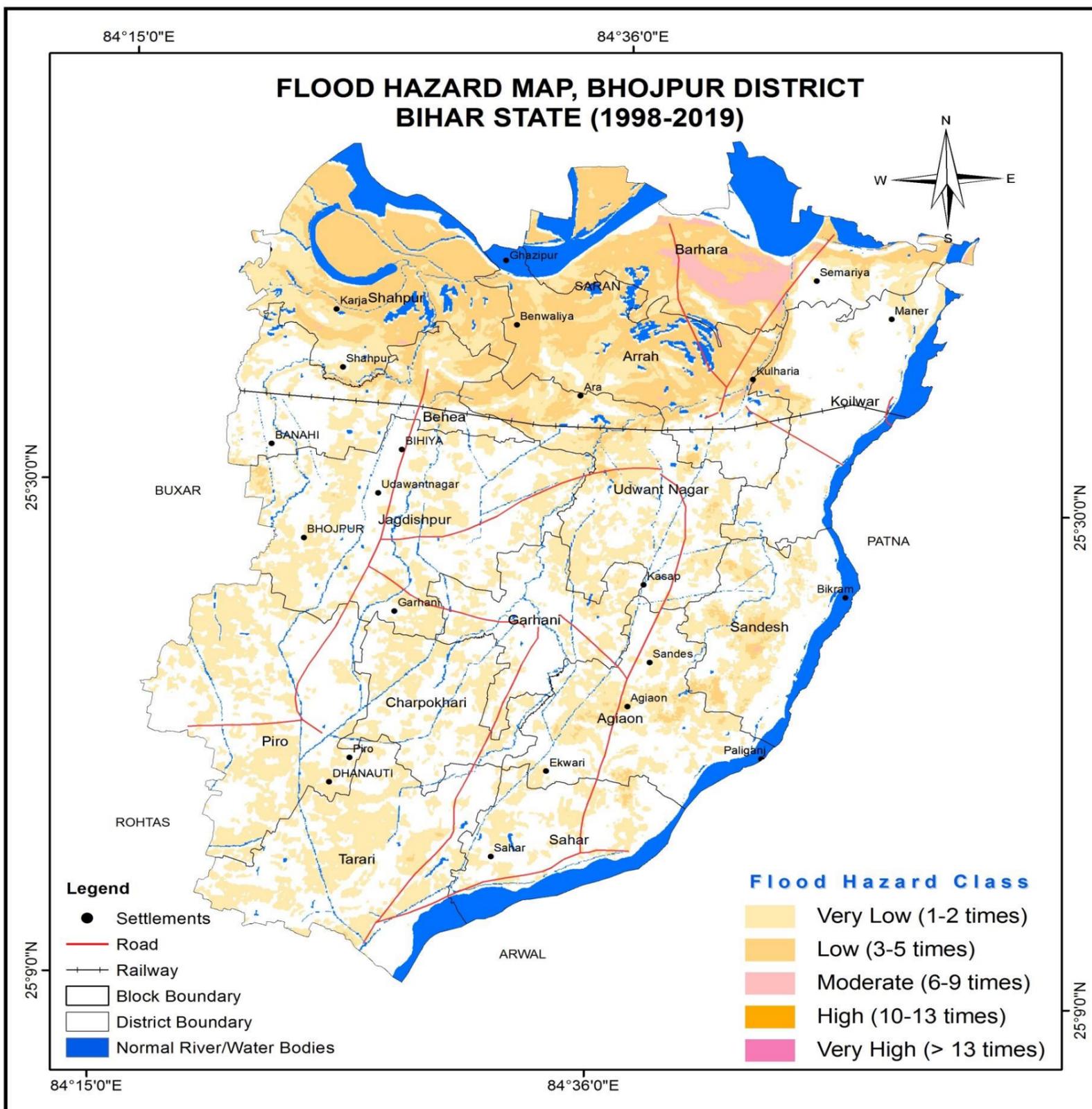




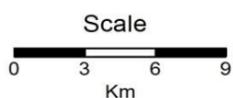
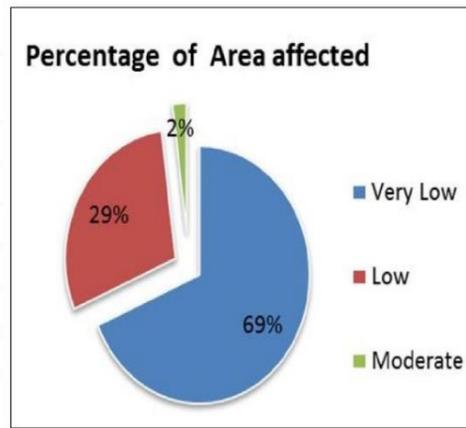
S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	42585
2	Low	30208
3	Moderate	23515
4	High	16171
5	Very High	4928
Total		117407



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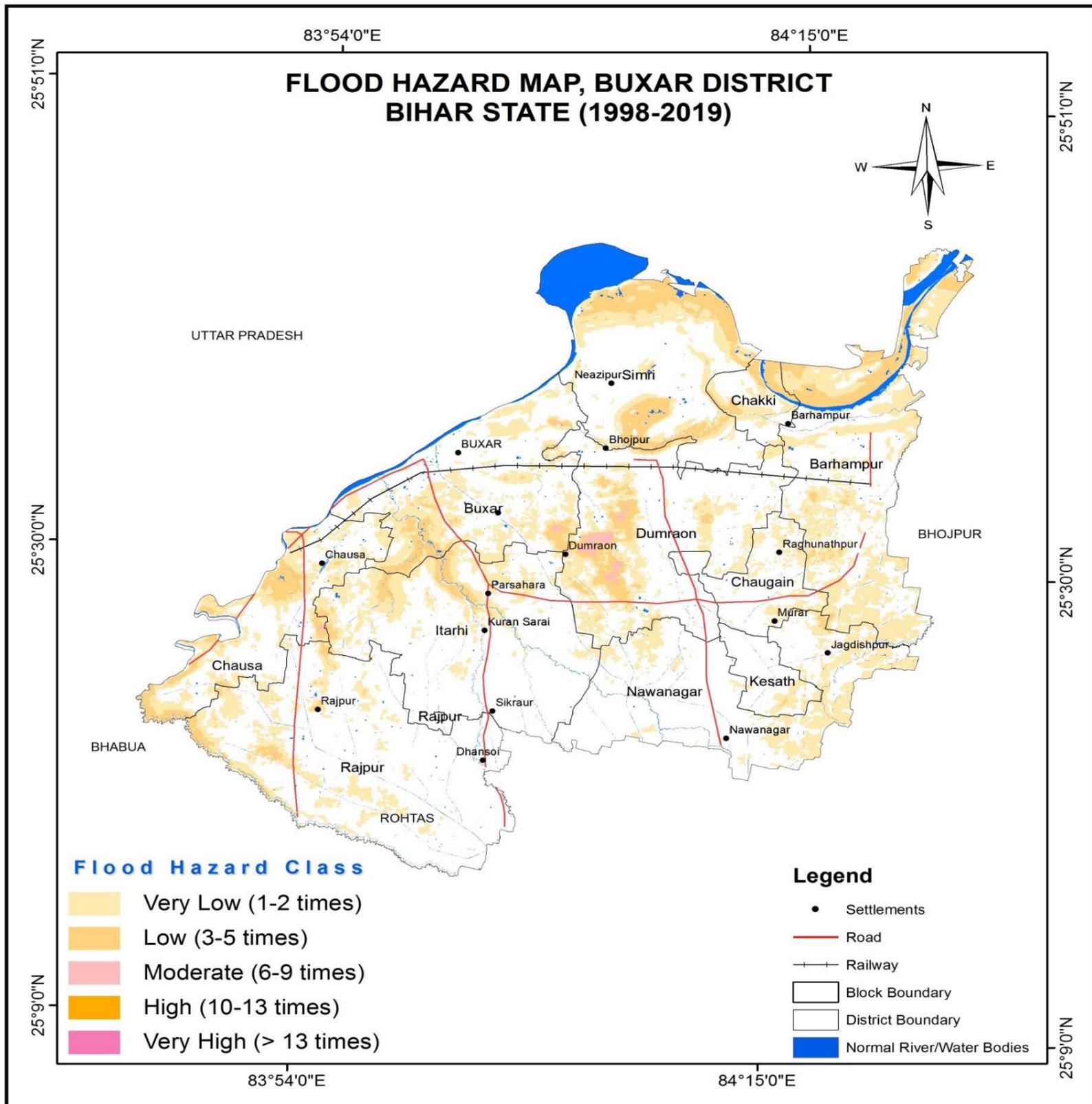


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	78479
2	Low	33586
3	Moderate	2347
4	High	0
5	Very High	0
Total		114412

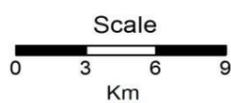
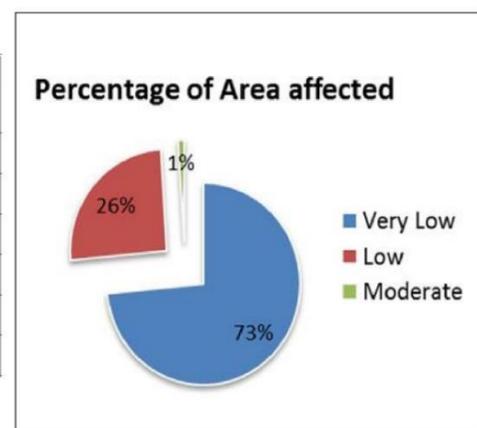


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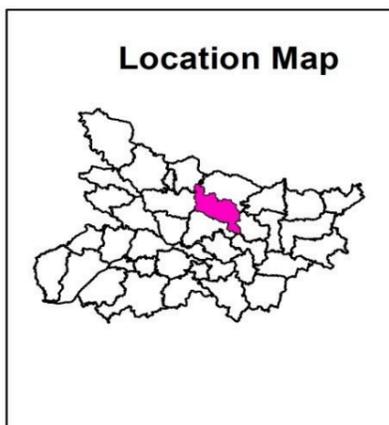
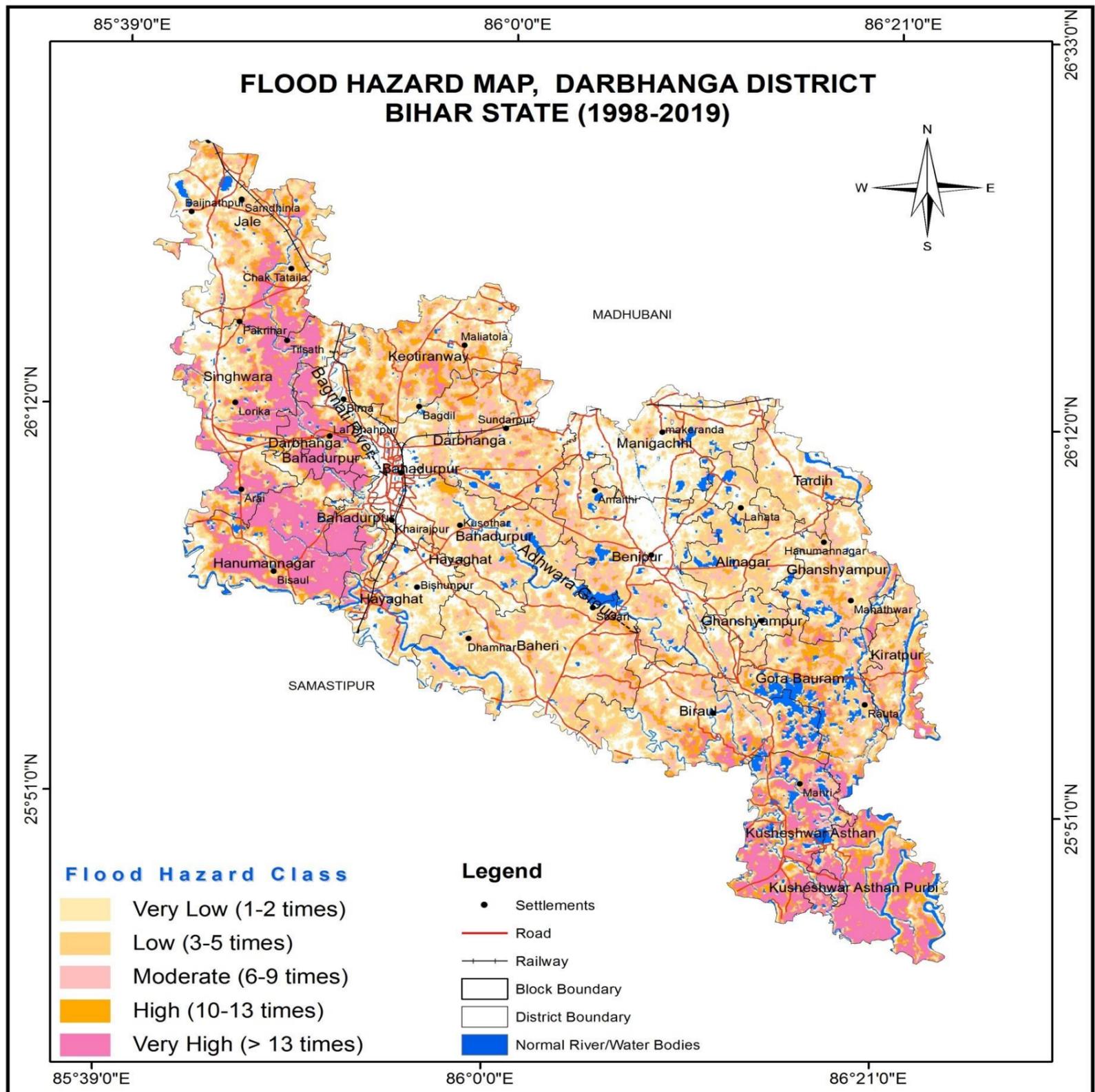


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	37191
2	Low	12907
3	Moderate	506
4	High	0
5	Very High	0
Total		50603

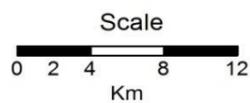
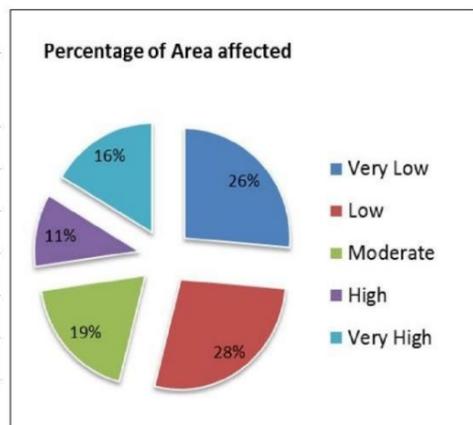


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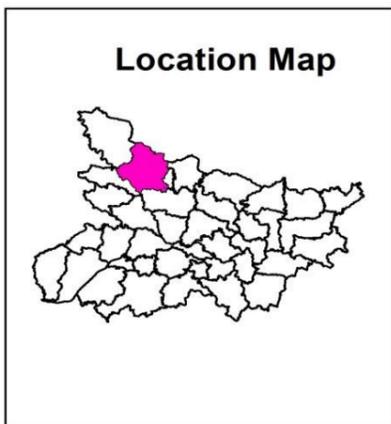
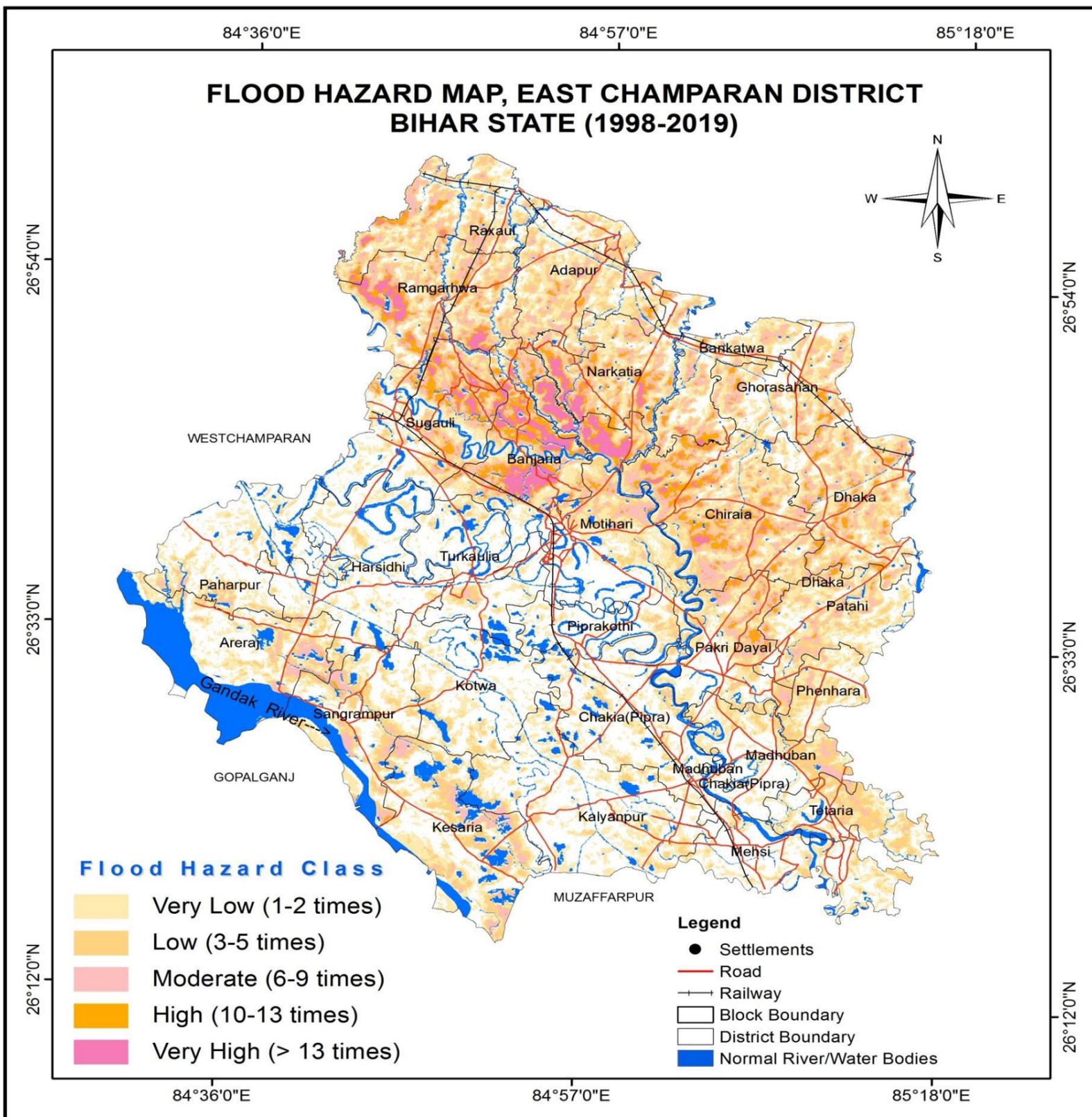


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	52293
2	Low	54889
3	Moderate	37276
4	High	21279
5	Very High	32783
Total		198520

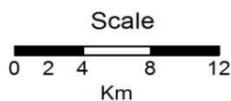
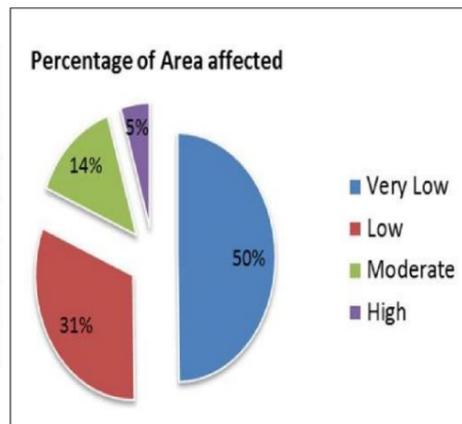


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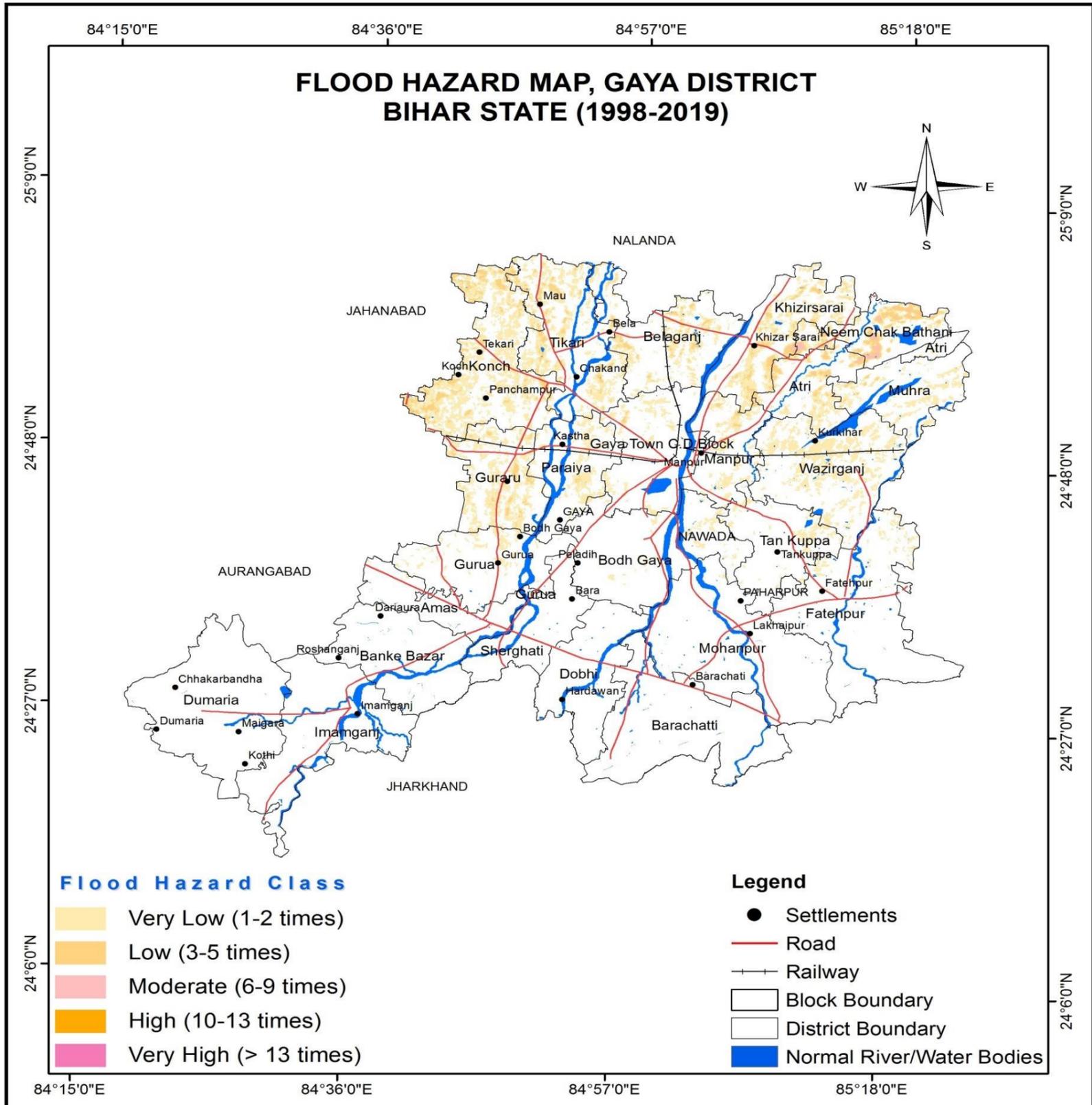


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	105815
2	Low	66877
3	Moderate	29862
4	High	10166
5	Very High	6021
Total		218741

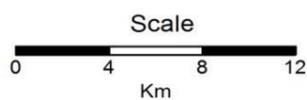
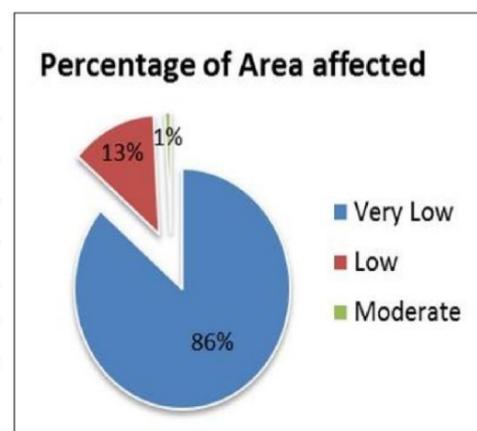


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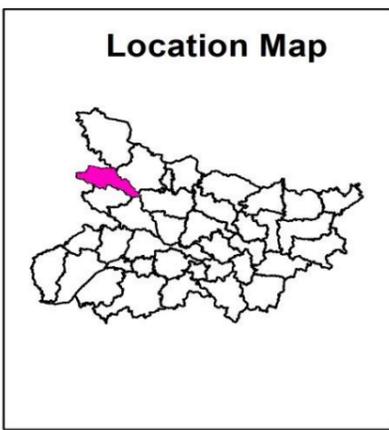
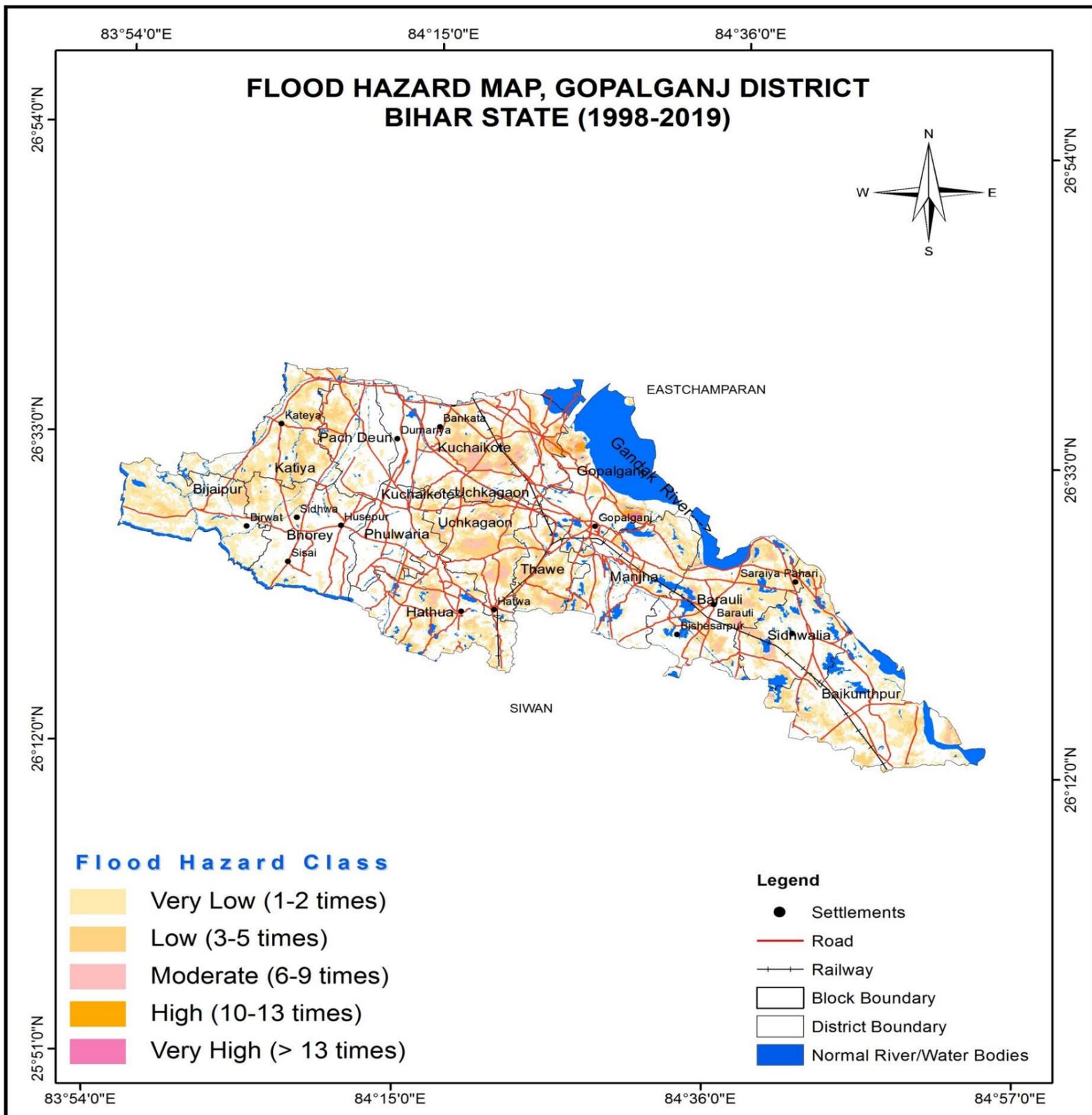




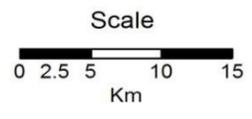
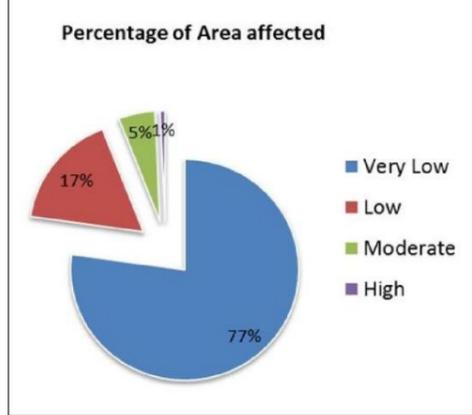
S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	54717
2	Low	8111
3	Moderate	542
4	High	0
5	Very High	0
Total		63370



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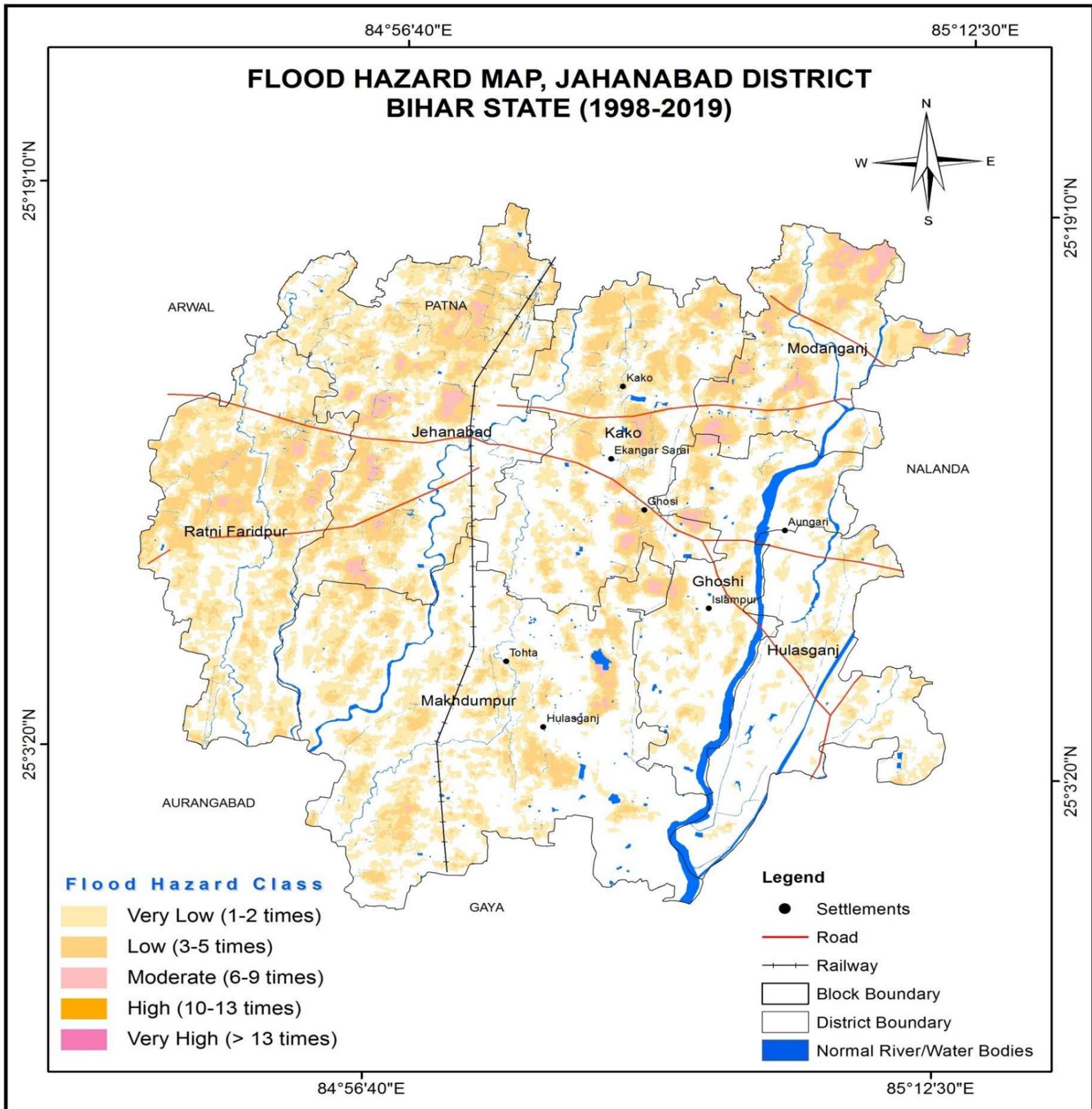


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	55354
2	Low	12106
3	Moderate	3725
4	High	494
5	Very High	122
Total		71800

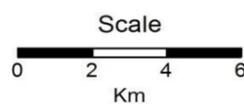
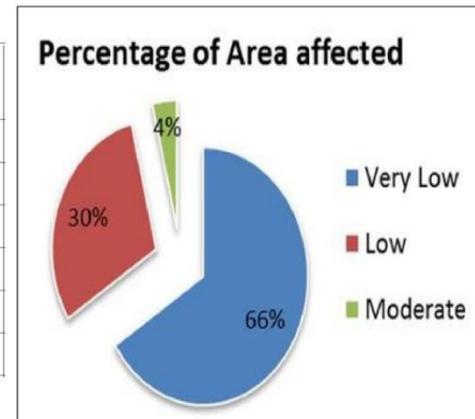


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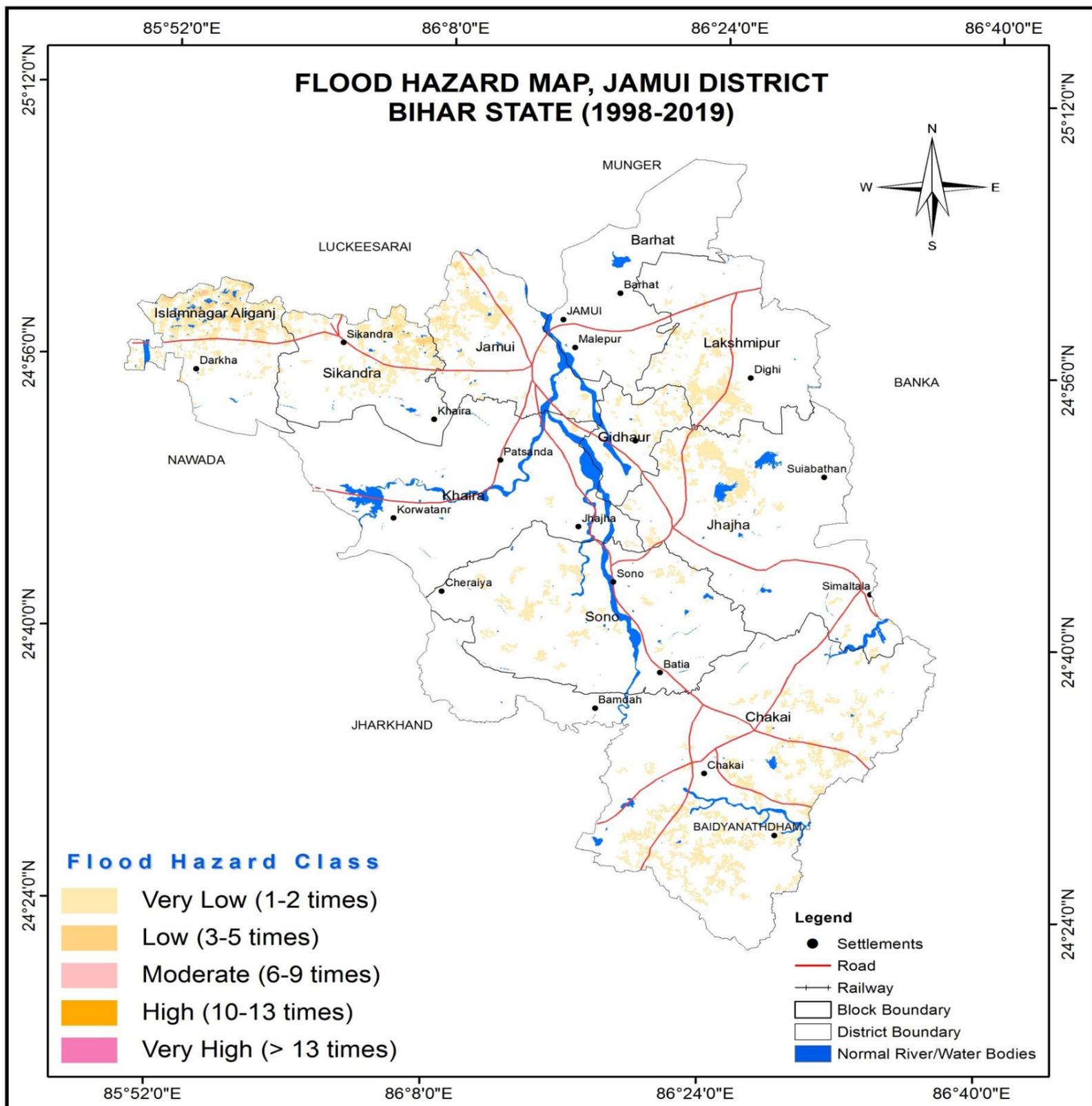


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	27237
2	Low	12469
3	Moderate	1577
4	High	0
5	Very High	0
Total		41283

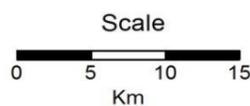
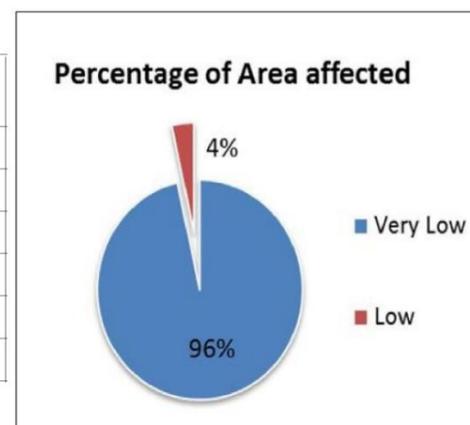


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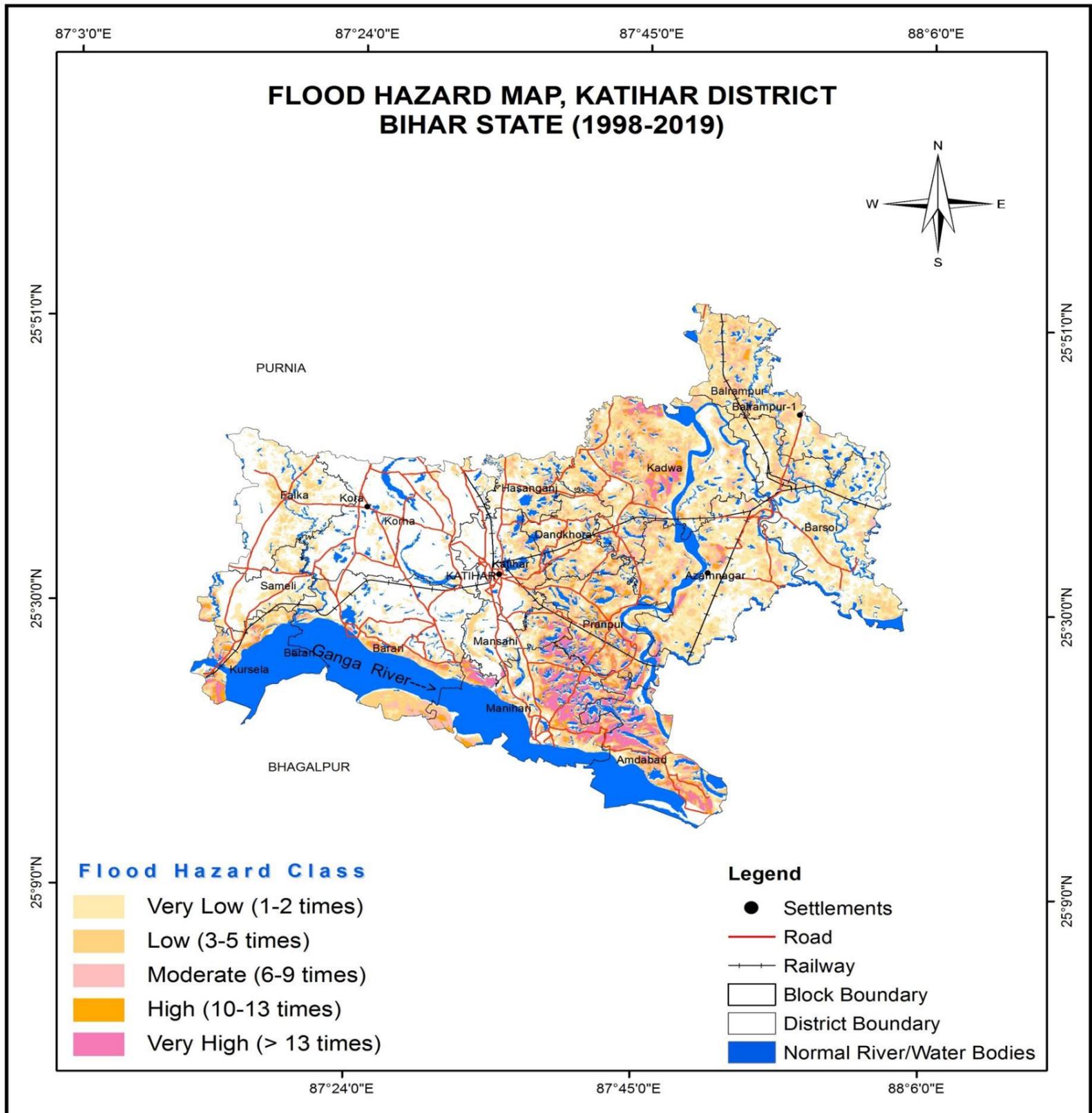


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	24773
2	Low	941
3	Moderate	10
4	High	0
5	Very High	0
Total		25723

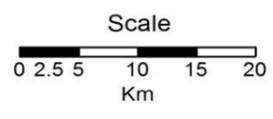
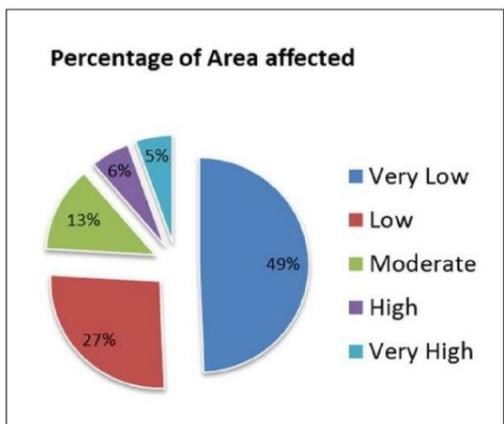


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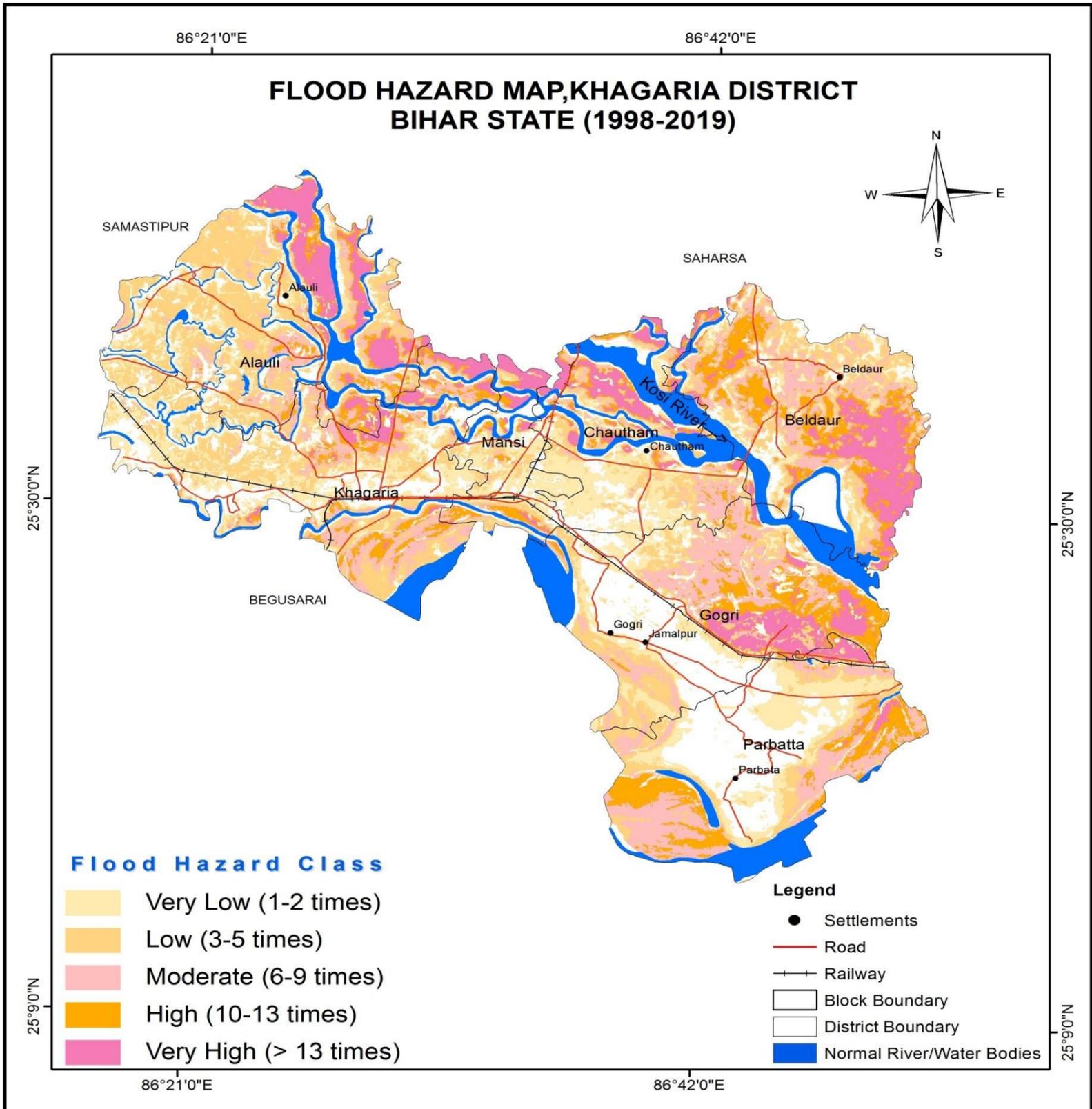




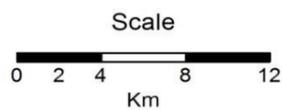
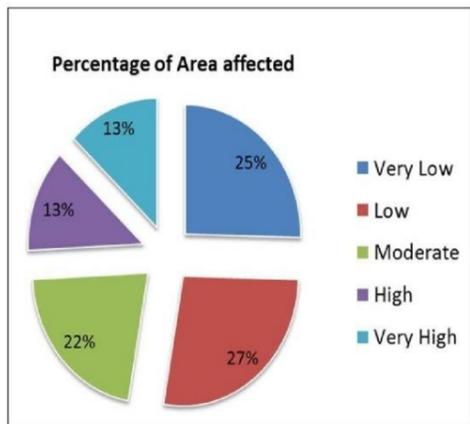
S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	76797
2	Low	41293
3	Moderate	19970
4	High	9049
5	Very High	8495
Total		155603



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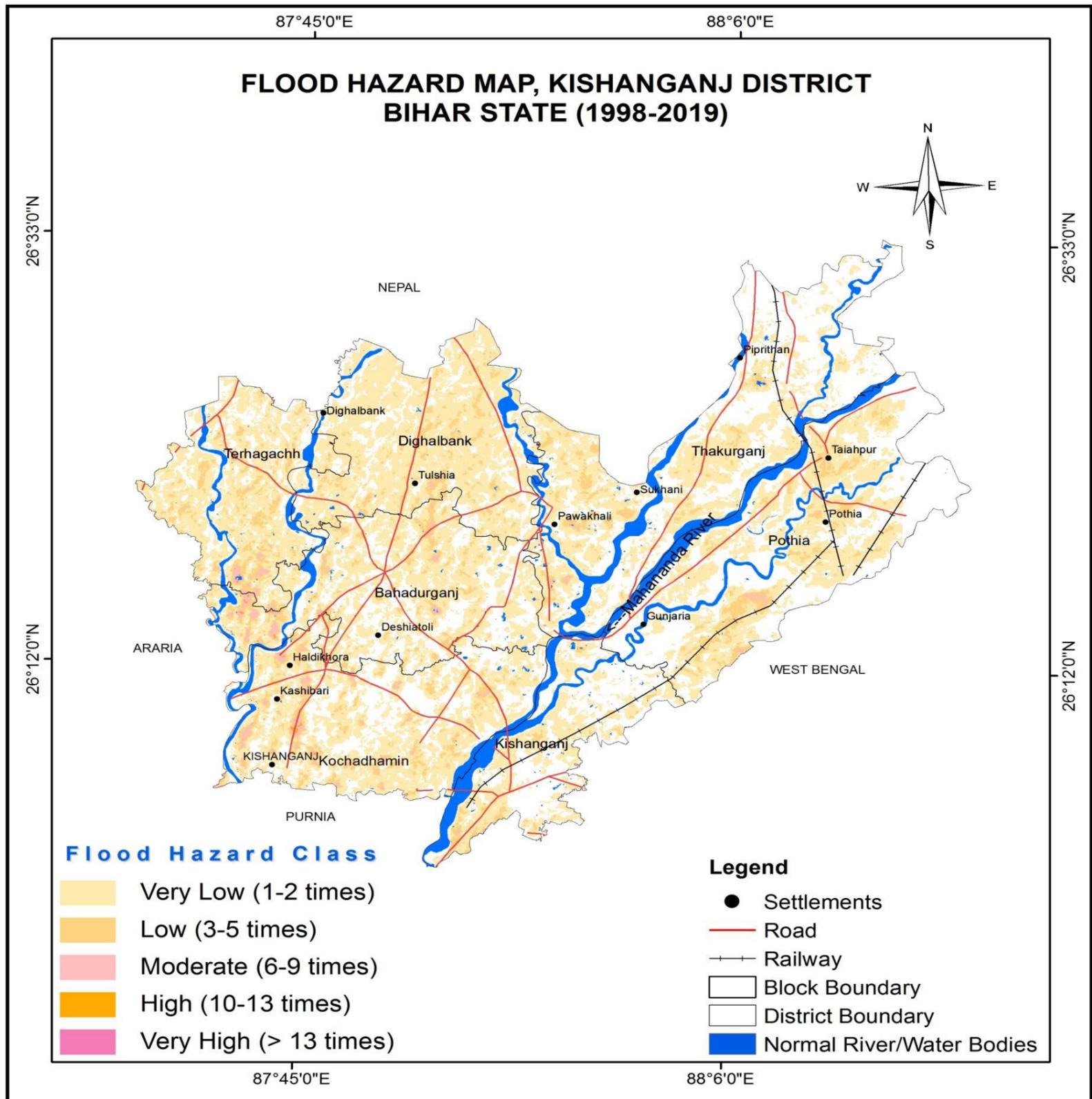


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	27235
2	Low	29285
3	Moderate	22999
4	High	13816
5	Very High	13842
Total		107177

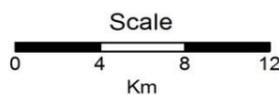
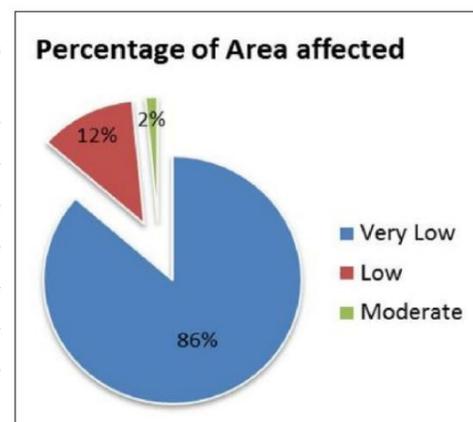


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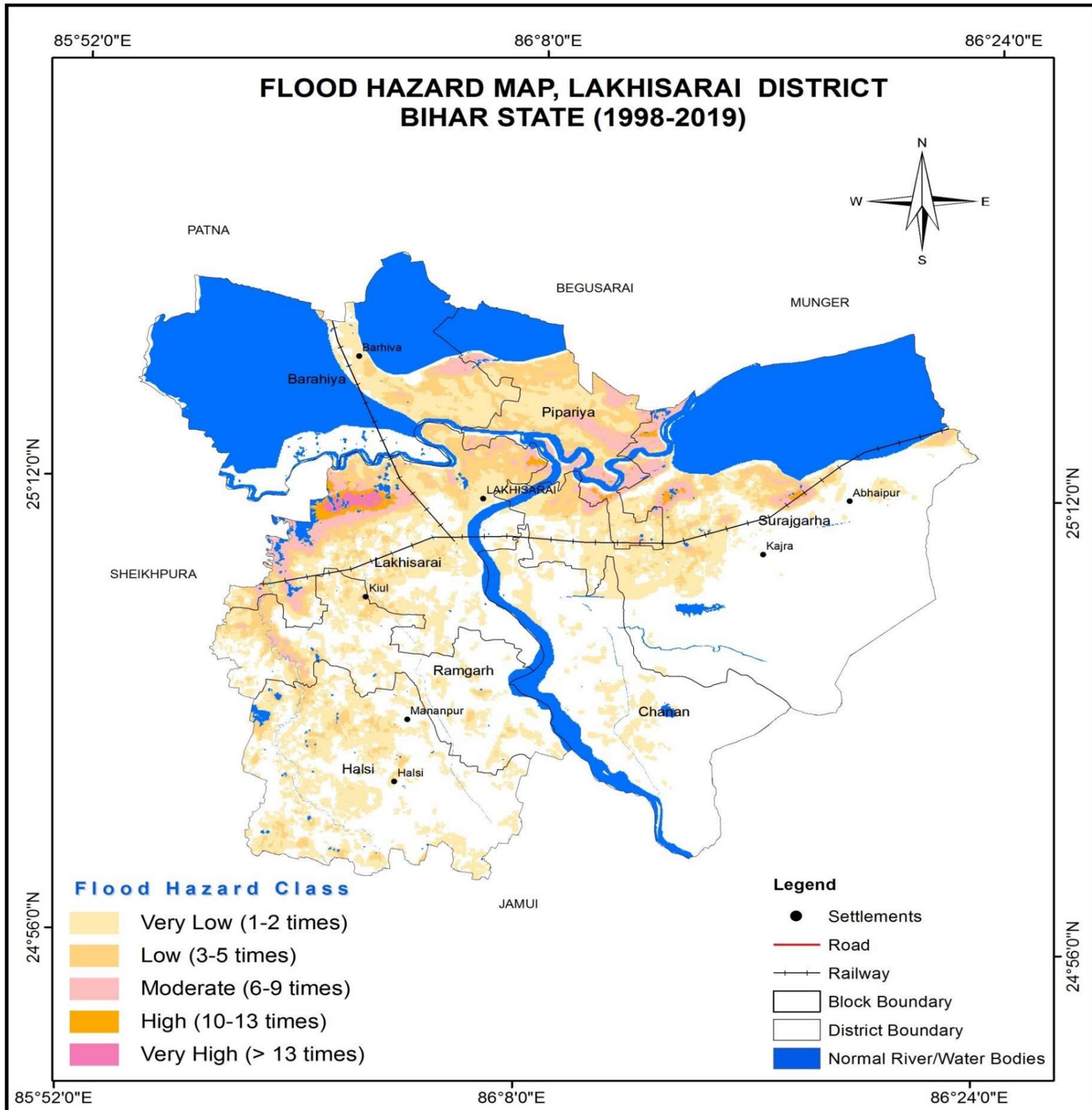


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	91192
2	Low	12660
3	Moderate	1594
4	High	61
5	Very High	0
Total		105507

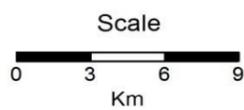
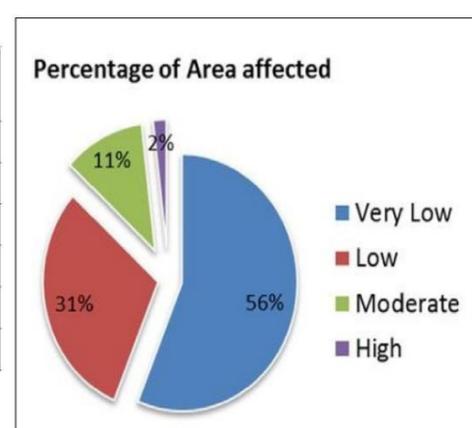


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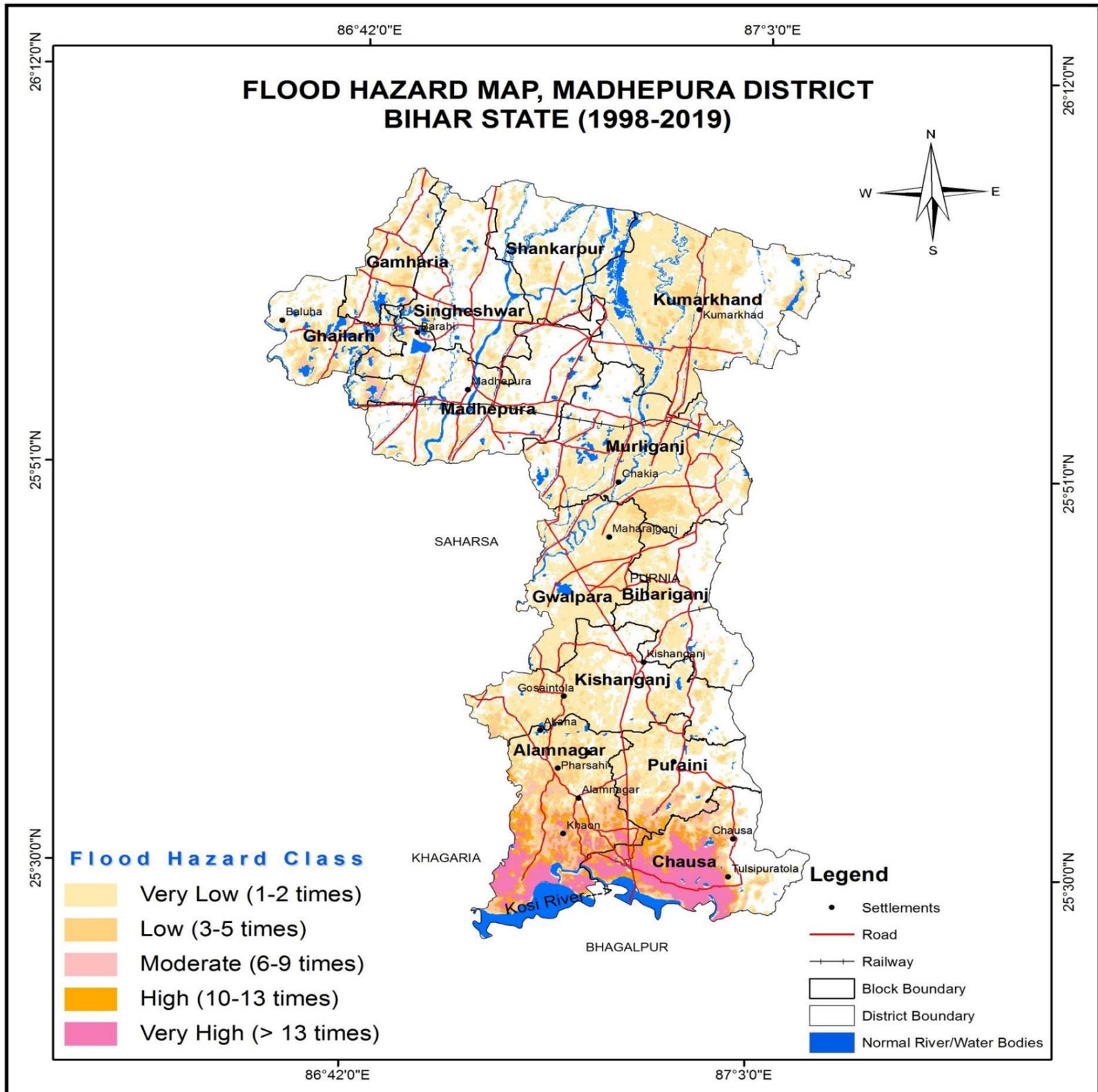


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	26767
2	Low	14509
3	Moderate	5396
4	High	902
5	Very High	239
Total		47813

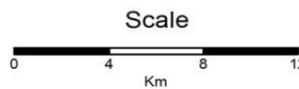
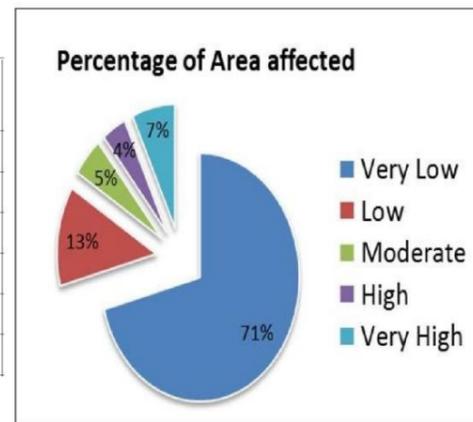


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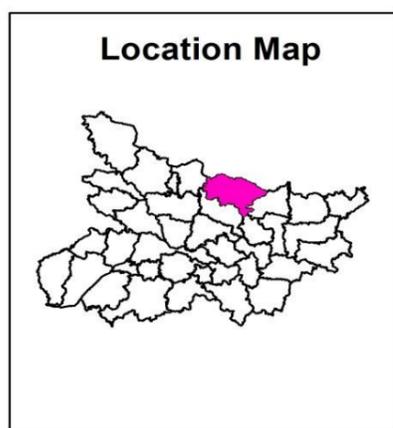
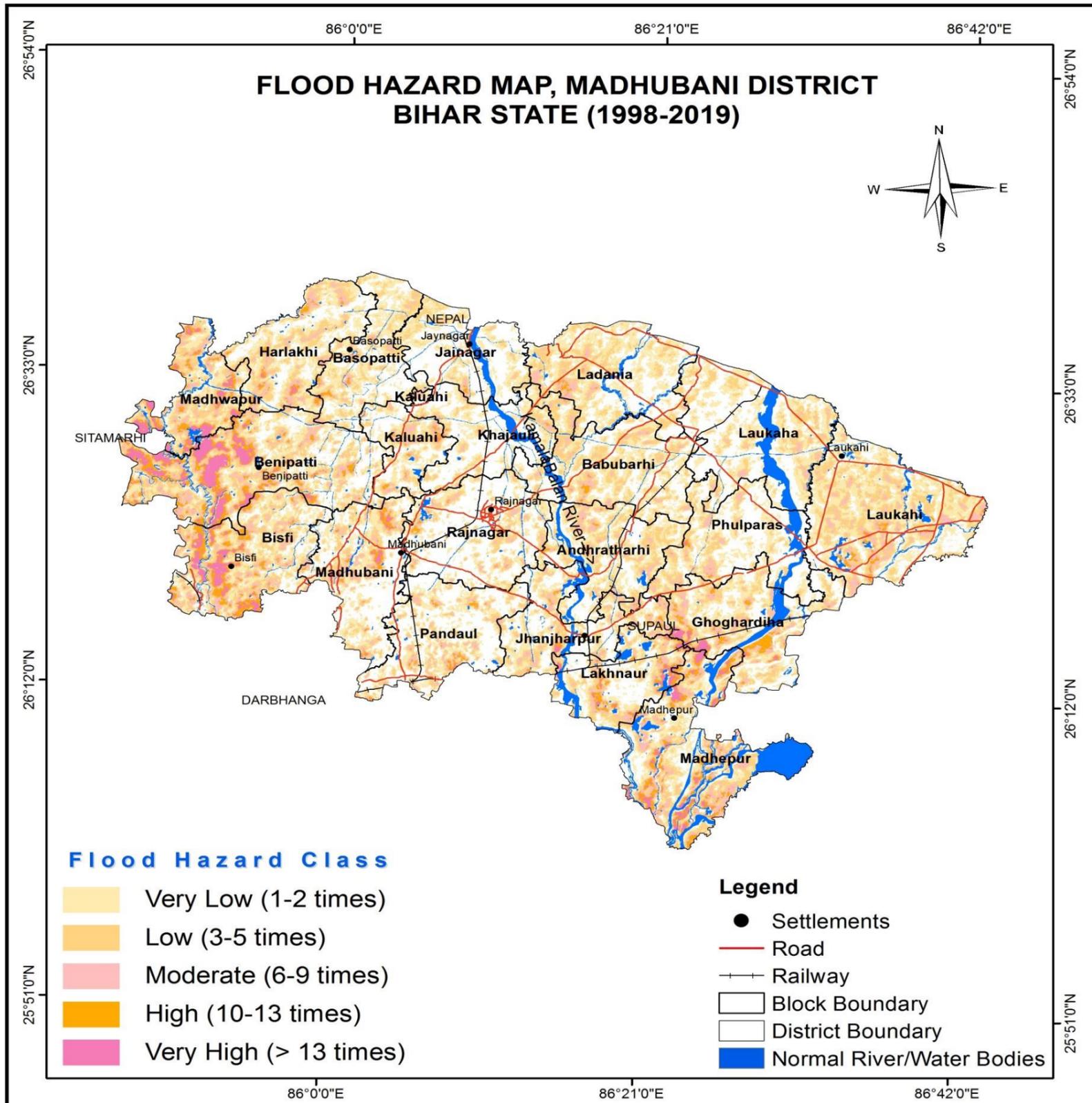


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	68008
2	Low	12490
3	Moderate	4921
4	High	3812
5	Very High	6755
Total		95986

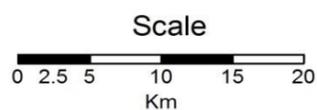
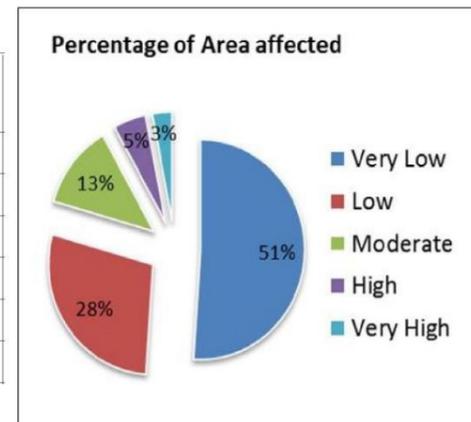


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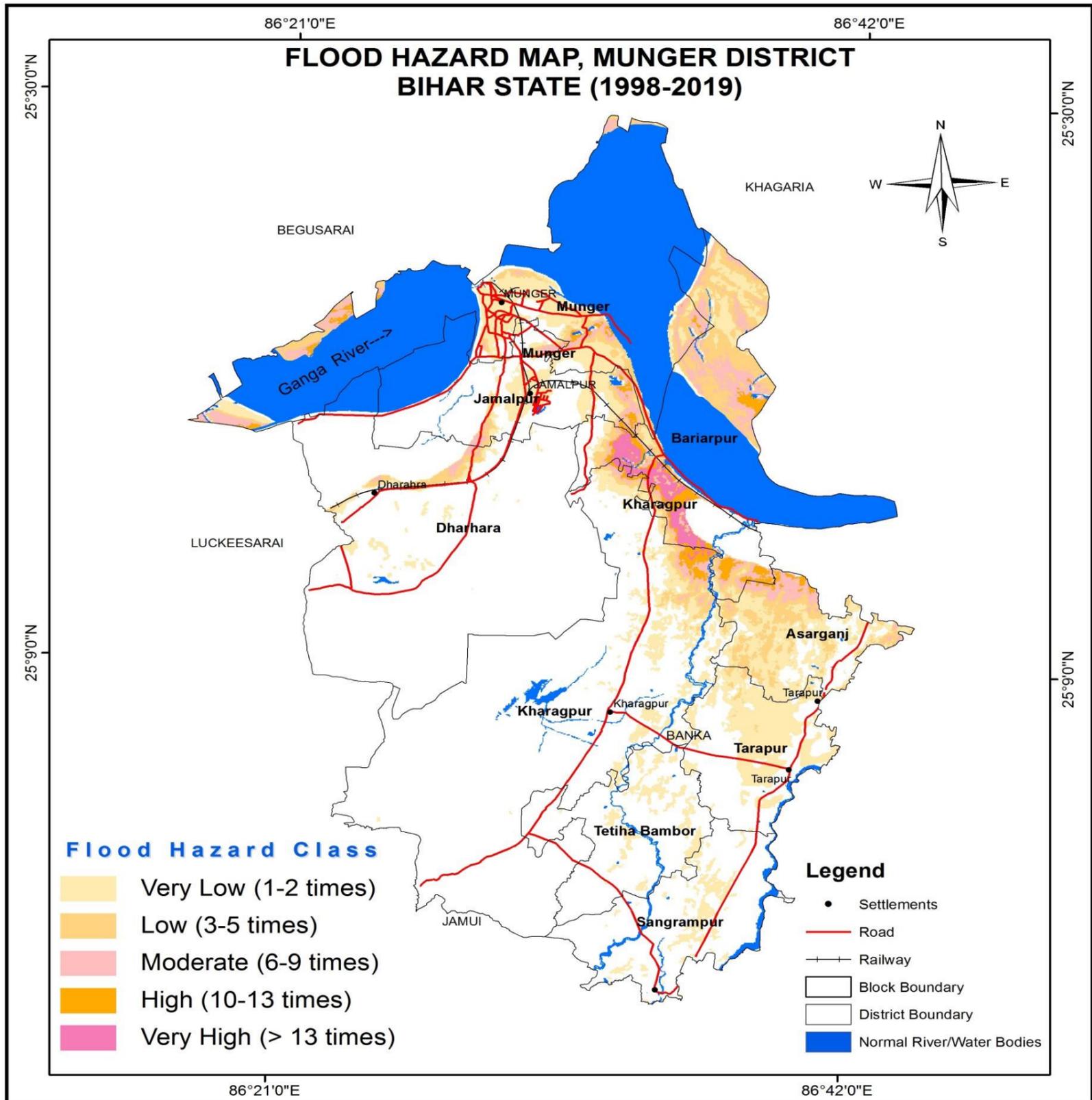


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	109361
2	Low	60734
3	Moderate	26666
4	High	10834
5	Very High	6615
Total		214209

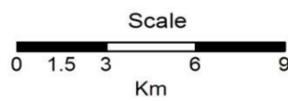
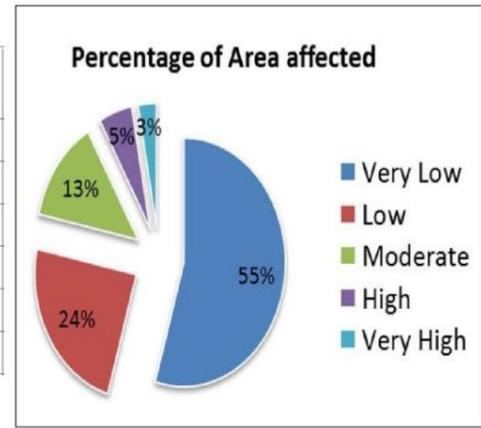


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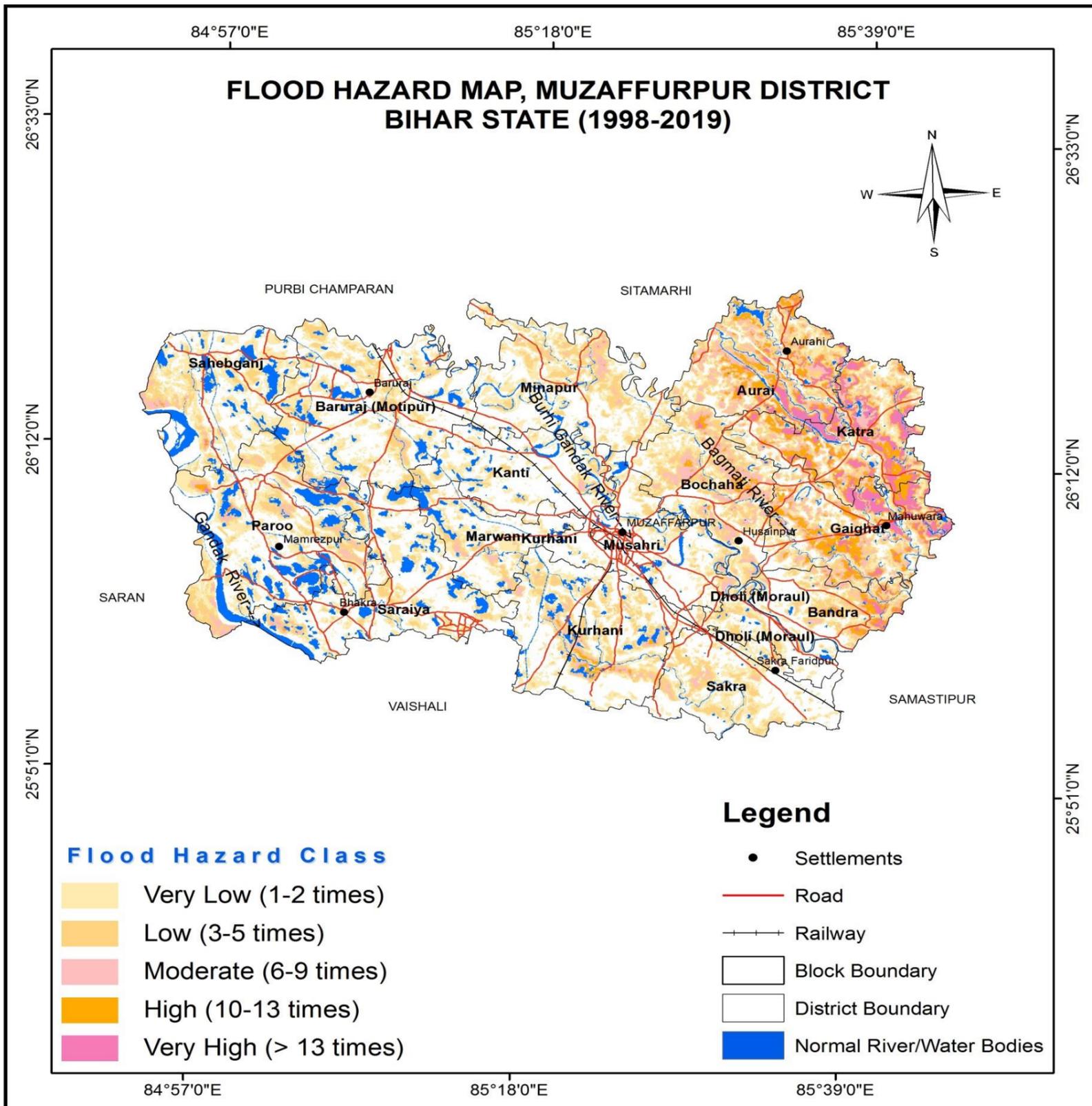


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	16829
2	Low	7813
3	Moderate	4819
4	High	1668
5	Very High	872
Total		32001

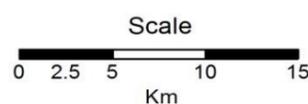
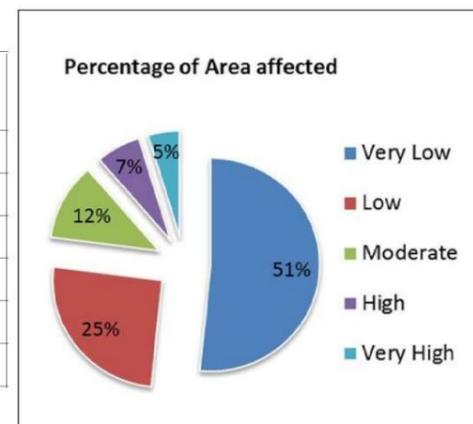


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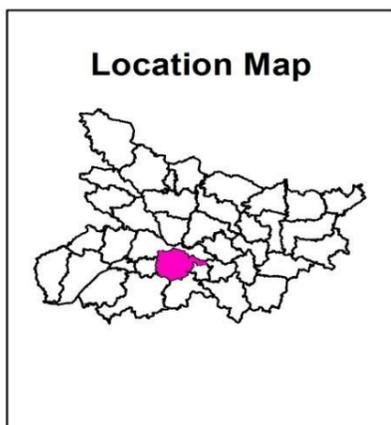
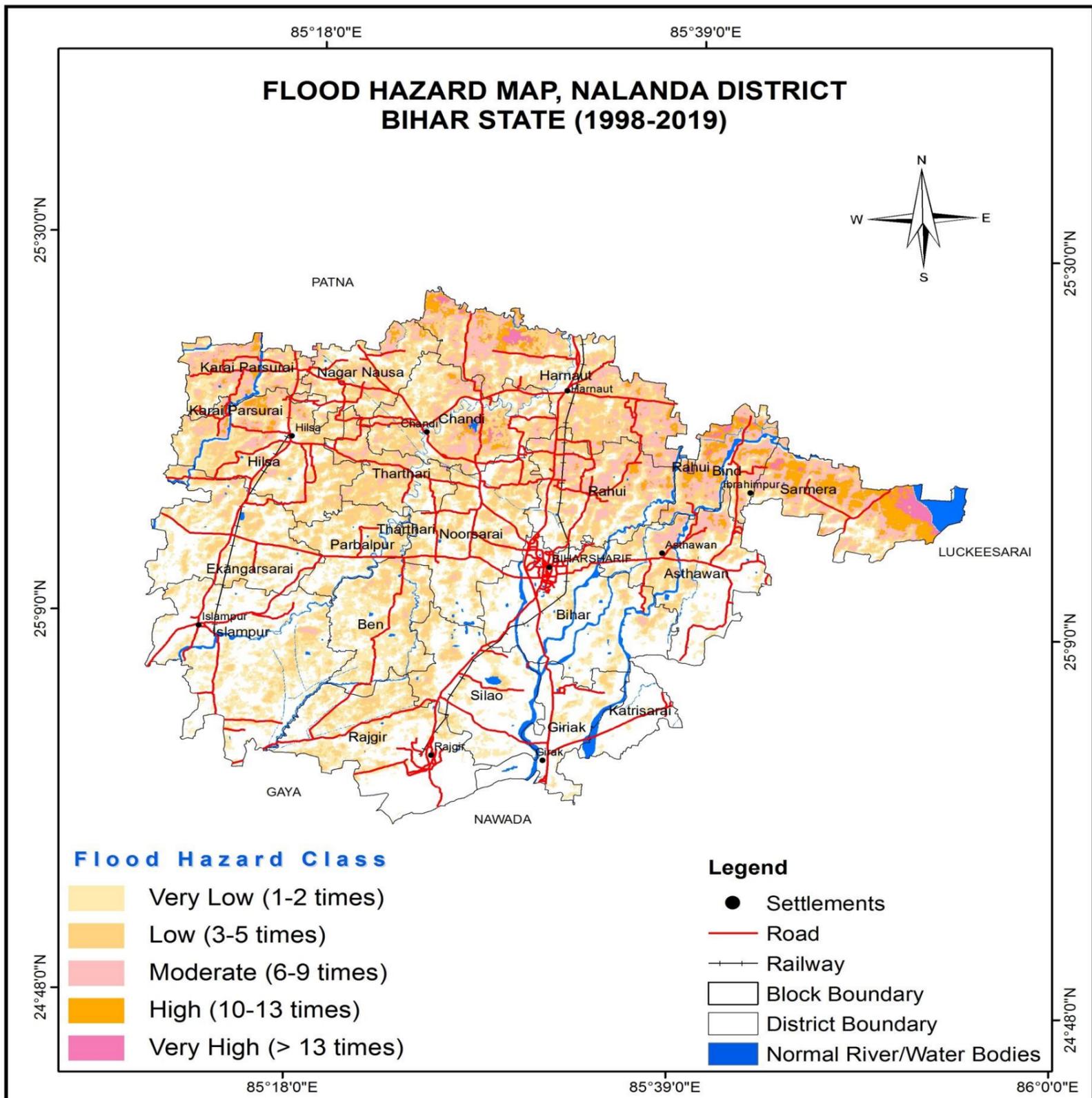


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	82565
2	Low	40774
3	Moderate	18686
4	High	10580
5	Very High	7528
Total		160131

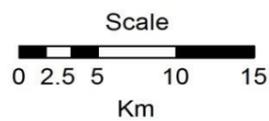
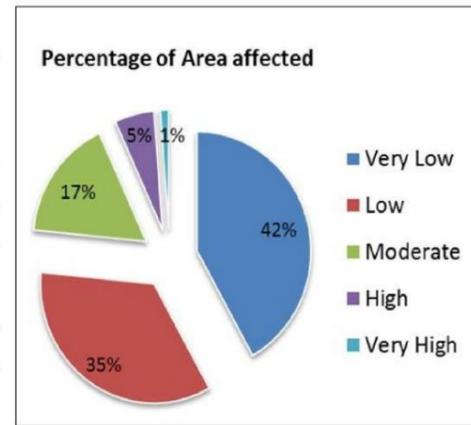


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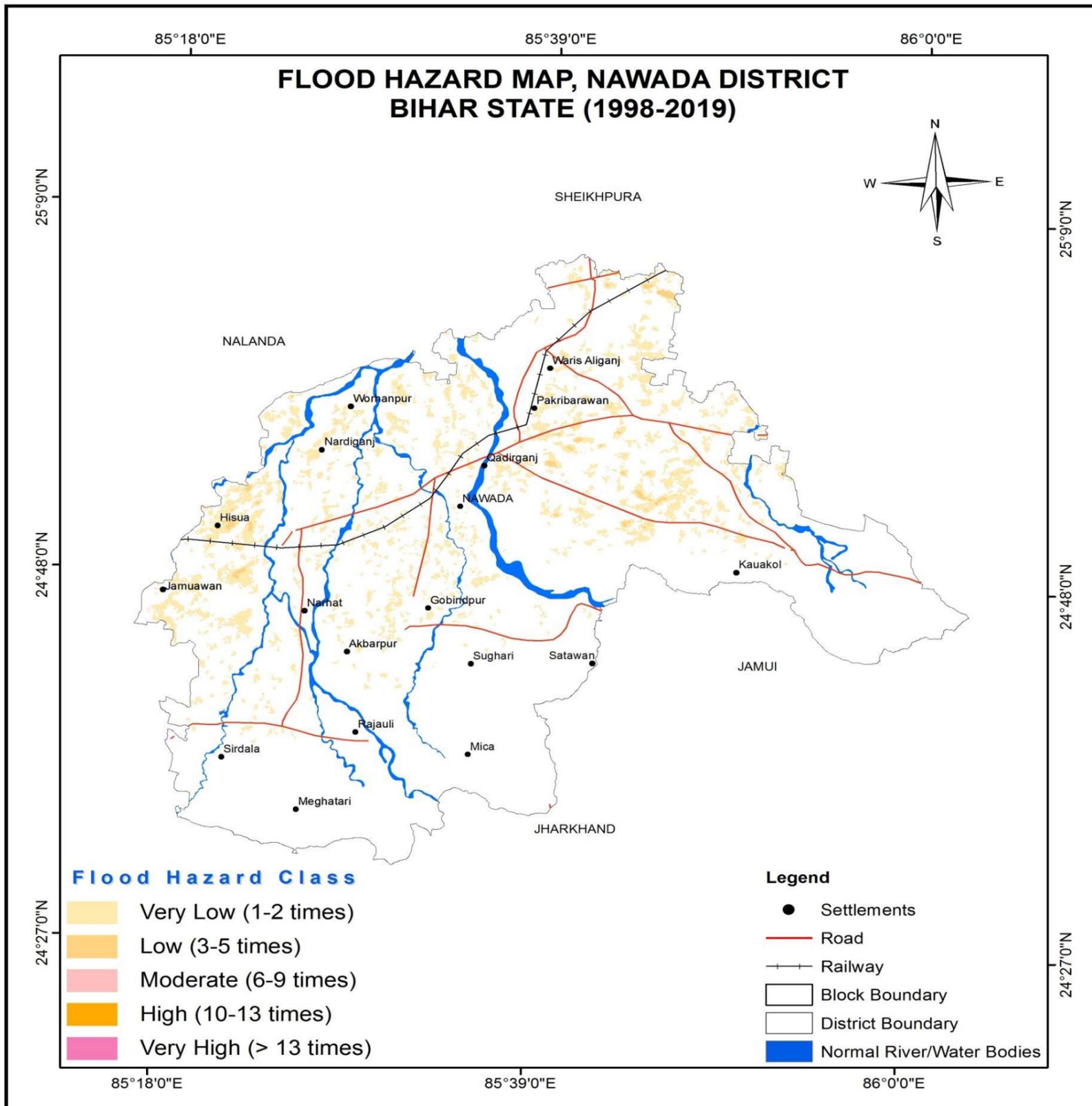


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	56621
2	Low	46806
3	Moderate	22466
4	High	7585
5	Very High	1624
Total		135102

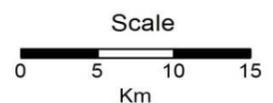
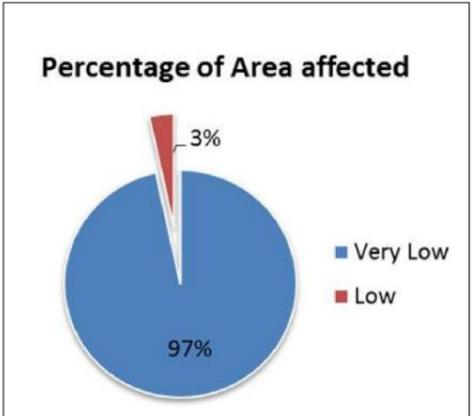


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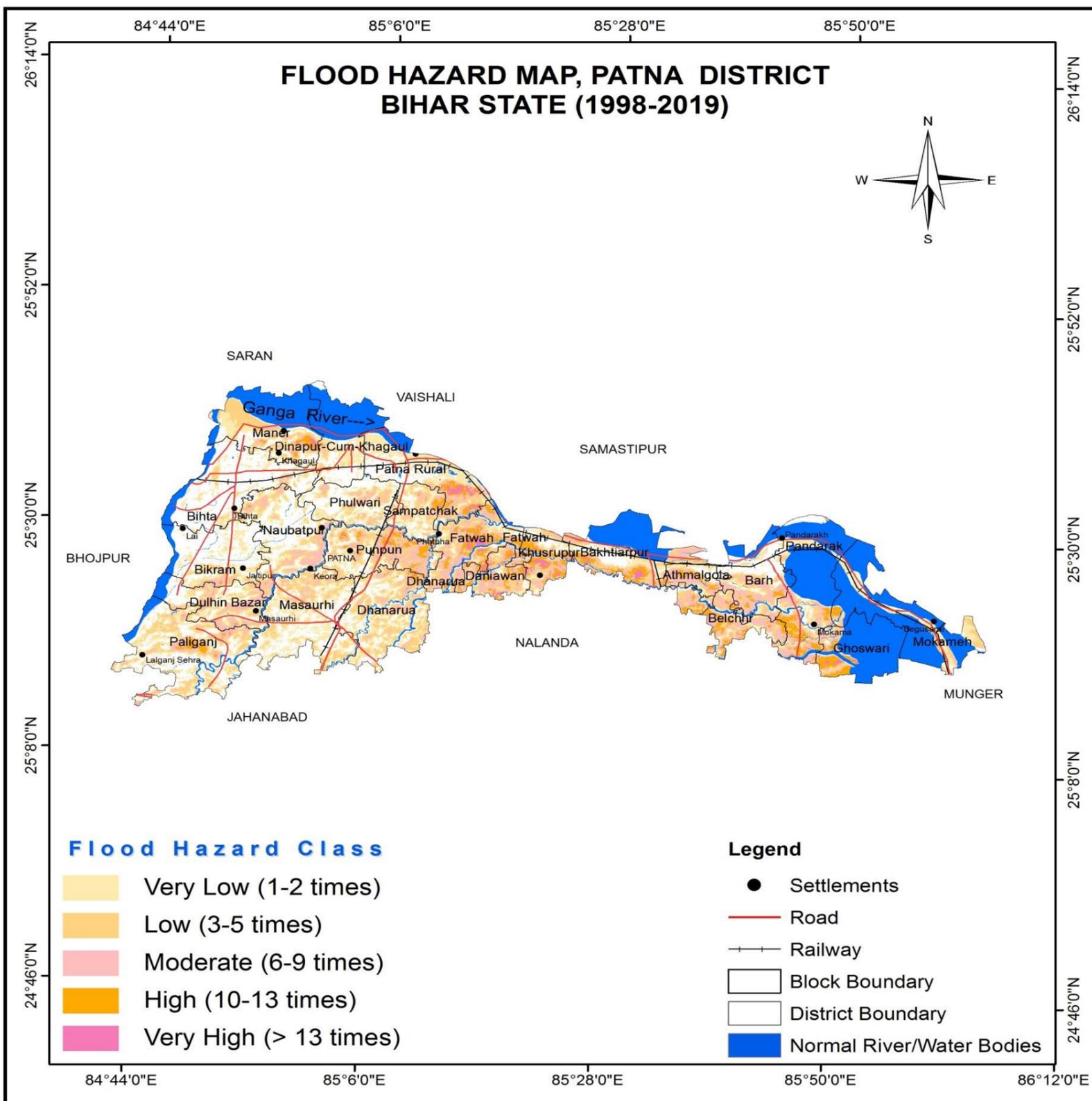


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	21511
2	Low	760
3	Moderate	0
4	High	0
5	Very High	0
Total		22271

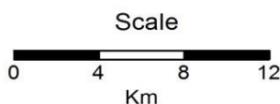
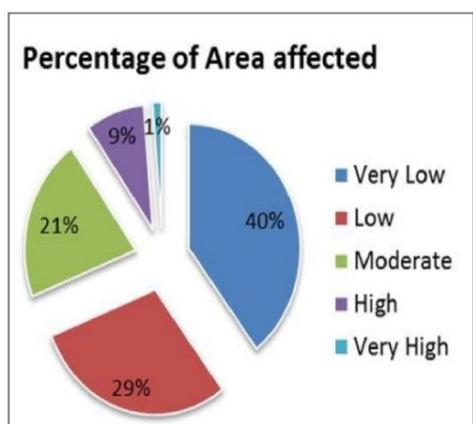


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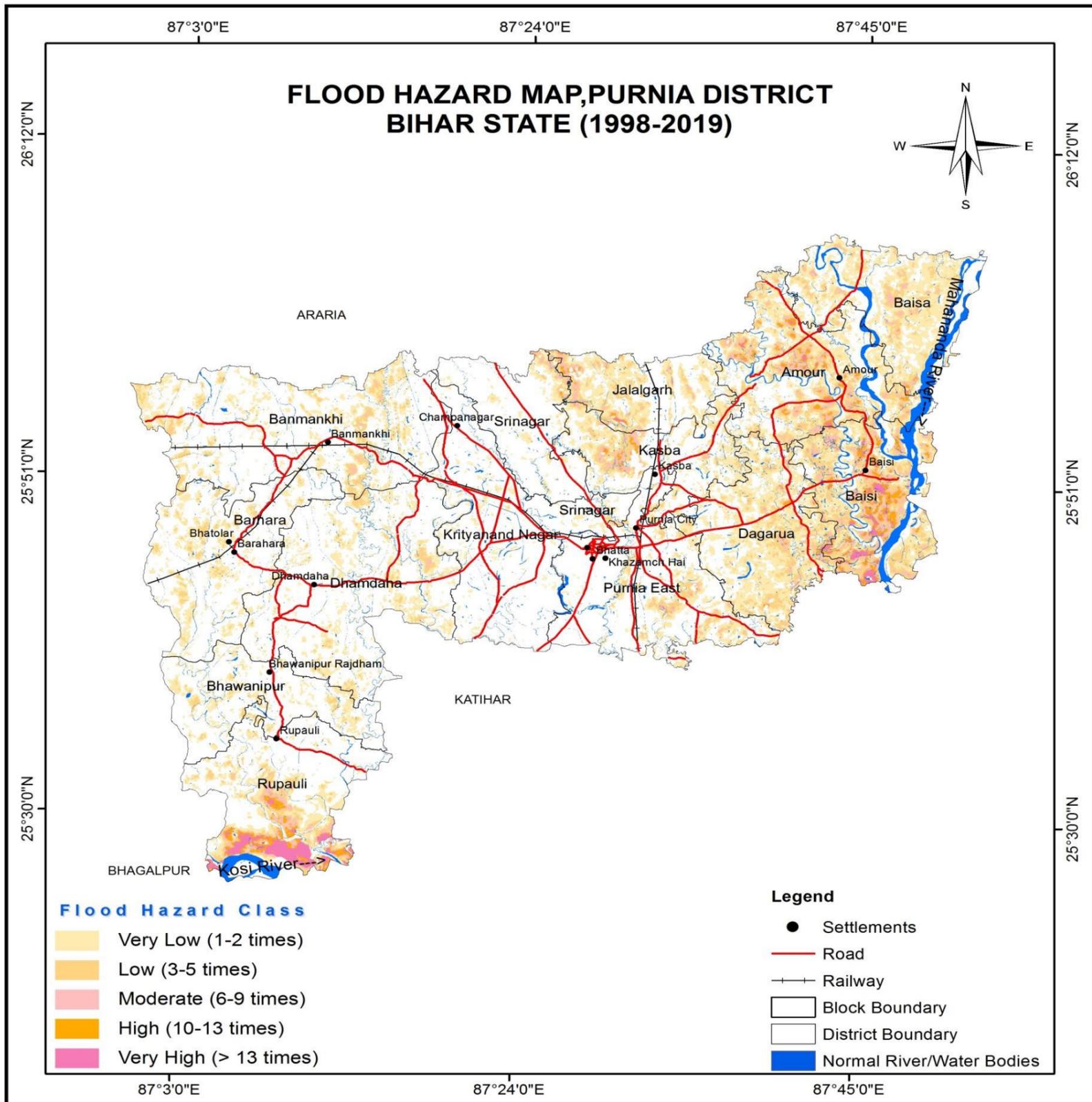


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	67113
2	Low	49586
3	Moderate	35829
4	High	14380
5	Very High	2259
Total		169167

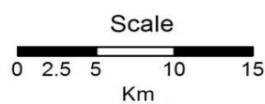
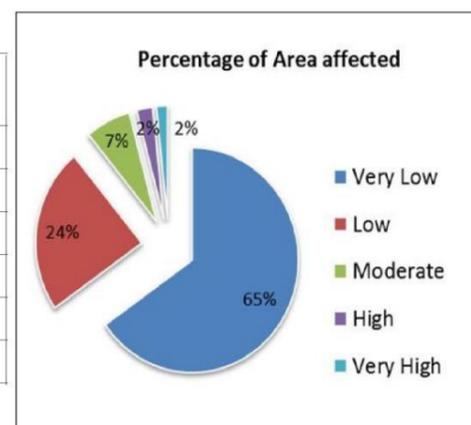


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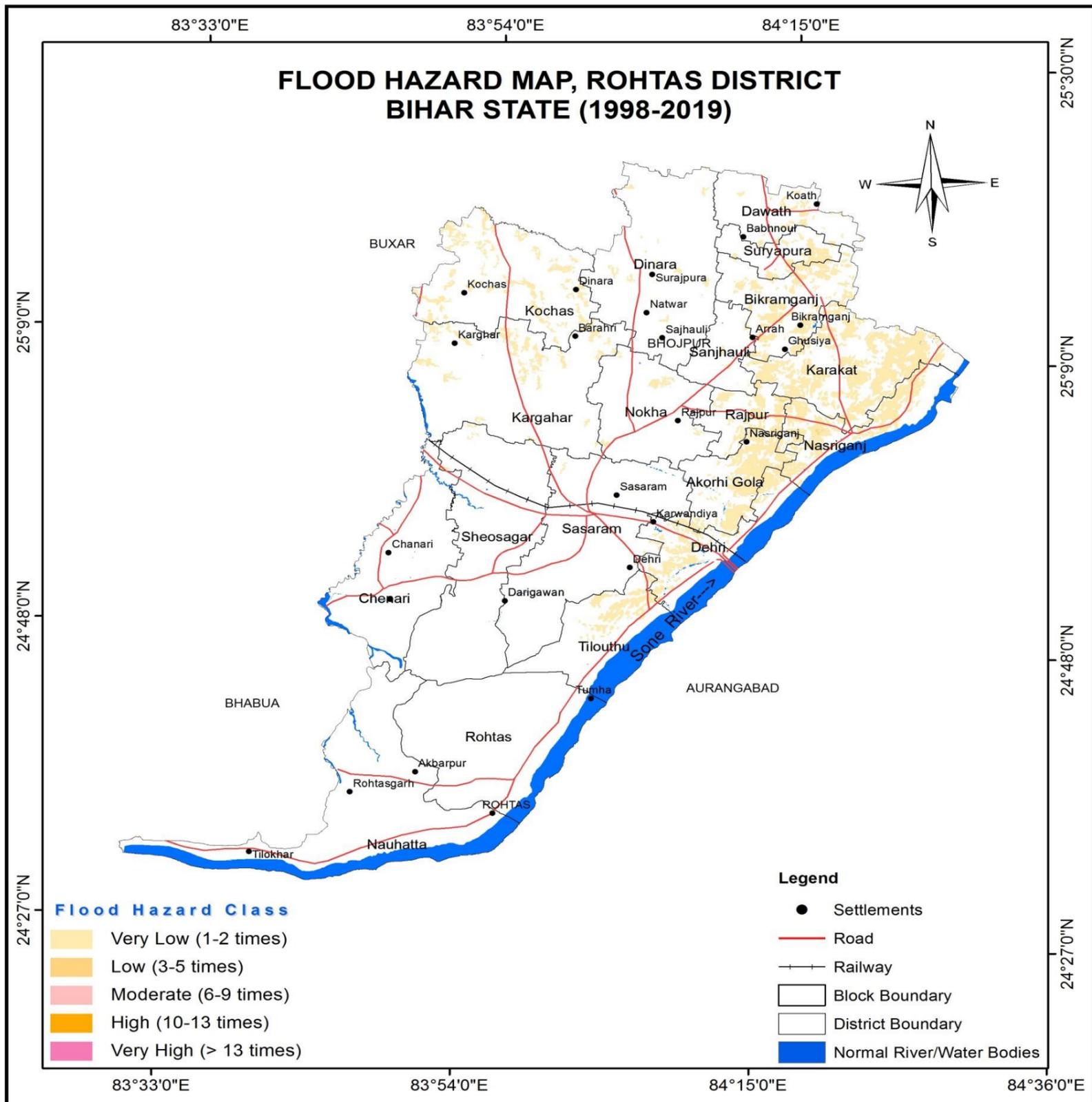


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	74420
2	Low	26992
3	Moderate	7852
4	High	2789
5	Very High	1938
Total		113991

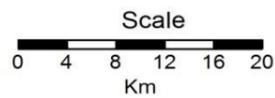
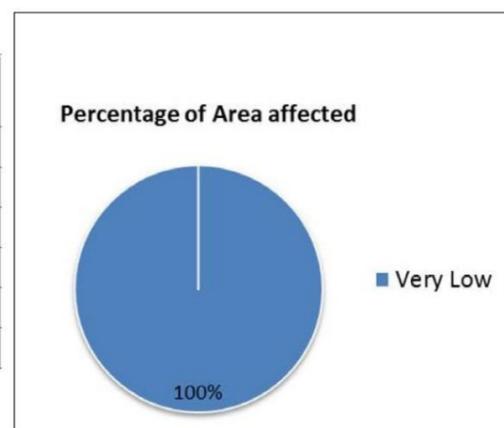


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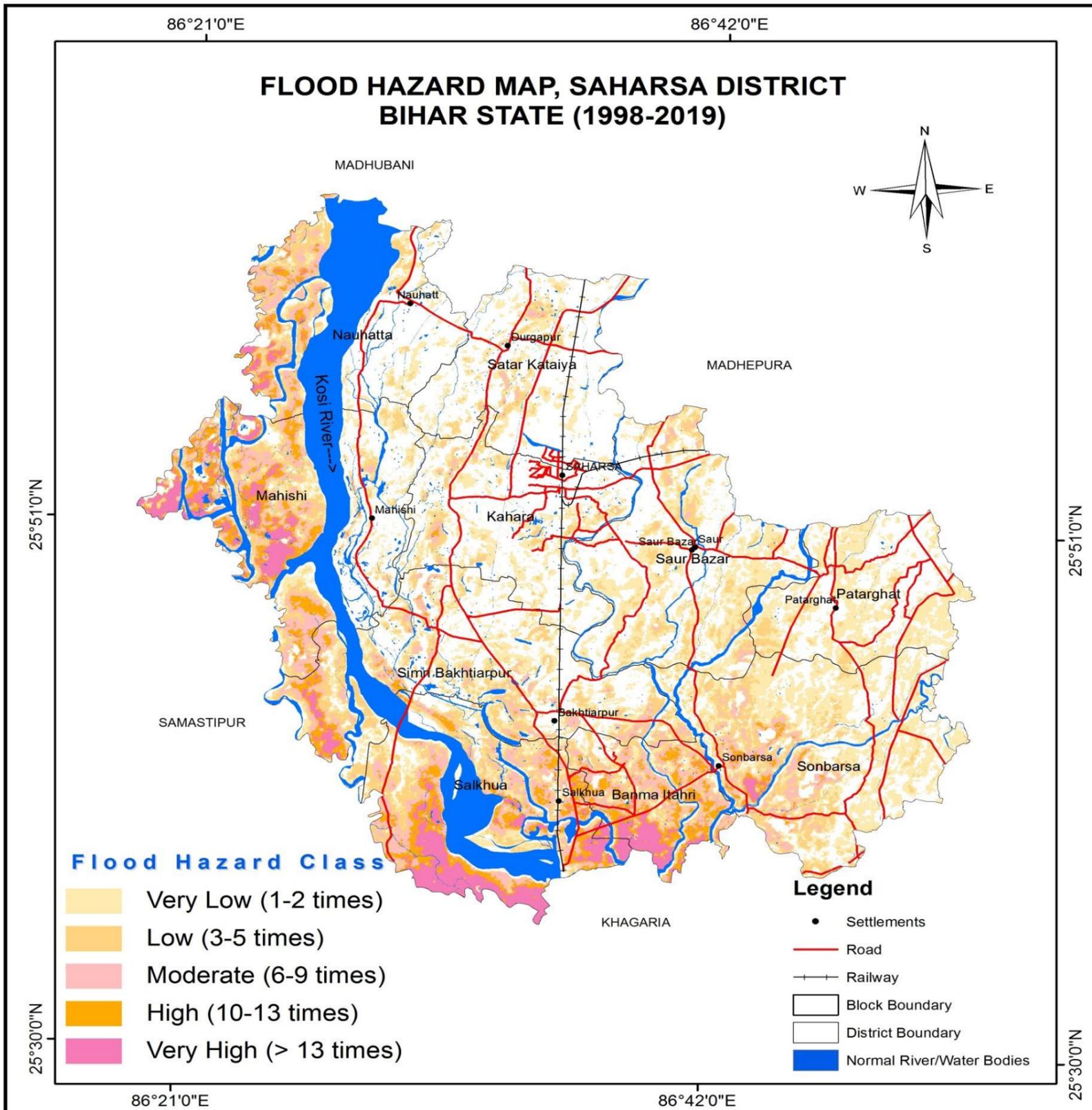


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	36704
2	Low	53
3	Moderate	0
4	High	0
5	Very High	0
Total		36757

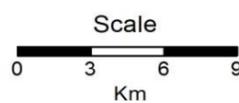
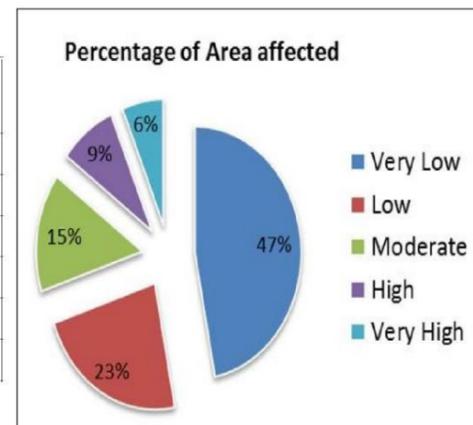


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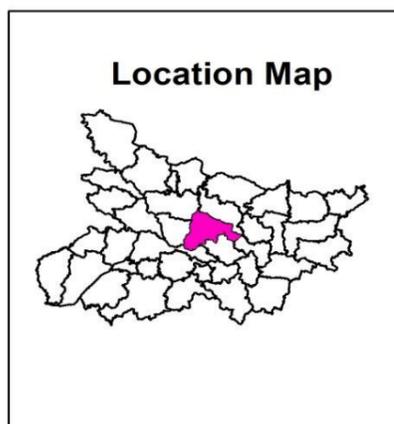
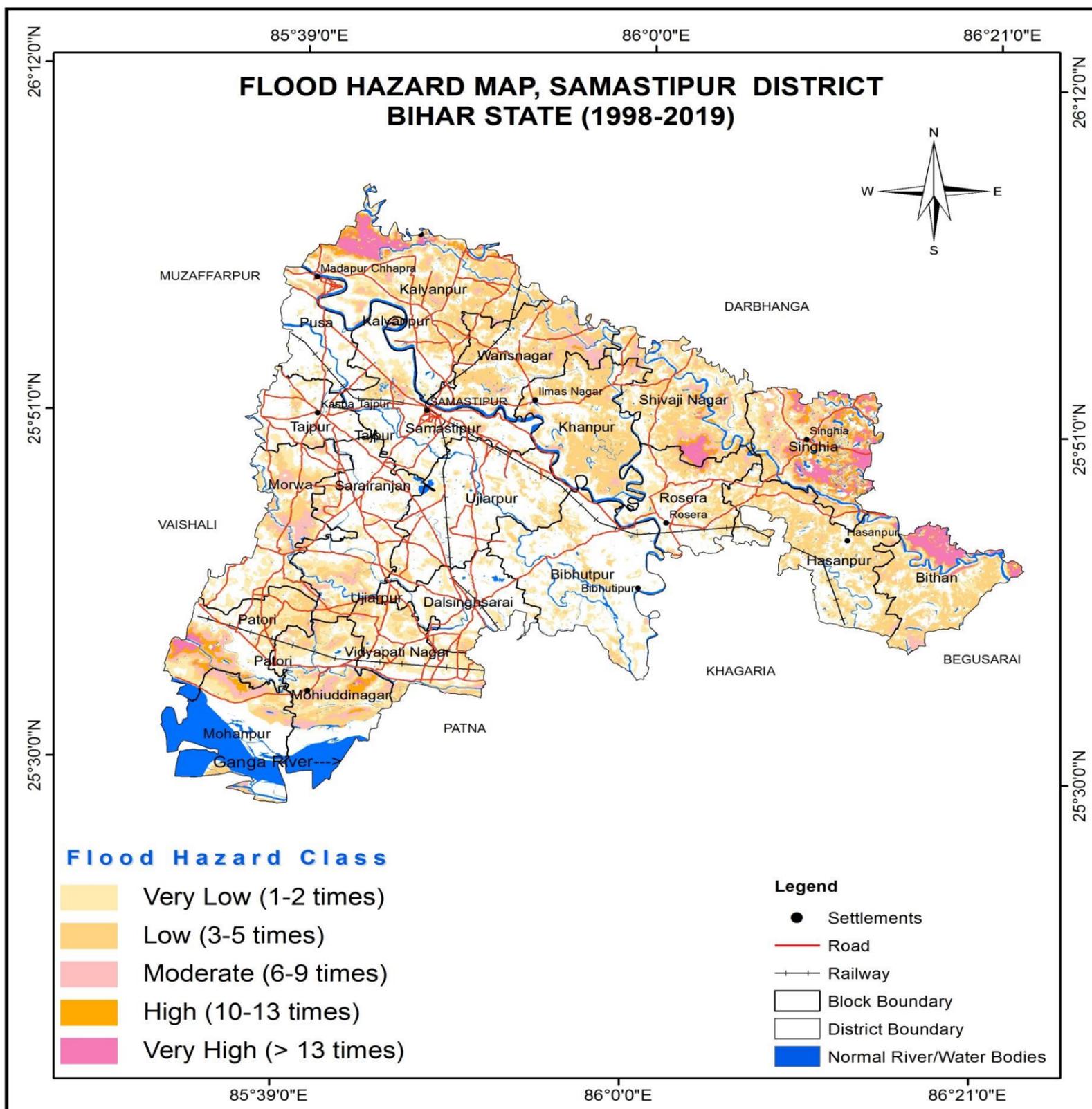


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	39069
2	Low	19043
3	Moderate	12661
4	High	7137
5	Very High	5231
Total		83141

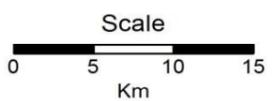
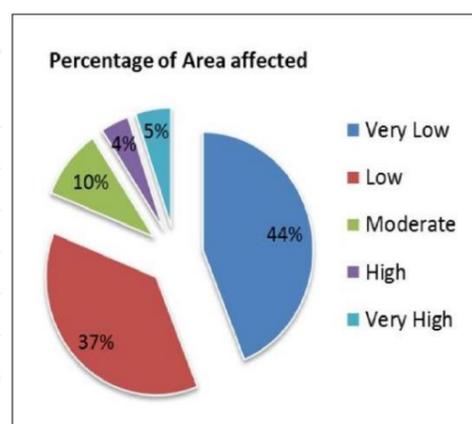


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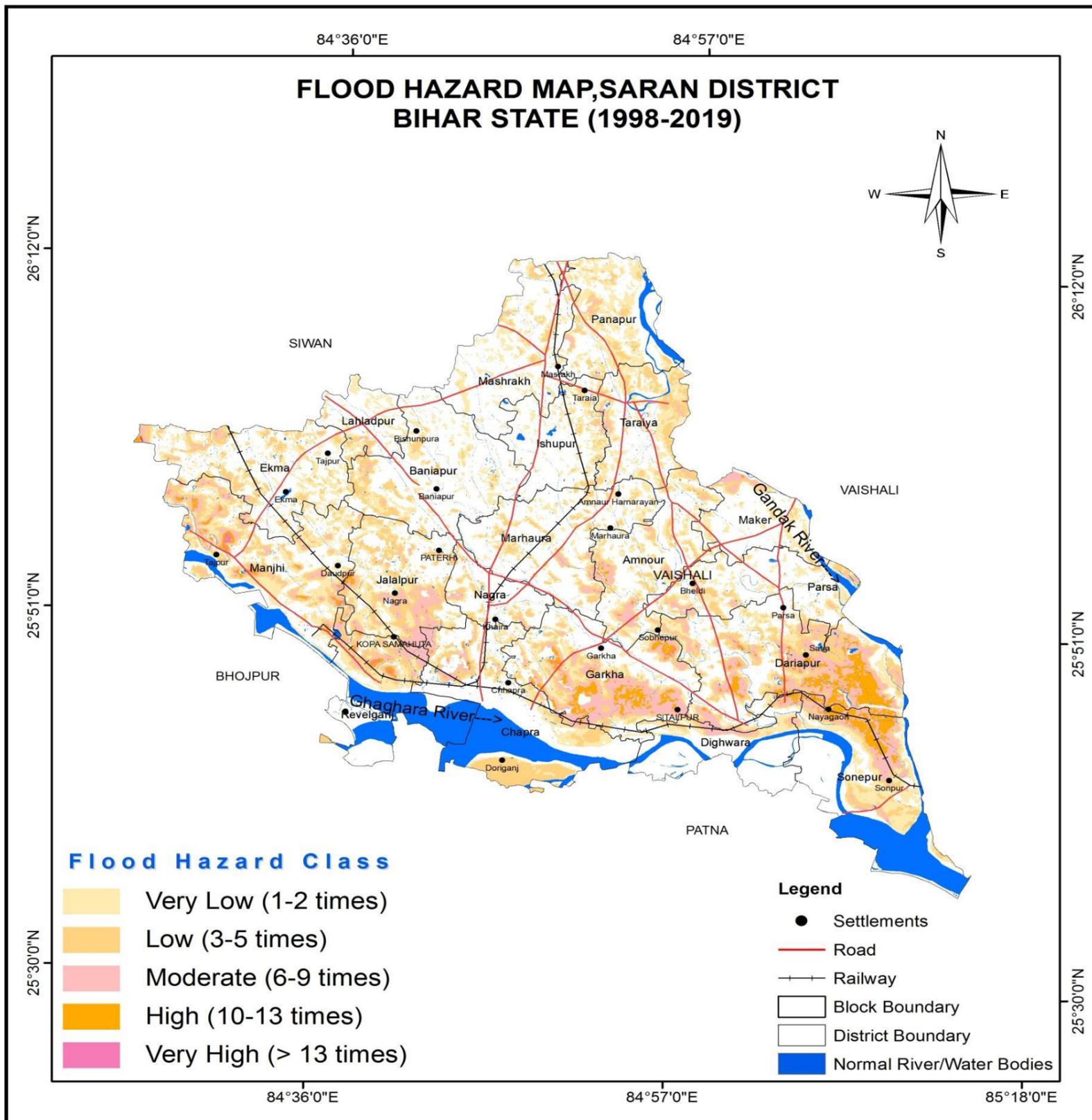




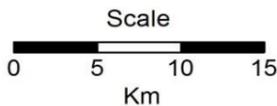
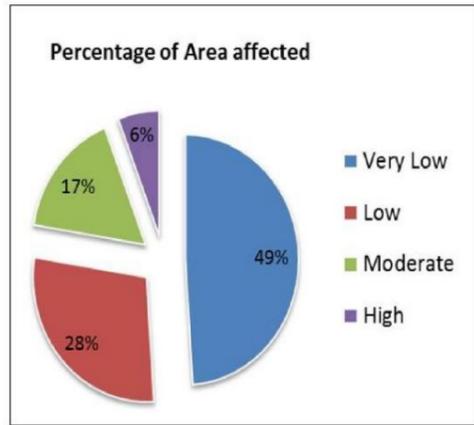
S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	58302
2	Low	49406
3	Moderate	12759
4	High	5496
5	Very High	6897
Total		132859



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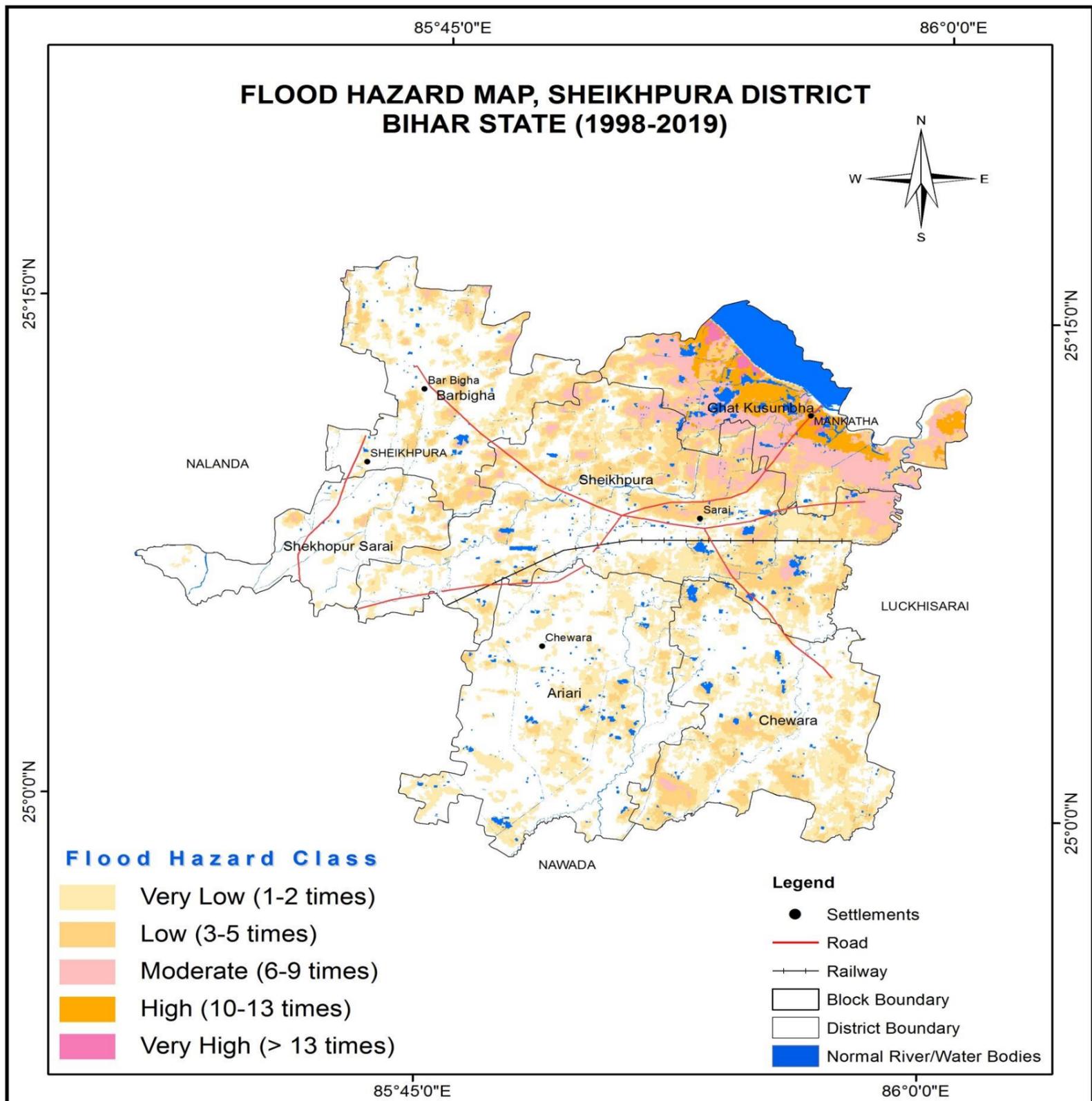


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	53848
2	Low	31410
3	Moderate	18253
4	High	6449
5	Very High	162
Total		110122

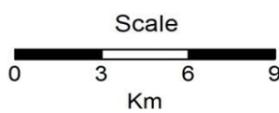
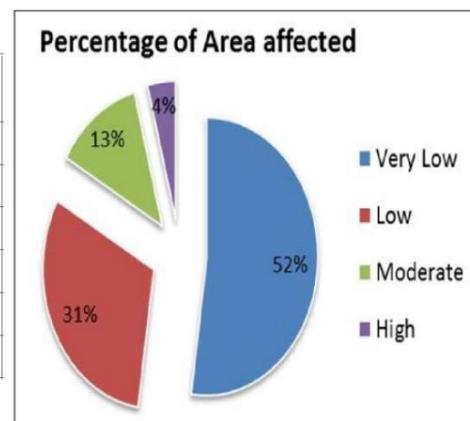


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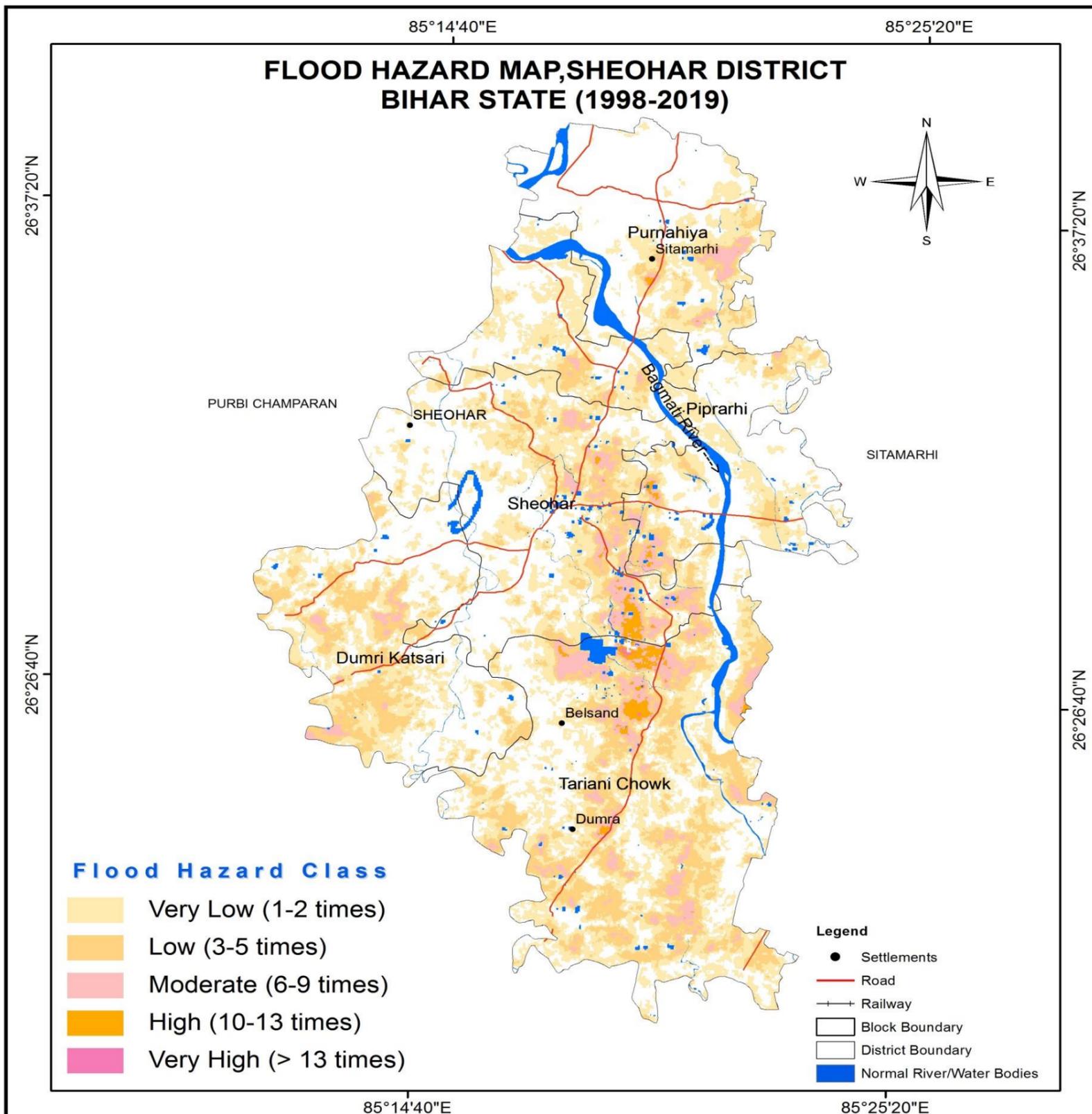


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	14348
2	Low	8496
3	Moderate	3481
4	High	1123
5	Very High	64
Total		27512

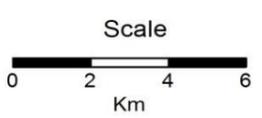
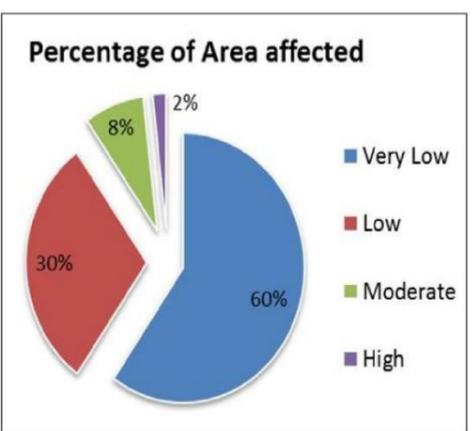


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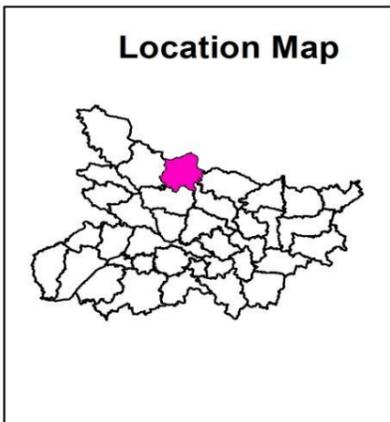
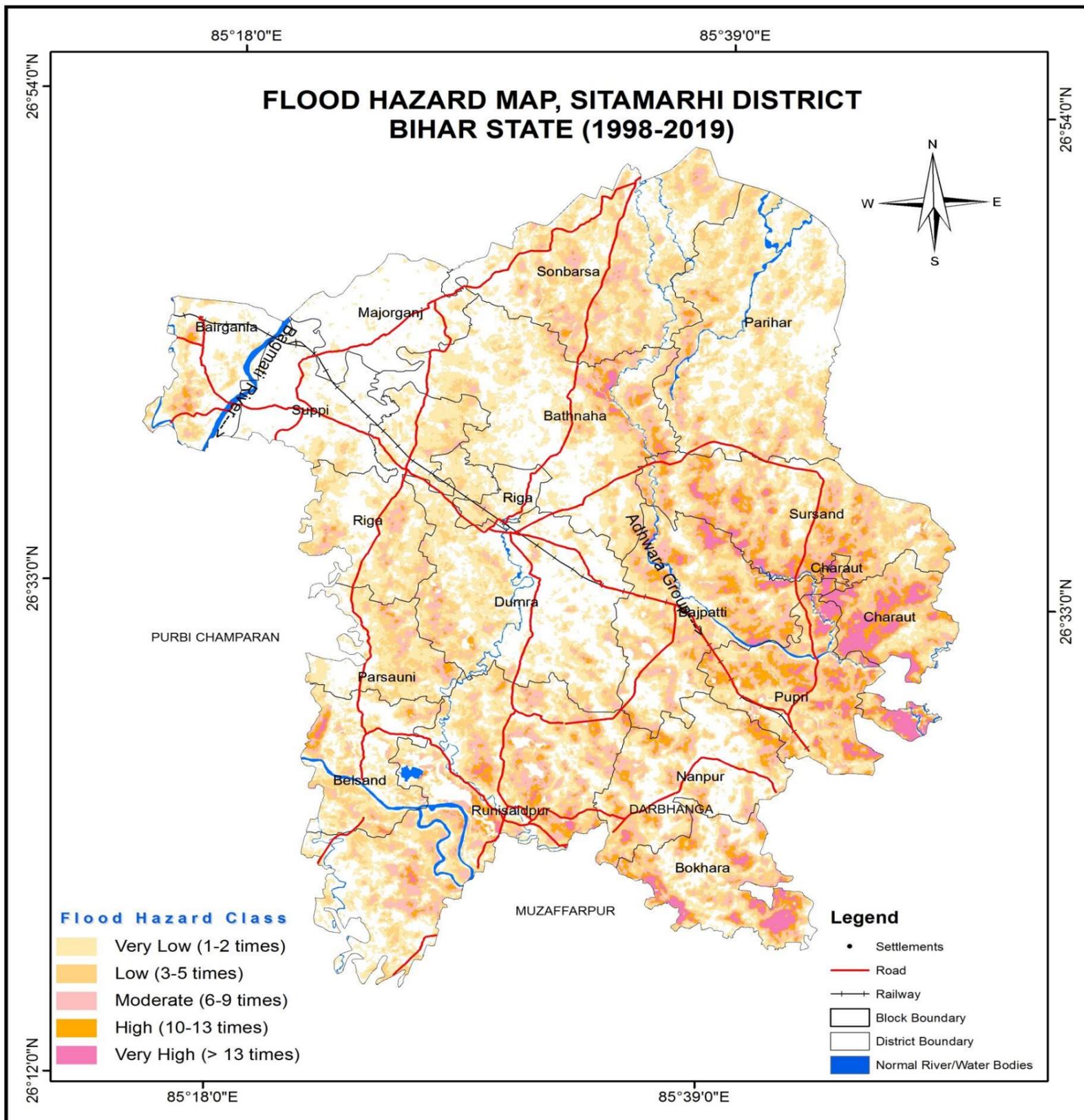


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	19432
2	Low	9881
3	Moderate	2610
4	High	594
5	Very High	81
Total		32597

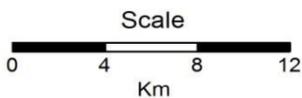
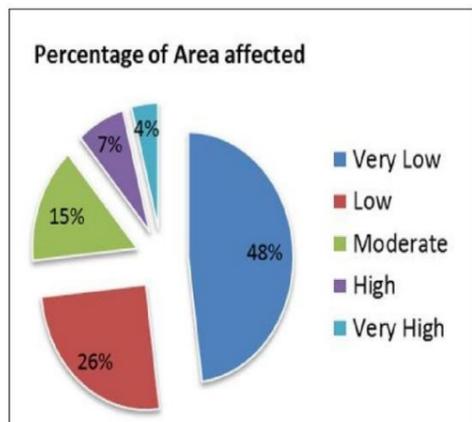


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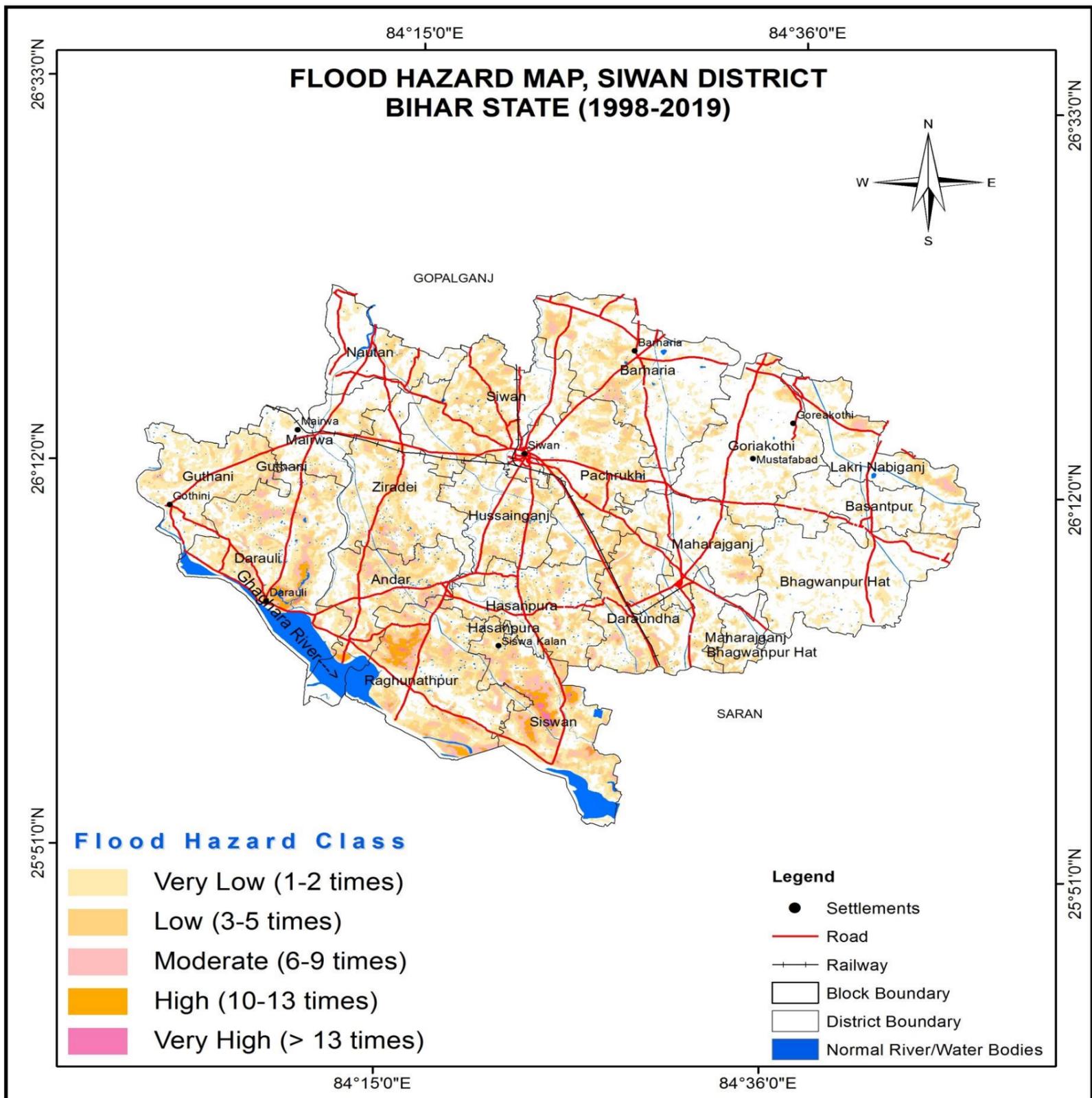




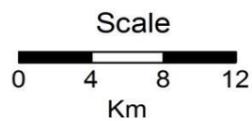
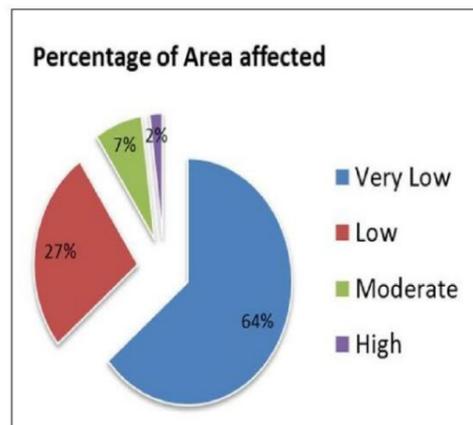
S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	63662
2	Low	33900
3	Moderate	20039
4	High	9781
5	Very High	5471
Total		132852



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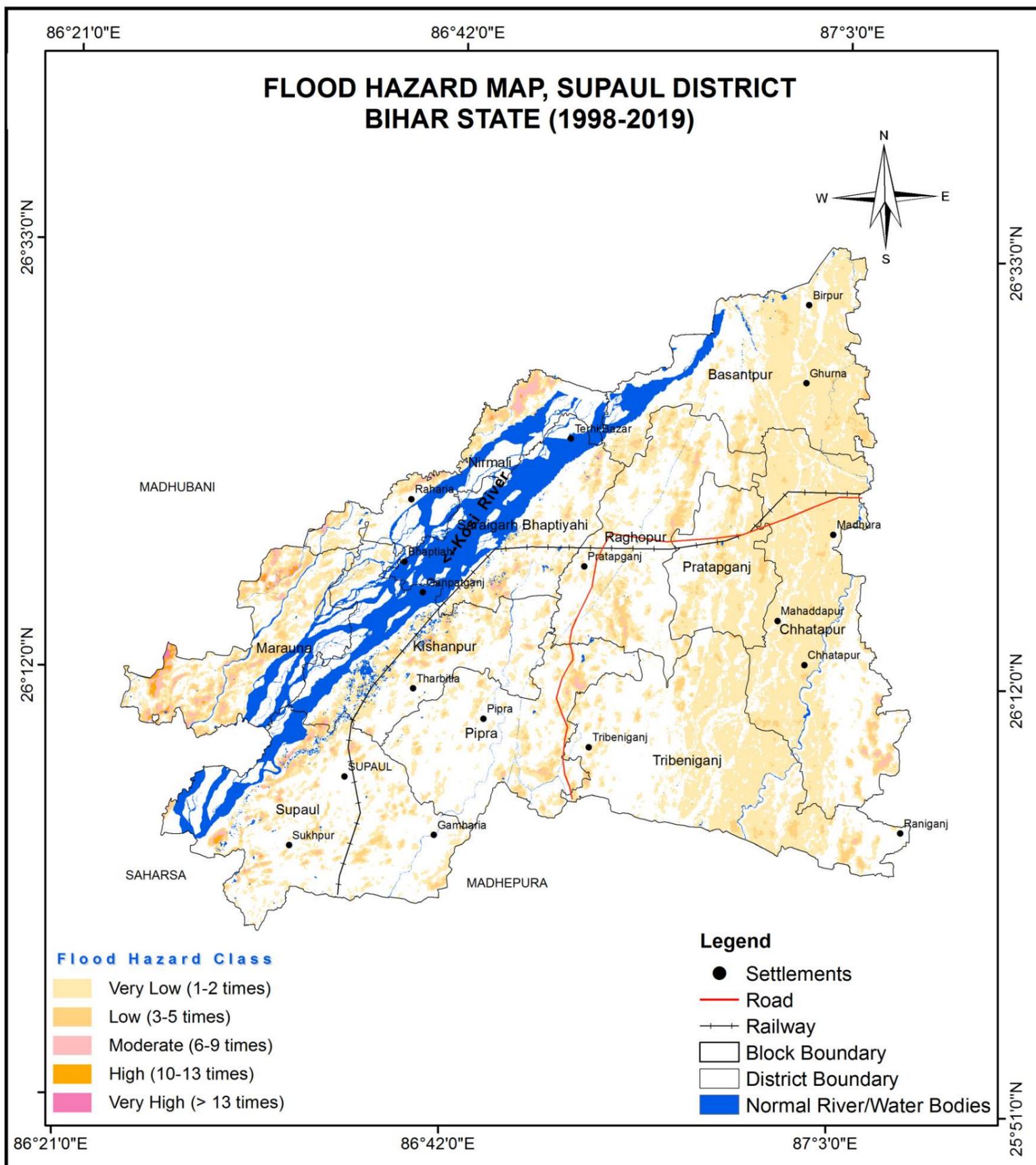


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	63319
2	Low	26345
3	Moderate	7339
4	High	1979
5	Very High	312
Total		99293

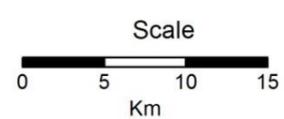
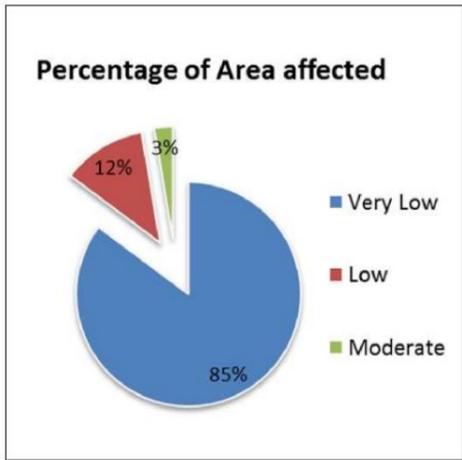


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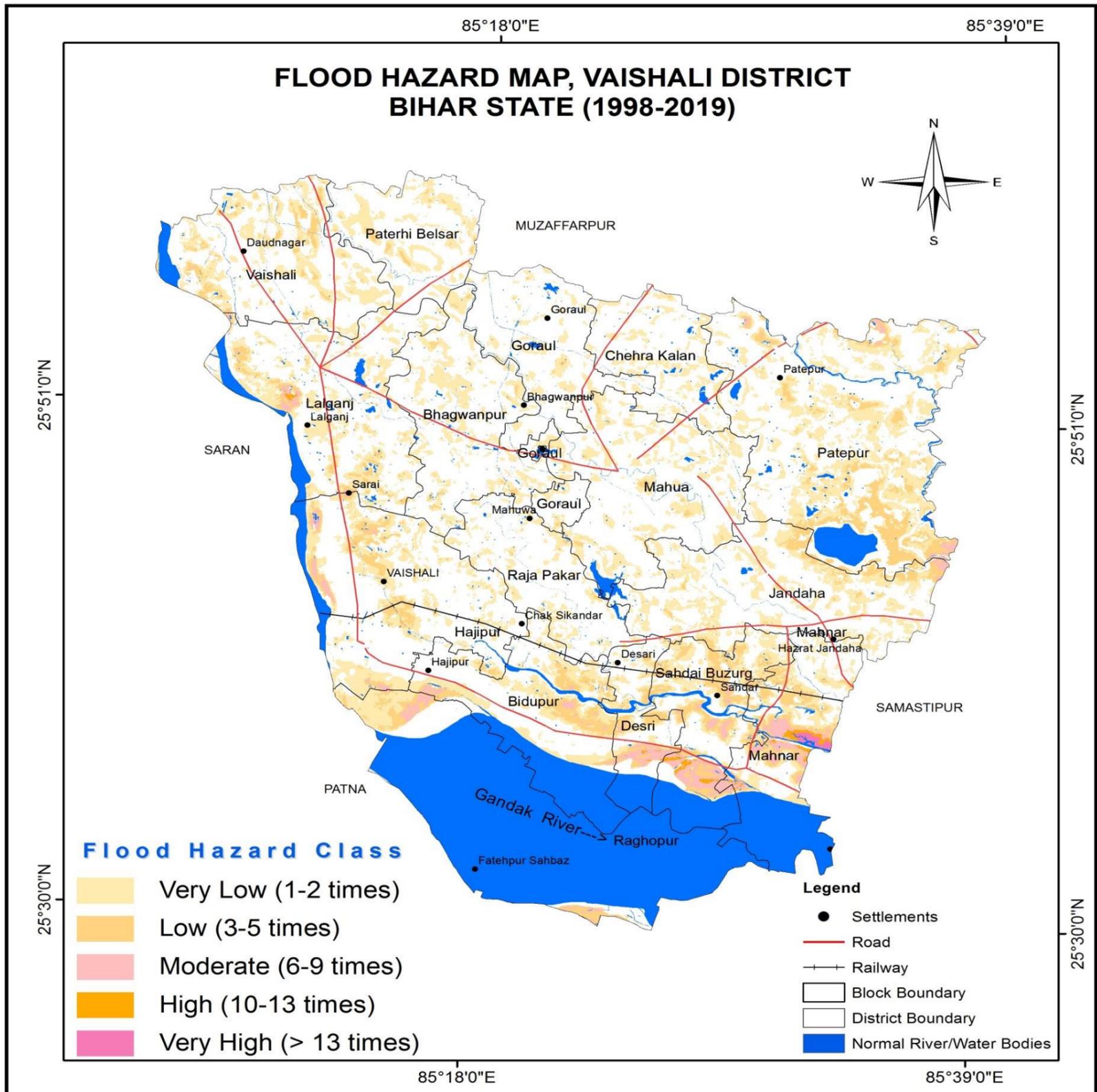




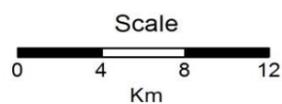
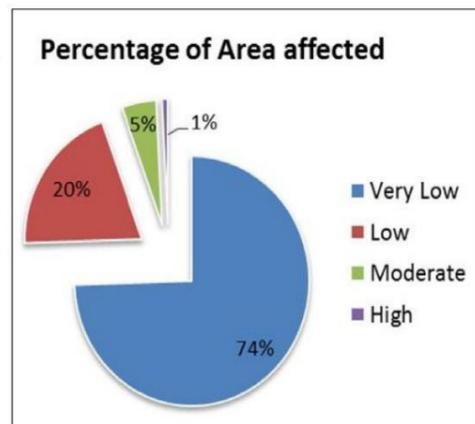
S.No	Hazard Severity	Flood Hazard Area (Hactares)
1	Very Low	79623
2	Low	11321
3	Moderate	2501
4	High	363
5	Very High	33
Total		93839



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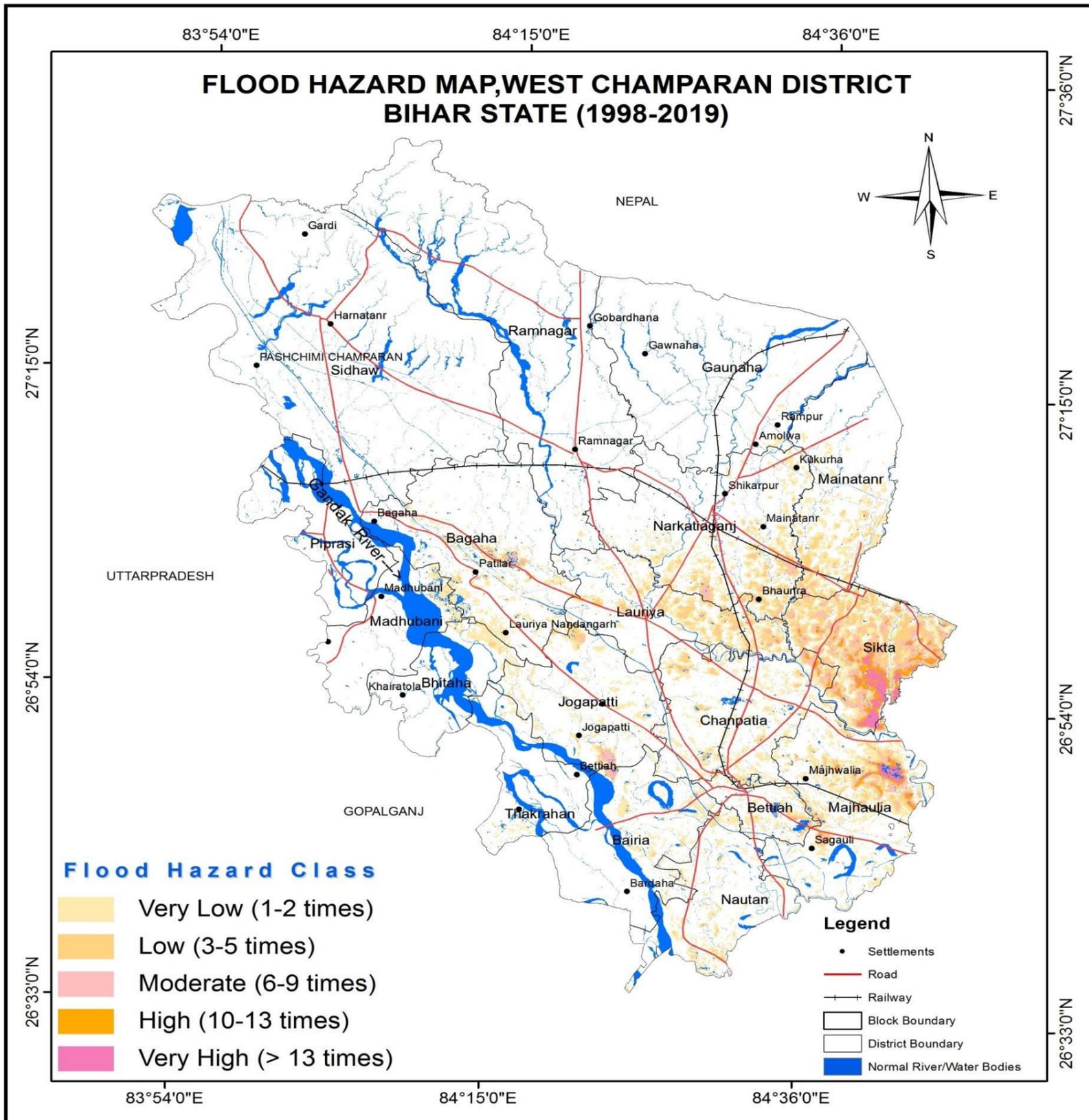


S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	41963
2	Low	11213
3	Moderate	2691
4	High	451
5	Very High	174
Total		56491

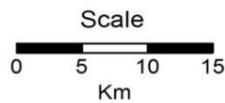
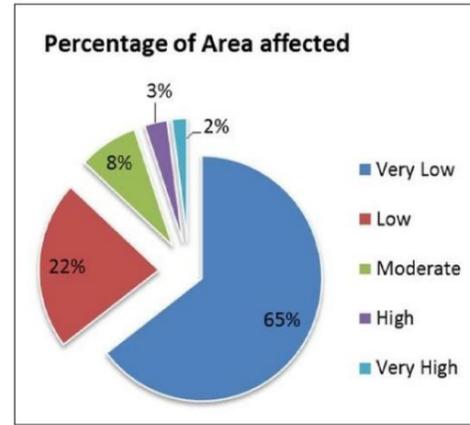


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S.No	Hazard Severity	Flood Hazard Area (Hectares)
1	Very Low	44523
2	Low	15333
3	Moderate	5505
4	High	2124
5	Very High	1425
Total		68909



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LIST OF VILLAGES UNDER VERY HIGH AND HIGH FLOOD HAZARD CATEGORIES -1998-2019
(Number of Villages -1096)

District-wise list of villages falling in Very High and High Flood Hazard Categories during (1998-2019)

S.No	District Name	Block Name	Village Name	Flood Hazard Category
1	Begusarai	Bachhwara	Begam Sarai	High
2		Bachhwara	Chak Kazi	High
3		Bachhwara	Gobind Daspur	High
4		Bachhwara	Jhamatia	High
5		Bachhwara	Mahammadpur Fata	High
6		Bachhwara	Rani	Very High
7		Bachhwara	Rani	High
8		Teghra	Rampur Gopi	High
9	Bhagalpur	Bihpur	Bikrampur	Very High
10		Colgong	Dhanaura	High
11		Colgong	Ekchari	Very High
12		Colgong	Rampur Kharahara	Very High
13		Colgong	Rasulpur	Very High
14		Gopalpur	Abhai Diara	High
15		Gopalpur	Abhia	High
16		Gopalpur	Dimha	High
17		Gopalpur	Goshaingaon	High
18		Gopalpur	Makanpur	High
19		Goradih	Agarpur	High
20		Goradih	Azizpur Pithra	High
21		Goradih	Bishunpur Jichho	High
22		Goradih	Gohario	High
23		Goradih	Jamunidih	High
24		Goradih	Kedarpur	High
25		Goradih	Mabarakpur	High
26		Goradih	Mahammadabad	High
27		Ismailpur	Lachhmipur Barmotra	High
28		Ismailpur	Malpur	High
29		Ismailpur	Mathiara Chak	High
30		Ismailpur	Naraen Pur	High
31		Kharik	Barheta	Very High
32		Kharik	Dadpur	High
33		Narayanpur	Nagarpara Arazi	High
34		Narayanpur	Narainpur	High
35		Narayanpur	Rami Chak	Very High
36		Narayanpur	Shahzadpur	High
37		Narayanpur	Sihpur	High
38		Nathnagar	Bholapur	Very High
39		Nathnagar	Chandpur	High
40		Nathnagar	Fatehpur	Very High
41		Nathnagar	Kalupur	High
42		Nathnagar	Maniarpur Chaur	High
43		Nathnagar	Paigambarpur	Very High
44		Nathnagar	Purani Sarai	High
45		Nathnagar	Sujapur	High
46		Naugachhia	Barwa	High
47		Naugachhia	Khagra	High
48		Naugachhia	Khatma Chak	High
49		Naugachhia	Pakra	High
50		Naugachhia	Pamna	High
51		Pirpanti	Babupur Ogairah	High
52		Pirpanti	Jot Amant	High
53		Sabour	Asanandpur	High
54		Sabour	Babupur	High
55		Sabour	Bagder	High

S.No	District Name	Block Name	Village Name	Flood Hazard Category
56		Sabour	Baijalpur	High
57		Sabour	Bansitikar	High
58		Sabour	Basantpur	High
59		Sabour	Bhithi	High
60		Sabour	Chandheri	High
61		Sabour	Dadpur	High
62		Sabour	Dhankar	High
63		Sabour	Gobindpur	High
64		Sabour	Gopalpur	High
65		Sabour	Haripur	High
66		Sabour	Ibrahimpur	High
67		Sabour	Khan Kita	High
68		Sabour	Khodadadpur	High
69		Sabour	Lailakh	High
70		Sabour	Lodipur Khurd	High
71		Sabour	Mirzapur	High
72		Sabour	Nabipur	High
73		Sabour	Pharka	High
74		Sabour	Rajpur	High
75		Sabour	Sabour	High
76		Sabour	Safia Garhi	High
77		Sabour	Saidpur	High
78		Sabour	Siripur	High
79		Sabour	Sultanpur	High
80		Sabour	Tal Barail	High
81		Sabour	Tal Islam	High
82		Sabour	Tal Mobarak	High
83		Shahkund	Asrafpur	High
84		Sultanganj	Akbarnagar	High
85		Sultanganj	Astandih	Very High
86		Sultanganj	Basantpur	Very High
87		Sultanganj	Bhaunathpur	Very High
88		Sultanganj	Damodarpur Arazi	Very High
89		Sultanganj	Fatehpur Arazi	Very High
90		Sultanganj	Hario	High
91		Sultanganj	Jaitipur	Very High
92		Sultanganj	Khaira Kishunpur	Very High
93		Sultanganj	Khutaha	Very High
94		Sultanganj	Khutaha	High
95		Sultanganj	Kishunpur	Very High
96		Sultanganj	Maheshi	High
97		Sultanganj	Makanpur Chhit	High
98		Sultanganj	Makundpur	High
99		Sultanganj	Masdi	High
100		Sultanganj	Nisahara	High
101		Sultanganj	Rabiachak	High
102		Sultanganj	Rabichak	High
103		Sultanganj	Taraita	High
104		Bahadurpur	Abdullahpur	High
105		Bahadurpur	Ahila	High
106		Bahadurpur	Badh Basti	Very High
107		Bahadurpur	Balaha Dariapur	Very High
108		Bahadurpur	Balia	Very High
109		Bahadurpur	Baluahi	Very High
110		Bahadurpur	Barheta	Very High
111	Darbhanga	Bahadurpur	Bastauli	Very High
112		Bahadurpur	Bishambharpur	High
113		Bahadurpur	Chak Gonauli	Very High
114		Bahadurpur	Chataria	High
115		Bahadurpur	Chhaprar	High
116		Bahadurpur	Chor Bandha	Very High
117		Bahadurpur	Dalaur	Very High
118		Bahadurpur	Dharnipatti	Very High

S.No	District Name	Block Name	Village Name	Flood Hazard Category
119		Bahadurpur	Farukhpur	Very High
120		Bahadurpur	Ganipur	Very High
121		Bahadurpur	Gehumi	Very High
122		Bahadurpur	Gundaui	Very High
123		Bahadurpur	Jagatpur	Very High
124		Bahadurpur	Jagatpur	High
125		Bahadurpur	Jagdispur	High
126		Bahadurpur	Jalwara	Very High
127		Bahadurpur	Kauarpatti	Very High
128		Bahadurpur	Kheraj Kamrauli	Very High
129		Bahadurpur	Kherajpur	Very High
130		Bahadurpur	Maniari	Very High
131		Bahadurpur	Manihas	Very High
132		Bahadurpur	Musapur	High
133		Bahadurpur	Mutnaza Lara Larni	Very High
134		Bahadurpur	Nehalpur	Very High
135		Bahadurpur	Phulwaria	Very High
136		Bahadurpur	Raja Rauli	Very High
137		Bahadurpur	Rampur Rauli	Very High
138		Bahadurpur	Semra	High
139		Bahadurpur	Shahpur	Very High
140		Bahadurpur	Sobhan	Very High
141		Bahadurpur	Tara Lahi	Very High
142		Bahadurpur	Tarauni	High
143		Bahadurpur	Teunga	Very High
144		Biraul	Golma	Very High
145		Biraul	Hanti	High
146		Biraul	Kataya	Very High
147		Biraul	Mahamadpur	Very High
148		Biraul	Nathpatti	Very High
149		Biraul	Paghari	Very High
150		Biraul	Patania	High
151		Biraul	Saduka	High
152		Biraul	Sonpur	Very High
153		Darbhangha	Balaha	High
154		Darbhangha	Banauli	Very High
155		Darbhangha	Bhuskaul	High
156		Darbhangha	Brahmotar Az Rakbe Dularpur	High
157		Darbhangha	Chakka	Very High
158		Darbhangha	Kansi Dakhli	Very High
159		Darbhangha	Ketuka	Very High
160		Darbhangha	Madhopur	High
161		Darbhangha	Madhpur	Very High
162		Darbhangha	Makhnahi	Very High
163		Darbhangha	Manihas	Very High
164		Darbhangha	Manihas Kansi	Very High
165		Darbhangha	Masumpur Kataria	Very High
166		Darbhangha	Narkatia	Very High
167		Ghanshyampur	Dathua	High
168		Ghanshyampur	Pali	High
169		Gora Bauram	Aadharpur	High
170		Gora Bauram	Adhlar	Very High
171		Gora Bauram	Ahisa	Very High
172		Gora Bauram	Balthari	High
173		Gora Bauram	Ganauni	Very High
174		Gora Bauram	Hasanpur	High
175		Gora Bauram	Kunauni	High
176		Gora Bauram	Lagwa Bais	High
177		Gora Bauram	Manorthi	High
178		Gora Bauram	Nadai	High
179		Gora Bauram	Palawa	Very High
180		Gora Bauram	Pharshahi	Very High
181		Gora Bauram	Tira	High

S.No	District Name	Block Name	Village Name	Flood Hazard Category
182		Gora Bauram	Uphraul	High
183		Hanumannagar	Ama Dih	Very High
184		Hanumannagar	Araila	Very High
185		Hanumannagar	Az Rakbe Kali	Very High
186		Hanumannagar	Az Rakbe Urra	Very High
187		Hanumannagar	Baghela	Very High
188		Hanumannagar	Baghela	High
189		Hanumannagar	Bahupatti	Very High
190		Hanumannagar	Balaha	Very High
191		Hanumannagar	Banswara	High
192		Hanumannagar	Bharaul	Very High
193		Hanumannagar	Bhawanipur	Very High
194		Hanumannagar	Bihari Makund	Very High
195		Hanumannagar	Bisaul	Very High
196		Hanumannagar	Bishunpur	High
197		Hanumannagar	Chhatauna	Very High
198		Hanumannagar	Dabhrauli	Very High
199		Hanumannagar	Dath	Very High
200		Hanumannagar	Dih Lahi	Very High
201		Hanumannagar	Dumrawan	Very High
202		Hanumannagar	Godaipatti	Very High
203		Hanumannagar	Gopalpur	High
204		Hanumannagar	Gorhaila	Very High
205		Hanumannagar	Gorhiari	Very High
206		Hanumannagar	Gorwara Barhmotar	High
207		Hanumannagar	Hichhaul	Very High
208		Hanumannagar	Husenabad	High
209		Hanumannagar	Kali	Very High
210		Hanumannagar	Kolhatta	Very High
211		Hanumannagar	Kolwara	Very High
212		Hanumannagar	Lauara	Very High
213		Hanumannagar	Madanpur Gorhairi	Very High
214		Hanumannagar	Madhopur	Very High
215		Hanumannagar	Mahamadpur Sinduar	Very High
216		Hanumannagar	Mahnauli	Very High
217		Hanumannagar	Manhara	Very High
218		Hanumannagar	Musihama	Very High
219		Hanumannagar	Mustafapur	Very High
220		Hanumannagar	Narsara	Very High
221		Hanumannagar	Neam	Very High
222		Hanumannagar	Panchobh	Very High
223		Hanumannagar	Patori	Very High
224		Hanumannagar	Phulwaria	Very High
225		Hanumannagar	Poaria	Very High
226		Hanumannagar	Rampatti	High
227		Hanumannagar	Rampur Dih	Very High
228		Hanumannagar	Rupauli	Very High
229		Hanumannagar	Tal Pupri	Very High
230		Hanumannagar	Udhopatti	High
231		Hanumannagar	Urta	Very High
232		Hayaghat	Mahamadpur	Very High
233		Hayaghat	Sirnia	Very High
234		Jale	Ahiari	High
235		Jale	Chandar Dipa	High
236		Jale	Ghograha	High
237		Jale	Kataia	Very High
238		Jale	Khajurwara	Very High
239		Jale	Milk Pauni	High
240		Jale	Nimrauli	Very High
241		Keotiranway	Barahi Abuara	High
242		Keotiranway	Bariaul	Very High
243		Keotiranway	Bharathpur	High
244		Keotiranway	Bhokraha	High

S.No	District Name	Block Name	Village Name	Flood Hazard Category
245		Keotiranway	Birkhali	High
246		Keotiranway	Chak Ajam	High
247		Keotiranway	Dhobgawan	High
248		Keotiranway	Ekdara	High
249		Keotiranway	Hanuman Nagar	High
250		Keotiranway	Harpur	Very High
251		Keotiranway	Harpur	High
252		Keotiranway	Jahangirpur	Very High
253		Keotiranway	Jethiahi	High
254		Keotiranway	Jiwar	High
255		Keotiranway	Kaharia	Very High
256		Keotiranway	Kamaldah	High
257		Keotiranway	Kasma Lala	High
258		Keotiranway	Khirma	High
259		Keotiranway	Madhopatti Raghali	Very High
260		Keotiranway	Maheshajan	High
261		Keotiranway	Milki	Very High
262		Keotiranway	Mohan Math	High
263		Keotiranway	Naya Gaon	Very High
264		Keotiranway	Pachma	High
265		Keotiranway	Ratauli	High
266		Keotiranway	Sahpur Dih	High
267		Kiratpur	Amahi	High
268		Kiratpur	Bhandaria	High
269		Kiratpur	Birdipur	Very High
270		Kiratpur	Kandwara	Very High
271		Kusheshwar Asthan	Aber Urf Rambari	Very High
272		Kusheshwar Asthan	Aso	Very High
273		Kusheshwar Asthan	Bahrampur Urf Masankhon	Very High
274		Kusheshwar Asthan	Bairo	Very High
275		Kusheshwar Asthan	Balaha	Very High
276		Kusheshwar Asthan	Bargaon	Very High
277		Kusheshwar Asthan	Barna (Barenda)	Very High
278		Kusheshwar Asthan	Barsanda	Very High
279		Kusheshwar Asthan	Basaul	Very High
280		Kusheshwar Asthan	Dharshyam	High
281		Kusheshwar Asthan	Dinmo	Very High
282		Kusheshwar Asthan	Doriha	Very High
283		Kusheshwar Asthan	Dubaha	Very High
284		Kusheshwar Asthan	Fakirana Kalyan Dih	High
285		Kusheshwar Asthan	Ghordaur	Very High
286		Kusheshwar Asthan	Gora	Very High
287		Kusheshwar Asthan	Gothani	Very High
288		Kusheshwar Asthan	Harnagar	Very High
289		Kusheshwar Asthan	Hathauri	Very High
290		Kusheshwar Asthan	Hathra	Very High
291		Kusheshwar Asthan	Hirni	Very High
292		Kusheshwar Asthan	Jafarpur	Very High
293		Kusheshwar Asthan	Jhajhra	Very High
294		Kusheshwar Asthan	Kachhua	Very High
295		Kusheshwar Asthan	Kalna Dih	High
296		Kusheshwar Asthan	Khesraha	Very High
297		Kusheshwar Asthan	Khotas Kalana	Very High
298		Kusheshwar Asthan	Laranch Bhadaul	Very High
299		Kusheshwar Asthan	Larni	Very High
300		Kusheshwar Asthan	Mahri	Very High
301		Kusheshwar Asthan	Mahri Chakla	Very High
302		Kusheshwar Asthan	Maibi	High
303		Kusheshwar Asthan	Majhiam	High
304		Kusheshwar Asthan	Manaita	Very High
305		Kusheshwar Asthan	Manoripur	Very High
306		Kusheshwar Asthan	Missi	High
307		Kusheshwar Asthan	Mohim Buzurg	Very High

S.No	District Name	Block Name	Village Name	Flood Hazard Category
308		Kusheshwar Asthan	Mohim Khurd	Very High
309		Kusheshwar Asthan	Naraenpur	Very High
310		Kusheshwar Asthan	Pach Hara Buzrug	High
311		Kusheshwar Asthan	Paika Charai	Very High
312		Kusheshwar Asthan	Pakahi	Very High
313		Kusheshwar Asthan	Pando	Very High
314		Kusheshwar Asthan	Sanauli	Very High
315		Kusheshwar Asthan	Sanichara	Very High
316		Kusheshwar Asthan	Semraha	Very High
317		Kusheshwar Asthan	Shahpur	Very High
318		Kusheshwar Asthan	Sultanpur	Very High
319		Kusheshwar Asthan	Tasmanpatti	Very High
320		Kusheshwar Asthan	Tole Khakhi Daspur	High
321		Kusheshwar Asthan	Uda	Very High
322		Kusheshwar Asthan Purbi	Adalpur	Very High
323		Kusheshwar Asthan Purbi	Anrahi	Very High
324		Kusheshwar Asthan Purbi	Barania	High
325		Kusheshwar Asthan Purbi	Beltharwa	Very High
326		Kusheshwar Asthan Purbi	Bhaluka	Very High
327		Kusheshwar Asthan Purbi	Bhirua	Very High
328		Kusheshwar Asthan Purbi	Bishunia	High
329		Kusheshwar Asthan Purbi	Burhia Sukhrasi	Very High
330		Kusheshwar Asthan Purbi	Dharampur	Very High
331		Kusheshwar Asthan Purbi	Godaipura	Very High
332		Kusheshwar Asthan Purbi	Goram Dih	Very High
333		Kusheshwar Asthan Purbi	Gulma	Very High
334		Kusheshwar Asthan Purbi	Harnahi	Very High
335		Kusheshwar Asthan Purbi	Jakhri	Very High
336		Kusheshwar Asthan Purbi	Kaunia	Very High
337		Kusheshwar Asthan Purbi	Kewatgawan	Very High
338		Kusheshwar Asthan Purbi	Khalasin	Very High
339		Kusheshwar Asthan Purbi	Kola	Very High
340		Kusheshwar Asthan Purbi	Kolatoka	Very High
341		Kusheshwar Asthan Purbi	Mahadeo Math	High
342		Kusheshwar Asthan Purbi	Mahisanr Urf Narkatia	Very High
343		Kusheshwar Asthan Purbi	Mahisaut	Very High
344		Kusheshwar Asthan Purbi	Pipra	Very High
345		Kusheshwar Asthan Purbi	Piprahi	Very High
346		Kusheshwar Asthan Purbi	Raepur	Very High
347		Kusheshwar Asthan Purbi	Reota	Very High
348		Kusheshwar Asthan Purbi	Samhaura	Very High
349		Kusheshwar Asthan Purbi	Sima	Very High
350		Kusheshwar Asthan Purbi	Sisauna	Very High
351		Kusheshwar Asthan Purbi	Sughrain	Very High
352		Kusheshwar Asthan Purbi	Tilakpur	Very High
353		Kusheshwar Asthan Purbi	Tilkeswar	Very High
354		Kusheshwar Asthan Purbi	Ujua	Very High
355		Kusheshwar Asthan Purbi	Urthua	Very High
356		Kusheshwar Asthan Purbi	Usri	Very High
357		Singhwara	Arai	Very High
358		Singhwara	Atarbel	Very High
359		Singhwara	Bahuara Buzurg	Very High
360		Singhwara	Barhaulia	High
361		Singhwara	Basauli	Very High
362		Singhwara	Bataul	Very High
363		Singhwara	Bedauli	Very High
364		Singhwara	Bharathi	Very High
365		Singhwara	Bharauli	Very High
366		Singhwara	Bharwara	Very High
367		Singhwara	Brahampur	Very High
368		Singhwara	Chaphan	Very High
369		Singhwara	Dhaliahi	Very High
370		Singhwara	Garha	Very High

S.No	District Name	Block Name	Village Name	Flood Hazard Category
371		Singhwara	Gaura Buzurg	Very High
372		Singhwara	Gogaul Urf Gangauli	Very High
373		Singhwara	Hariharpur	Very High
374		Singhwara	Hasan Chak	Very High
375		Singhwara	Hayatpur	High
376		Singhwara	Kanigaon	Very High
377		Singhwara	Kauar	Very High
378		Singhwara	Kheraj Phulthua	Very High
379		Singhwara	Kora	Very High
380		Singhwara	Kuarpatti	High
381		Singhwara	Kusumpatti Kanaur	Very High
382		Singhwara	Lorika	Very High
383		Singhwara	Madhopur	Very High
384		Singhwara	Madhupur	Very High
385		Singhwara	Maheshpatti	Very High
386		Singhwara	Mirzapur Jitwara	Very High
387		Singhwara	Misrauli	Very High
388		Singhwara	Mohanpur	Very High
389		Singhwara	Paigambarpur	Very High
390		Singhwara	Paira	Very High
391		Singhwara	Phulthua	Very High
392		Singhwara	Pipra	High
393		Singhwara	Rajo	Very High
394		Singhwara	Rampatti	Very High
395		Singhwara	Rampura	Very High
396		Singhwara	Rasulpur	High
397		Singhwara	Sanahpur	Very High
398		Singhwara	Sarwara	Very High
399		Singhwara	Shadhampur	Very High
400		Singhwara	Simri	High
401		Singhwara	Tekatar	High
402		Banjaria	Burhwa	High
403		Banjaria	Chichurahia	High
404		Banjaria	Chitaha	Very High
405		Banjaria	Gamharia	High
406		Banjaria	Kukurjari	Very High
407		Banjaria	Pachrukha	Very High
408		Banjaria	Rohinia	Very High
409		Banjaria	Sukhi Dih	Very High
410		Chirai	Baijnathpur	High
411		Chirai	Harbolwa	High
412		Chirai	Khorha	High
413		Dhaka	Gurhanwa	High
414		Motihari	Basbita	High
415		Motihari	Gangia Dih	Very High
416		Motihari	Jamunapur	Very High
417		Motihari	Jhit Kahiya	Very High
418		Motihari	Lachhmipur	High
419		Motihari	Lakhaura	Very High
420		Motihari	Naurangia	High
421		Motihari	Sarsaula	Very High
422		Narkatia	Bachanpur	Very High
423		Narkatia	Bishunpur	High
424		Narkatia	Duho Suho	High
425		Narkatia	Rampur	Very High
426		Narkatia	Tola Banjari	Very High
427		Ramgarhwa	Ahirauliya	Very High
428		Ramgarhwa	Patni	Very High
429		Ramgarhwa	Sukhi Semra	Very High
430		Raxaul	Belwa	High
431		Raxaul	Gamhariya Anand Sagar	High
432		Raxaul	Pipariya	High
433		Raxaul	Siswaniyan	High

S.No	District Name	Block Name	Village Name	Flood Hazard Category
434		Sugauli	Baksa	High
435		Sugauli	Khonra	High
436		Sugauli	Madhopurnankar	High
437		Sugauli	Mali	High
438		Sugauli	Shampur	High
439		Sugauli	Unwa Birit	Very High
440		Gopalganj	Arazi Bikrampur	Very High
441		Gopalganj	Khap Jagmalwa	Very High
442	Gopalganj	Gopalganj	Mali Kana	High
443		Gopalganj	Nawadah	High
444		Amdabad	Baida	High
445		Amdabad	Balua Ghatti	Very High
446		Amdabad	Bangalpara	Very High
447		Amdabad	Bathna	Very High
448		Amdabad	Bhawanipur	Very High
449		Amdabad	Bhornathi	Very High
450		Amdabad	Chilhania	Very High
451		Amdabad	Dakra	High
452		Amdabad	Dewa Lachhmipur	High
453		Amdabad	Gauripur	Very High
454		Amdabad	Gobind Nagar	Very High
455		Amdabad	Jamra	Very High
456		Amdabad	Jangli Tal English	Very High
457		Amdabad	Jhula	Very High
458		Amdabad	Lakhanpur	High
459		Amdabad	Rosnamal	Very High
460		Amdabad	Singhia	Very High
461		Amdabad	Sundri	High
462		Azamnagar	Gachh Baliatha	High
463		Azamnagar	Garh Kamat	High
464		Azamnagar	Kusaha	Very High
465		Azamnagar	Sheonagar	High
466		Azamnagar	Sisabari	Very High
467		Balrampur	Sharif Nagar Milik	High
468		Kadwa	Babhangaon	Very High
469		Kadwa	Berho	Very High
470	Katihar	Kadwa	Bhag Pokhar	Very High
471		Kadwa	Haripur	High
472		Kadwa	Jaja	Very High
473		Kadwa	Khusalpur	Very High
474		Kadwa	Kurhaila	High
475		Kadwa	Majhauri	Very High
476		Kadwa	Malikpur	Very High
477		Kadwa	Mokaria	Very High
478		Kadwa	Pothia	Very High
479		Kadwa	Sakrauna Muradpur	Very High
480		Kursela	Chakarbati Milik	High
481		Kursela	Shahpur Dharmi	Very High
482		Kursela	Shahpur Dharmi Milik	Very High
483		Kursela	Shahpur Dharmi Milik	High
484		Manihari	Bagahar Milik	High
485		Manihari	Baghar Bil	Very High
486		Manihari	Bahadurpur	Very High
487		Manihari	Fatehnagar	Very High
488		Manihari	Hanswar	Very High
489		Manihari	Harlajori	Very High
490		Manihari	Katakus	Very High
491		Manihari	Kishunpur	Very High
492		Manihari	Mahuar	Very High
493		Manihari	Mianpur	Very High
494		Manihari	Pagalbari	Very High
495		Manihari	Shahpur	Very High
496		Manihari	Simlapara	Very High

S.No	District Name	Block Name	Village Name	Flood Hazard Category
497		Manihari	Sowa	Very High
498		Manihari	Teldanga	Very High
499		Mansahi	Lahsa	Very High
500		Mansahi	Pachbarga	Very High
501		Pranpur	Amdaul	High
502		Pranpur	Athara	High
503		Pranpur	Babhni	Very High
504		Pranpur	Bangarua	Very High
505		Pranpur	Bhalgaur	High
506		Pranpur	Gajhar	High
507		Pranpur	Gram Deota	Very High
508		Pranpur	Kasht Habar	Very High
509		Pranpur	Kasundi	High
510		Pranpur	Kehunia	Very High
511		Pranpur	Keshopur	High
512		Pranpur	Madansahi	High
513		Pranpur	Mijli	Very High
514		Pranpur	Pakaria	High
515		Pranpur	Panki	High
516		Pranpur	Sadapur	Very High
517		Pranpur	Satare	High
518		Sameli	Bhatatara	Very High
519		Sameli	Morsanda Milik	High
520		Alauli	Ananpur Maran	Very High
521		Alauli	Aurahidih	Very High
522		Alauli	Cherakhera	Very High
523		Alauli	Dahwa Khairi Khutaha	High
524		Alauli	Dariapur	Very High
525		Alauli	Saharbani	Very High
526		Beldaur	Barun	Very High
527		Beldaur	Bhela Nauabad	High
528		Beldaur	Dighaun	Very High
529		Beldaur	Dudraja	Very High
530		Beldaur	Gindhanson	Very High
531		Beldaur	Kingri	High
532		Beldaur	Pachaut	Very High
533		Beldaur	Pirnagra	High
534		Beldaur	Ramnagar	High
535		Beldaur	Sathman	Very High
536		Chautham	Arnawan	Very High
537		Chautham	Bal Kunda	Very High
538		Chautham	Dhamhara	Very High
539		Chautham	Muzafferpur Sham	Very High
540		Chautham	Sar Sawa	Very High
541		Chautham	Thuthi (Mohanpur)	Very High
542		Gogri	Bhimri	Very High
543		Gogri	Chandwa	Very High
544		Gogri	Deotha	Very High
545		Gogri	Kharowa	High
546		Gogri	Paikant	High
547		Gogri	Pasraha	Very High
548		Gogri	Patti Nandania	Very High
549		Khagaria	Marar	Very High
550		Khagaria	Pifrail	High
551		Mansi	Chak Kamal	High
552		Mansi	Dharhara	Very High
553		Mansi	Mansi	High
554		Mansi	Thamta	Very High
555		Parbatta	Bhatkhar	High
556		Parbatta	Dariapur	High
557		Parbatta	Dariapur Bhelwa	High
558		Parbatta	Dariapur Patpar	High
559		Parbatta	Dumaria Buzurg	High

S.No	District Name	Block Name	Village Name	Flood Hazard Category
560		Parbatta	Mathurpur	High
561		Parbatta	Temtha Karari	High
562		Parbatta	Thebhao	High
563		Parbatta	Zorawarpur	High
564		Alamnagar	Bargaon	High
565		Alamnagar	Gangapur	Very High
566		Alamnagar	Gauchi Dih	High
567		Alamnagar	Ithari	High
568		Alamnagar	Kishunpur Ratwara	Very High
569		Alamnagar	Kunjauri	High
570		Alamnagar	Parail	Very High
571		Alamnagar	Phulaut English	Very High
572		Chausa	Amanat Hidaetullah Subedar	Very High
573		Chausa	Amanat Manullah Jagir	Very High
574		Chausa	Amanat Manullah Subedar	High
575		Chausa	Amanat Mungi Khan Subedar	Very High
576		Chausa	Bhola Singh Jamadar	Very High
577		Chausa	Dhanseshpur	High
578		Chausa	Ghosai	Very High
579		Chausa	Hidaetullah Jamadar Jagir	Very High
580		Chausa	Itwari Jamadar Jagir	High
581		Chausa	Lualagaon	Very High
582		Chausa	Lualagaon Amanat Sarkar	Very High
583		Chausa	Manullah Subedar Jagir	Very High
584		Chausa	Morsanda	Very High
585		Chausa	Pachrasi	Very High
586		Chausa	Pachrasi Amanat Sarkar	Very High
587		Chausa	Paina	High
588		Chausa	Phulaut	Very High
589		Chausa	Subhani Subedar Jagir	High
590		Puraini	Amanat Sarkar	High
591		Puraini	Kherho	High
592		Benipatti	Agai	High
593		Benipatti	Ahpur	High
594		Benipatti	Andhri	Very High
595		Benipatti	Arazi Uchaith	Very High
596		Benipatti	Barantpur	Very High
597		Benipatti	Barri	Very High
598		Benipatti	Betauna	Very High
599		Benipatti	Bishunpur	Very High
600		Benipatti	Chandpur Patti	High
601		Benipatti	Chandpura	Very High
602		Benipatti	Dhanukhi	Very High
603		Benipatti	Ganguli	Very High
604		Benipatti	Gendaul	High
605		Benipatti	Karhara	Very High
606		Benipatti	Khutauna	High
607		Benipatti	Lorika	Very High
608		Benipatti	Madhopur	High
609		Benipatti	Mahamadpur	High
610		Benipatti	Matrahari	High
611		Benipatti	Samada	Very High
612		Benipatti	Sohraul	Very High
613		Benipatti	Uren	Very High
614		Bisfi	Arazi Usauth	High
615		Bisfi	Baingra	Very High
616		Bisfi	Bardaha	High
617		Bisfi	Bherwa	Very High
618		Bisfi	Bisfi	Very High
619		Bisfi	Jagban	High
620		Bisfi	Usrahi	High
621		Ghoghardiha	Alola	High
622		Ghoghardiha	Behrari	Very High

S.No	District Name	Block Name	Village Name	Flood Hazard Category
623		Ghoghardiha	Bhirahar	High
624		Ghoghardiha	Bishuharia	High
625		Ghoghardiha	Hatni	High
626		Ghoghardiha	Rajuahi	High
627		Jhanjharpur	Amraha Raian	Very High
628		Jhanjharpur	Az Rakbe Sirkharia	High
629		Jhanjharpur	Bali	High
630		Lakhnaur	Amarupi	Very High
631		Lakhnaur	Bahera	High
632		Lakhnaur	Manmohan	Very High
633		Lakhnaur	Sonbarsa	High
634		Madhepur	Az Rakbe Bhit Bhagwanpur	High
635		Madhepur	Birpur Burh	High
636		Madhepur	Bishunpur	High
637		Madhepur	Chapram	Very High
638		Madhepur	Daldal	High
639		Madhepur	Mahasingh Hasauli	Very High
640		Madhepur	Nawada	Very High
641		Madhepur	Shankarpur	High
642		Madhepur	Sundar Birajit	High
643		Madhubani	Bahoroaha	Very High
644		Madhubani	Ram Khetri	High
645		Madhubani	Sapta	High
646		Madhwapur	Badhauna	Very High
647		Madhwapur	Bishunpur	Very High
648		Madhwapur	Dumra	Very High
649		Madhwapur	Minti	Very High
650		Madhwapur	Pakar Sam	High
651		Madhwapur	Pirokhar	Very High
652		Madhwapur	Pokharauni Birta	Very High
653		Bariapur	Bagra	Very High
654		Bariapur	Barail	Very High
655		Bariapur	Barail Arazi	Very High
656		Bariapur	Chuki Nirpur	Very High
657		Bariapur	Harpur Arazi	High
658		Bariapur	Mahdewa	High
659	Munger	Bariapur	Nurpur	High
660		Bariapur	Rajdhan	Very High
661		Bariapur	Ratanpur	Very High
662		Khargpur	Bhadaura	High
663		Khargpur	Karharia	High
664		Munger	Maudan Chak	High
665		Aurai	Asmanpur	High
666		Aurai	Bahuara	High
667		Aurai	Banauli	High
668		Aurai	Bara Buzurg	High
669		Aurai	Basua Urf Amaith	High
670		Aurai	Bishunath Urf Bishunpur Gokhul	Very High
671		Aurai	Borwara Garib	High
672		Aurai	Chainpur	Very High
673		Aurai	Chak Sarhanchia	High
674		Aurai	Chihuta	Very High
675	Muzaffarpur	Aurai	Deora Asli	High
676		Aurai	Dharampur	Very High
677		Aurai	Dharopatti	Very High
678		Aurai	Fatehpur Barauna	High
679		Aurai	Gangauli	Very High
680		Aurai	Gorai Urf Askauli	High
681		Aurai	Haswara	High
682		Aurai	Jusar	Very High
683		Aurai	Karhatti	High
684		Aurai	Madhopur	High
685		Aurai	Maheswara	Very High

S.No	District Name	Block Name	Village Name	Flood Hazard Category
686		Aurai	Mahisautha	Very High
687		Aurai	Mahrauli Urf Madhauri	High
688		Aurai	Mathna Urf Basua	Very High
689		Aurai	Mathurapur	Very High
690		Aurai	Mathurapur Buzurg	Very High
691		Aurai	Nankar Rampur Az Rakbe	Very High
692		Aurai	Rampur	Very High
693		Aurai	Rampur Az Rakbe	High
694		Aurai	Sarhanchia	High
695		Aurai	Tal Bharthail	High
696		Aurai	Tojaul	Very High
697		Bandra	Chandpura	High
698		Bandra	Keotsa	High
699		Bandra	Shakri	Very High
700		Bochaha	Balia Indarjit	High
701		Bochaha	Borwara	High
702		Gaighat	Baraila	Very High
703		Gaighat	Bitwara Urf Bahadurpur	High
704		Gaighat	Chauth Urf Jamalpur Kodai	Very High
705		Gaighat	Chhitwara	High
706		Gaighat	Dhubauli Lakhmi	High
707		Gaighat	Dhubauli Piar Bhela	High
708		Gaighat	Dhubauli Sube	High
709		Gaighat	Dumrawan	High
710		Gaighat	Jamalpur Kodai	Very High
711		Gaighat	Jarang	High
712		Gaighat	Kalyanpur Urf Bishunpurkalyan	Very High
713		Gaighat	Maheshwara	Very High
714		Gaighat	Paga	High
715		Gaighat	Raghopur	Very High
716		Gaighat	Santha	Very High
717		Gaighat	Shakarwara Nur	High
718		Gaighat	Shakarwara Sabik	High
719		Gaighat	Sinia	High
720		Gaighat	Subas Kesho	Very High
721		Gaighat	Subas Kunaimaisubasgangwasubas	Very High
722		Gaighat	Tejauli Buzurg	Very High
723		Gaighat	Thika Pahi	Very High
724		Gaighat	Tirsatha	Very High
725		Katra	Aghari Raepur Aghari	Very High
726		Katra	Ankhauri	Very High
727		Katra	Bandhpura	Very High
728		Katra	Barari Urf Braudi Buzurg	Very High
729		Katra	Barhad	High
730		Katra	Barheta Ramai Urf Mohanpur	Very High
731		Katra	Basant	Very High
732		Katra	Basant Khagura Bazurg	High
733		Katra	Bel Pakauna Urf Maheshpatti	Very High
734		Katra	Bhagwanpur	Very High
735		Katra	Bisautha Urf Mahisautha	High
736		Katra	Chak Bhabda	Very High
737		Katra	Chak Mohiuddin Urf Bishunpatti	Very High
738		Katra	Chanauri	High
739		Katra	Darhaul Urf Daraul	High
740		Katra	Deogan	High
741		Katra	Dhanaur	High
742		Katra	Dhubauli	Very High
743		Katra	Inglish Az Rakbe Bhagwanpur	Very High
744		Katra	Jitwara	High
745		Katra	Khangura Dih Urf Lakmipur	Very High
746		Katra	Kopi Urf Narkothi	High
747		Katra	Madaripur	Very High

S.No	District Name	Block Name	Village Name	Flood Hazard Category
748		Katra	Madhaipura	High
749		Katra	Madhopur	Very High
750		Katra	Madhurapur Changel Nankar	Very High
751		Katra	Marwa	High
752		Katra	Nagwara	Very High
753		Katra	Nawada Urf Khangura Khurd	Very High
754		Katra	Pahsaul	Very High
755		Katra	Pindauli	Very High
756		Katra	Sahnauli	Very High
757		Katra	Shiudaspur	Very High
758		Katra	Sohagpur	Very High
759		Katra	Sonepur	Very High
760		Katra	Tehwara	High
761		Bind	Bakra	High
762		Bind	Gazipur	High
763		Bind	Makanpur	High
764		Bind	Mirzapur	High
765		Bind	Nirpur	High
766		Bind	Suratpur	High
767		Bind	Tajnipur	High
768		Chandi	Kachra	High
769		Chandi	Panchanbe	High
770		Harnaut	Az Rakbe Sirsi	High
771		Harnaut	Chak Akmal	High
772		Harnaut	Chak Rashid	High
773		Harnaut	Mustafapur	High
774		Harnaut	Nazimnagar	High
775		Harnaut	Nobbah	High
776		Harnaut	Rustampur	Very High
777		Harnaut	Rustampur	High
778	Nalanda	Harnaut	Sirsi	High
779		Hilsa	Alipur	High
780		Karai Parsurai	Berawan	High
781		Karai Parsurai	Jalalpur	High
782		Nagar Nausa	Chiraiya Deal	High
783		Rahui	Sonsikra	Very High
784		Sarmera	Barhia	High
785		Sarmera	Chero	High
786		Sarmera	Isua	High
787		Sarmera	Kenar	High
788		Sarmera	Mirnagar	High
789		Sarmera	Misia	High
790		Sarmera	Murtaza Chak	High
791		Sarmera	Musahri	High
792		Sarmera	Nauarup	Very High
793		Sarmera	Sadha	High
794		Sarmera	Sasaur	High
795		Sarmera	Singhaul Nala Chhoka	High
796		Bakhtiarapur	Chak Daulat	High
797		Bakhtiarapur	Champapur	High
798		Bakhtiarapur	Majhauili	High
799		Bakhtiarapur	Mirdaha Chak	High
800		Bakhtiarapur	Saidpur	High
801		Belchhi	Ahranwan	High
802		Belchhi	Bandi Chak	High
803	Patna	Belchhi	Harlochanpur	High
804		Belchhi	Kaimadih Sarshikan	High
805		Daniawan	Kashmiriya	High
806		Daniawan	Madari Chak	High
807		Daniawan	Salarpur	High
808		Dhanarua	Deokali	High
809		Fatwah	Akharia	High
810		Fatwah	Dariapur	High

S.No	District Name	Block Name	Village Name	Flood Hazard Category
811		Fatwah	Daulatput	Very High
812		Fatwah	Gangapur	High
813		Fatwah	Kasimpur	High
814		Fatwah	Kharphar	High
815		Fatwah	Lashkari Chak	Very High
816		Fatwah	Mohiuddinpur	High
817		Fatwah	Mominpur	High
818		Fatwah	Niyazipur	High
819		Fatwah	Pachrukha	High
820		Fatwah	Parsa	High
821		Fatwah	Parsarampur	High
822		Fatwah	Rabia Chak	High
823		Fatwah	Sarbahampur	High
824		Fatwah	Sonaru	High
825		Fatwah	Soti Chak	Very High
826		Fatwah	Supan Chak	High
827		Fatwah	Turk Diha	Very High
828		Fatwah	Waripur	High
829		Ghoshwari	Keoti	High
830		Ghoshwari	Samaya No 5 (Samaya)	High
831		Ghoshwari	Samaya No 6 (Milki Etc)	High
832		Ghoshwari	Samaya No 9 (Isanagar)	High
833		Ghoshwari	Samaya No.7	High
834		Ghoshwari	Samaya No.8(Sarfaz Nagar Urf Kumhra)	High
835		Khusrupur	Az Rakba Mustafapur	High
836		Khusrupur	Chaunra	High
837		Khusrupur	Diso Chak	High
838		Khusrupur	Haibatpur	High
839		Khusrupur	Hardas Bigha	High
840		Khusrupur	Hemzapur	High
841		Khusrupur	Lodipur	Very High
842		Khusrupur	Mustafapur	High
843		Khusrupur	Sukar Beg Chak	High
844		Khusrupur	Tilhar	High
845		Maner	Bag Aga	High
846		Maner	Chak Daud	High
847		Paliganj	Kalupur	High
848		Paliganj	Khapura	High
849		Paliganj	Lalganj Sehra	High
850		Paliganj	Masaurhi	High
851		Pandarakh	Darwe Bhadaur	High
852		Pandarakh	Daudpur Jiuri	High
853		Pandarakh	Khajurar	High
854		Pandarakh	Lalpura	High
855		Pandarakh	Sirsikalan	High
856		Patna Rural	Chimo Chak	Very High
857		Patna Rural	Dhaulpura	Very High
858		Patna Rural	Hiranandpur	High
859		Patna Rural	Mir Chak Kothia	High
860		Patna Rural	Nasirpur Tajpur	High
861		Patna Rural	Ranipur Milki Chak	High
862		Patna Rural	Sadullahpur	High
863		Patna Rural	Simli Murarpur	Very High
864		Punpun	Ekauna	High
865		Punpun	Fahim Chak	High
866		Punpun	Kalianpur Basiawan	High
867		Punpun	Khapura	High
868		Punpun	Milki	High
869		Punpun	Nuruddinpur	High
870		Punpun	Sapahua	High
871		Sampat Chak	Bairia	High
872	Purnia	Amour	Chan Surahia	High

S.No	District Name	Block Name	Village Name	Flood Hazard Category
873		Amour	Rahua	High
874		Baisi	Bangaon	High
875		Baisi	Bansbari	High
876		Baisi	Chopara	High
877		Baisi	Hardas Arazi	Very High
878		Baisi	Harichaura	High
879		Baisi	Mandel	High
880		Baisi	Salampur	High
881		Baisi	Shikarpur	Very High
882		Baisi	Sultanghata	Very High
883		Rupauli	Anjhari	High
884		Rupauli	Bairma	High
885		Rupauli	Balia	High
886		Rupauli	Bharoria	Very High
887		Rupauli	Bhaua Parbal	Very High
888		Rupauli	Mohanpur Istamrar	High
889		Banma Itahri	Hath Mandal	Very High
890		Banma Itahri	Jamal Nagar	Very High
891		Banma Itahri	Lalpur	High
892		Banma Itahri	Sahuria	Very High
893		Mahishi	Aina	High
894		Mahishi	Aina Sohagpur	High
895		Mahishi	Bhanthi	High
896		Mahishi	Chatania	High
897		Mahishi	Ghoghpur	High
898		Mahishi	Jalai	High
899		Mahishi	Jhara	Very High
900		Mahishi	Karhara	Very High
901		Mahishi	Manaur	Very High
902		Mahishi	Mangrauni	Very High
903		Mahishi	Nawada	High
904	Saharsa	Mahishi	Sisauna	Very High
905		Mahishi	Sonkurthua	Very High
906		Mahishi	Telwa	High
907		Nauhatta	Lalpur	Very High
908		Salkhua	Alani	High
909		Salkhua	Baldehi	Very High
910		Salkhua	Bankatti	Very High
911		Salkhua	Bhirkhi	Very High
912		Salkhua	Kabirpur	Very High
913		Salkhua	Khajur Bana	Very High
914		Salkhua	Mamarkha(Mobarakpur)	High
915		Salkhua	Matihani	Very High
916		Salkhua	Samhar Kalan	Very High
917		Salkhua	Samhar Khurd	Very High
918		Salkhua	Sauthi	Very High
919		Sonbarsa	Padumpur	Very High
920		Bithan	Banbhaura	Very High
921		Bithan	Bhatgawan	Very High
922		Bithan	Bhuindhar	Very High
923		Bithan	Chhechhani	Very High
924		Bithan	Kaurahi	Very High
925		Bithan	Khota Tilakpur	Very High
926		Bithan	Khutauna	Very High
927	Samastipur	Bithan	Lachhminia	Very High
928		Bithan	Lad Kapasia	Very High
929		Bithan	Nirpa	Very High
930		Bithan	Pirautana	Very High
931		Bithan	Purandaha	Very High
932		Bithan	Tetrahi	Very High
933		Kalyanpur	Arazi Jadu Mahsi	Very High
934		Kalyanpur	Bhardimal	Very High
935		Kalyanpur	Budakpur	Very High

S.No	District Name	Block Name	Village Name	Flood Hazard Category
936		Kalyanpur	Darori	Very High
937		Kalyanpur	Ganga Paran	Very High
938		Kalyanpur	Ganga Paran	High
939		Kalyanpur	Jathmalpur	High
940		Kalyanpur	Kalaunjar	Very High
941		Kalyanpur	Madanpur	Very High
942		Kalyanpur	Malinagar	Very High
943		Kalyanpur	Namapur	Very High
944		Kalyanpur	Ram Paran	Very High
945		Kalyanpur	Ratanpur	Very High
946		Kalyanpur	Sardimal	Very High
947		Kalyanpur	Sardimal	High
948		Kalyanpur	Sembhu Ram Tok	Very High
949		Kalyanpur	Siri Nath Paran	Very High
950		Kalyanpur	Srinath Paran	High
951		Kalyanpur	Surmar	Very High
952		Mohiuddinagar	Dubaha	High
953		Mohiuddinagar	Hazratpur	High
954		Patori	Araia	High
955		Patori	Dhamaun	High
956		Patori	Inaetpur	Very High
957		Shivaji Nagar	Kothia	High
958		Shivaji Nagar	Mahsar	Very High
959		Singhia	Arazi Maguraha	High
960		Singhia	Arazilachhminia	Very High
961		Singhia	Bastipatti Mahua Urf Murli	High
962		Singhia	Bharaia Nirpur	High
963		Singhia	Bharson	Very High
964		Singhia	Bishunpur Diha	High
965		Singhia	Bishunpur Kewathar	High
966		Singhia	Dhanaho	Very High
967		Singhia	Hardia	High
968		Singhia	Kabilashi	High
969		Singhia	Kankri	High
970		Singhia	Karahi	Very High
971		Singhia	Parhat	Very High
972		Singhia	Patail	High
973		Singhia	Salepur	Very High
974		Singhia	Son Mani	High
975		Dariapur	Barua	High
976		Dariapur	Bhagwan Chak	High
977		Dariapur	Bhopan Chak	High
978		Dariapur	Chak Akbarpur	High
979		Dariapur	Chak Banwaripur	High
980		Dariapur	Chak Khanpur Mahartha	High
981		Dariapur	Chak Nagwa Khurd Mahartha	High
982		Dariapur	Chak Semrahiya Mahartha	High
983		Dariapur	Chandwa Chak	High
984		Dariapur	Darihara Bhual	High
985		Dariapur	Dhongaha Inam	High
986	Saran	Dariapur	Faqir Chak	High
987		Dariapur	Gariba Chak	High
988		Dariapur	Jagdish	High
989		Dariapur	Joga Chak	High
990		Dariapur	Karanpura	High
991		Dariapur	Kusiari	High
992		Dariapur	Litiahi	High
993		Dariapur	Malmala	High
994		Dariapur	Mangarpal Murtuza	High
995		Dariapur	Mansa Chak	High
996		Dariapur	Math Kakara	High
997		Dariapur	Mathchelwa	High
998		Dariapur	Mohan Chak	High

S.No	District Name	Block Name	Village Name	Flood Hazard Category
999		Dariapur	Murar Chak	High
1000		Dariapur	Rampur	High
1001		Dariapur	Rasulpur	High
1002		Dariapur	Saman Chak	High
1003		Dariapur	Saraia	High
1004		Dariapur	Sarnarayan	High
1005		Dighwara	Nizama Chak	High
1006		Garkha	Banwari Basant	High
1007		Garkha	Bhagwani Chhapra	High
1008		Garkha	Chanda	High
1009		Garkha	Jogaulia	High
1010		Garkha	Kosalpur	High
1011		Garkha	Minapur	High
1012		Garkha	Naraenpur	High
1013		Garkha	Pach Patra	High
1014		Garkha	Pohian	High
1015		Garkha	Ramgarha	Very High
1016		Garkha	Tal Kechuli	High
1017		Revelganj	Saraindha	High
1018		Sonepur	Akilpur	High
1019		Sonepur	Chandpura	High
1020		Sonepur	Chaturpur	High
1021		Sonepur	Dariyapur	High
1022		Sonepur	Gopalpur	High
1023		Sonepur	Mahmud Chak	High
1024		Sonepur	Murthan	High
1025		Sonepur	Parmanandpur	High
1026		Sonepur	Rasulpur	High
1027		Ghat Kusumbha	Baoghat	High
1028	Sheikhpura	Ghat Kusumbha	Belauni	High
1029		Ghat Kusumbha	Koila	High
1030	Sheohar	Tariani Chowk	Belahi Dullah	High
1031		Bajpatti	Bhikaha	Very High
1032		Bajpatti	Mahamadpur Urf Sherpur	High
1033		Bajpatti	Pachra Nimahi	High
1034		Bajpatti	Rasulpur	Very High
1035		Bathnaha	Mahuawa	High
1036		Bathnaha	Sirsian	High
1037		Belsand	Rupauli	Very High
1038		Belsand	Walipur	High
1039		Bokhra	Arazi Chakouti	High
1040		Bokhra	Balasath	High
1041		Bokhra	Chakauti	Very High
1042		Bokhra	Sauria Buzurg	Very High
1043		Bokhra	Singha Chauri	Very High
1044		Charaut	Arazi Nankar	Very High
1045		Charaut	Az Rakbe Damodarpatti	High
1046	Sitamarhi	Charaut	Balsa	Very High
1047		Charaut	Barri Bihta	Very High
1048		Charaut	Bhanta Bari	Very High
1049		Charaut	Chandar Saina	Very High
1050		Charaut	Chikna Chak	Very High
1051		Charaut	Parigawan	Very High
1052		Nanpur	Bahera Zahid	High
1053		Nanpur	Biror	High
1054		Pupri	Awapur Urf Sherpur	High
1055		Pupri	Bagha Sati	Very High
1056		Pupri	Balha Madsudan	Very High
1057		Pupri	Bargachhia Mai Arazibargachhia	High
1058		Pupri	Belmohan	High
1059		Pupri	Bihta Dharampur	High
1060		Pupri	Chainpur	High
1061		Pupri	Gangwara	Very High

S.No	District Name	Block Name	Village Name	Flood Hazard Category
1062		Pupri	Hirauli	High
1063		Pupri	Madhubani	Very High
1064		Pupri	Manikpur	High
1065		Pupri	Shahjahanpur	Very High
1066		Runisaidpur	Baligarh Deona Khurd	High
1067		Runisaidpur	Chak Donai	High
1068		Runisaidpur	Madhopur	High
1069		Sursand	Amana	High
1070		Sursand	Deonathpatti	Very High
1071		Sursand	Kuari	High
1072		Sursand	Majhaulia	Very High
1073		Sursand	Makunahia	High
1074		Sursand	Piprarhi	Very High
1075		Sursand	Samhua	High
1076		Darauli	Belsui	High
1077		Raghunathpur	Basantpur	High
1078		Raghunathpur	Raghunath Lahar	High
1079		Raghunathpur	Santhi	High
1080		Raghunathpur	Tallahar	High
1081		Siswan	Bawan Dih	High
1082	Siwan	Siswan	Bhikhpur	Very High
1083		Siswan	Chatar	High
1084		Siswan	Jagdishpur	High
1085		Siswan	Kishunwari	High
1086		Siswan	Morwan	High
1087		Siswan	Nawada	High
1088		Siswan	Pachamuwa	High
1089	Supaul	Marauna	Kamrail	High
1090		Mahnar	Harpur Phatikwara	Very High
1091	Vaishali	Mahnar	Jagarnathpur	High
1092		Majhaulia	Mathia Birit	High
1093		Sikta	Mainpur	High
1094	West_Champaran	Sikta	Patkhaulia	High
1095		Sikta	Puraina	Very High
1096		Sikta	Sonbarsa	High

LIST OF VILLAGES UNDER MODERATE FLOOD HAZARD CATEGORIES -1998-2019
(Number of Villages -1336)

District-wise list of villages falling in Moderate Flood Hazard Category during (1998-2019)

S.No	District Name	Block Name	Village Name	Flood Hazard Category
1	Araria	Araria	Kismat Khawaspur	Moderate
2		Forbesganj	Nijkulharia	Moderate
3		Forbesganj	Ramganj	Moderate
4		Jokihat	Kajleta	Moderate
5		Palasi	Baraili	Moderate
6		Palasi	Daulatpur	Moderate
7		Palasi	Dhurgaon	Moderate
8		Palasi	Pharhara	Moderate
9		Palasi	Pipra	Moderate
10		Karpi	Khajuri	Moderate
11		Karpi	Purainia Ruknuddin	Moderate
12	Begusarai	Bachhwara	Ajitpur	Moderate
13		Bachhwara	Beltar	Moderate
14		Bachhwara	Chak Bhela	Moderate
15		Bachhwara	Chak Ganga	Moderate
16		Bachhwara	Chakoli	Moderate
17		Bachhwara	Chiraiyatok	Moderate
18		Bachhwara	Damusarai	Moderate
19		Bachhwara	Jit Bazidpur	Moderate
20		Bachhwara	Mahmilapur	Moderate
21		Bachhwara	Ratullahpur	Moderate
22		Bachhwara	Rupas Bag	Moderate
23		Bachhwara	Warisnagar	Moderate
24		Bakhri	Bahor Chak	Moderate
25		Balia	Basdeopur	Moderate
26		Balia	Birpur	Moderate
27		Balia	Husena	Moderate
28		Balia	Janardanpur	Moderate
29		Balia	Kazi Chak	Moderate
30		Balia	Kohua	Moderate
31		Balia	Mohanpur	Moderate
32		Balia	Nagargawan	Moderate
33		Balia	Nathullapur	Moderate
34		Balia	Dahia	Moderate
35		Balia	Jokia	Moderate
36		Balia	Rasalpur	Moderate
37		Bhagwanpur	Naula	Moderate
38		Bhagwanpur	Sirnia	Moderate
39		Bhagwanpur	Sirnia Barari	Moderate
40		Birpur	Harpur	Moderate
41		Matihani	Jianandpur	Moderate
42		Matihani	Kadam Rasul	Moderate
43		Sahebpur Kamal	Mogalsarai	Moderate
44		Sahebpur Kamal	Parora	Moderate
45		Sahebpur Kamal	Rasulpur	Moderate
46		Sahebpur Kamal	Saidpur	Moderate
47		Sahebpur Kamal	Salemabad	Moderate
48		Sahebpur Kamal	Sherpur	Moderate
49		Sahebpur Kamal	Akbarpur	Moderate
50		Sahebpur Kamal	Akbarpur Barari	Moderate
51		Sahebpur Kamal	Gohia	Moderate
52		Samho Akha Kurha	Ladhauna	Moderate
53		Samho Akha Kurha	Pathua	Moderate
54		Samho Akha Kurha	Saidpur Salha	Moderate
55		Samho Akha Kurha	Saidpur Salha Barari	Moderate
56		Samho Akha Kurha	Salha	Moderate
57		Samho Akha Kurha	Singhpur	Moderate
58		Samho Akha Kurha	Sonbarsa	Moderate

S.No	District Name	Block Name	Village Name	Flood Hazard Category
59	Bhagalpur	Bihpur	Gauripur	Moderate
60		Bihpur	Narkatia	Moderate
61		Colgong	Deori	Moderate
62		Colgong	Gohar	Moderate
63		Colgong	Gohar Chak	Moderate
64		Colgong	Lachhmipur	Moderate
65		Colgong	Manga Chak	Moderate
66		Colgong	Ogri	Moderate
67		Colgong	Parmanandpur Khawas	Moderate
68		Colgong	Sadhapur	Moderate
69		Colgong	Shankarpur Khawas	Moderate
70		Colgong	Sundarpur	Moderate
71		Gopalpur	Azmabad	Moderate
72		Gopalpur	Azmabad Milik	Moderate
73		Gopalpur	Goshaingaon	Moderate
74		Gopalpur	Mathiara	Moderate
75		Goradih	Basantpur	Moderate
76		Goradih	Bhawanipur Desri	Moderate
77		Goradih	Kalikapur	Moderate
78		Goradih	Korha	Moderate
79		Goradih	Malchhatta	Moderate
80		Goradih	Malchhatta Englis	Moderate
81		Goradih	Mirza Chak	Moderate
82		Goradih	Mohanpur	Moderate
83		Goradih	Muktapur	Moderate
84		Goradih	Nadiawan Amanat	Moderate
85		Goradih	Rahua Chaur	Moderate
86		Goradih	Salpur	Moderate
87		Ismailpur	Parbatta	Moderate
88		Ismailpur	Parbatta Deori	Moderate
89		Ismailpur	Maksuspur	Moderate
90		Jagdishpur	Dhodhia	Moderate
91		Kharik	Dudhaila	Moderate
92		Narayanpur	Eusufpur	Moderate
93		Narayanpur	Shahpur	Moderate
94		Narayanpur	Ajmeripur	Moderate
95		Nathnagar	Biharipur	Moderate
96		Nathnagar	Ganga Parsad	Moderate
97		Nathnagar	Khilaun	Moderate
98		Nathnagar	Purani Sarai	Moderate
99		Nathnagar	Rattipur	Moderate
100		Nathnagar	Sujapur	Moderate
101		Nathnagar	Kathi	Moderate
102		Nathnagar	Khagra Arazi	Moderate
103		Naugachhia	Babupur Hajipur Milik	Moderate
104		Naugachhia	Asanandpur	Moderate
105		Pirpanti	Asinchak	Moderate
106		Sabour	Din Mahammadpur	Moderate
107	Sabour	Kurpat	Moderate	
108	Sabour	Lala Chak	Moderate	
109	Sabour	Lodipur	Moderate	
110	Sabour	Mamlakha	Moderate	
111	Sabour	Masarh	Moderate	
112	Sabour	Sardho	Moderate	
113	Sabour	Sewaidih	Moderate	
114	Sabour	Tahbalpur	Moderate	
115	Sabour	Bala Chauki	Moderate	
116	Sabour	Bethu	Moderate	
117	Shahkund	Fatehpur	Moderate	
118	Shahkund	Harpur	Moderate	
119	Shahkund	Kasba Kherhi	Moderate	
120	Shahkund	Munjath	Moderate	
121	Shahkund	Pairedominia Milik	Moderate	
122	Shahkund	Rajpur Chaur	Moderate	
123	Shahkund	Sarha	Moderate	
124	Shahkund	Sarokh	Moderate	
125	Shahkund	Gausi Chak	Moderate	

S.No	District Name	Block Name	Village Name	Flood Hazard Category
126		Shahkund	Sirmatpur	Moderate
127		Sonhaura	Enaetpur	Moderate
128		Sonhaura	Karharia	Moderate
129		Sultanganj	Kasba	Moderate
130		Sultanganj	Kathara	Moderate
131		Sultanganj	Khanpur Daulatpur	Moderate
132		Sultanganj	Majhli	Moderate
133		Sultanganj	Manoharpur	Moderate
134		Sultanganj	Miabagicha	Moderate
135		Sultanganj	Mirhati	Moderate
136		Sultanganj	Nishara Arazi	Moderate
137		Sultanganj	Rasidpur	Moderate
138		Barhara	Bakhorapur English	Moderate
139		Barhara	Gangauli	Moderate
140		Barhara	Gunri	Moderate
141		Barhara	Gyanpur	Moderate
142	Bhojpur	Barhara	Karja	Moderate
143		Barhara	Keshopur	Moderate
144		Barhara	Lauhar	Moderate
145		Barhara	Milki Mir Chhaka	Moderate
146		Barhara	Shivpur	Moderate
147		Dumraon	Bharkunria	Moderate
148	Buxar	Dumraon	Kam Karahi	Moderate
149		Dumraon	Sahipur	Moderate
150		Dumraon	Sundarpur	Moderate
151		Alinagar	Chak Khoka	Moderate
152		Alinagar	Haritha	Moderate
153		Bahadurpur	Andama	Moderate
154		Bahadurpur	Arazi Madhuban	Moderate
155		Bahadurpur	Bali Asli	Moderate
156		Bahadurpur	Balia	Moderate
157		Bahadurpur	Basdeopur	Moderate
158		Bahadurpur	Bela Yakub	Moderate
159		Bahadurpur	Bishunpur Manora	Moderate
160		Bahadurpur	Dalaur	Moderate
161		Bahadurpur	Dharam Pokhar	Moderate
162		Bahadurpur	Fatehpur	Moderate
163		Bahadurpur	Jagdishpur	Moderate
164		Bahadurpur	Kamala Patti	Moderate
165		Bahadurpur	Kapchhahi	Moderate
166		Bahadurpur	Rosan Chak	Moderate
167		Bahadurpur	Chakla	Moderate
168		Baheri	Maheshpur	Moderate
169		Baheri	Balni	Moderate
170		Benipur	Ganesh Banauli	Moderate
171	Darbhanga	Benipur	Supaul	Moderate
172		Benipur	Afzala	Moderate
173		Biraul	Akbarpur Baik	Moderate
174		Biraul	Az Rakbe Gobindpur	Moderate
175		Biraul	Belgaun	Moderate
176		Biraul	Bhaini	Moderate
177		Biraul	Murwara	Moderate
178		Biraul	Ramnagar	Moderate
179		Biraul	Rasulpur	Moderate
180		Biraul	Sonbihat	Moderate
181		Biraul	Amdiha	Moderate
182		Biraul	Ami	Moderate
183		Darbhanga	Andhri	Moderate
184		Darbhanga	Arazi Barmotar	Moderate
185		Darbhanga	Badea	Moderate
186		Darbhanga	Belwa	Moderate
187		Darbhanga	Bhagwanpur	Moderate
188		Darbhanga	Bhaluahi	Moderate
189		Darbhanga	Bhawanipur	Moderate
190		Darbhanga	Bhidhi	Moderate
191		Darbhanga	Bhindi	Moderate
192		Darbhanga	Bijuli	Moderate

S.No	District Name	Block Name	Village Name	Flood Hazard Category
193		Darbhanga	Bishunpur	Moderate
194		Darbhanga	Bishunpur Medni	Moderate
195		Darbhanga	Borwa	Moderate
196		Darbhanga	Bramotar Az Rakbe Chhatwan	Moderate
197		Darbhanga	Chak Abdul Rahim	Moderate
198		Darbhanga	Chak Gadhia	Moderate
199		Darbhanga	Chak Karima	Moderate
200		Darbhanga	Chamru Bishunpur	Moderate
201		Darbhanga	Chataria	Moderate
202		Darbhanga	Chhoataipatti	Moderate
203		Darbhanga	Dularpur	Moderate
204		Darbhanga	Dumduma	Moderate
205		Darbhanga	Gabir Chak	Moderate
206		Darbhanga	Gehumi	Moderate
207		Darbhanga	Kharthua	Moderate
208		Darbhanga	Lau Tola	Moderate
209		Darbhanga	Leama	Moderate
210		Darbhanga	Mahjidia	Moderate
211		Darbhanga	Mamal	Moderate
212		Darbhanga	Mani	Moderate
213		Darbhanga	Milki	Moderate
214		Darbhanga	Pachgachhia	Moderate
215		Darbhanga	Ram Berai	Moderate
216		Darbhanga	Rampur	Moderate
217		Darbhanga	Tektar	Moderate
218		Darbhanga	Tethan	Moderate
219		Darbhanga	Asma	Moderate
220		Darbhanga	Az Rakbe Hardwarpur	Moderate
221		Darbhanga	Faizullahpur	Moderate
222		Ghanshyampur	Mahathwar	Moderate
223		Ghanshyampur	Phakirana	Moderate
224		Ghanshyampur	Pohadi	Moderate
225		Ghanshyampur	Shahpur	Moderate
226		Ghanshyampur	Baijnathpur	Moderate
227		Ghanshyampur	Bangrasi	Moderate
228		Ghanshyampur	Bargawan	Moderate
229		Ghanshyampur	Basuli	Moderate
230		Gora Bauram	Bhuskan	Moderate
231		Gora Bauram	Hasopur	Moderate
232		Gora Bauram	Kahuwa	Moderate
233		Gora Bauram	Kalhat	Moderate
234		Gora Bauram	Kanhai	Moderate
235		Gora Bauram	Malnadih	Moderate
236		Gora Bauram	Mansara	Moderate
237		Gora Bauram	Nankar	Moderate
238		Gora Bauram	Khusro Sarae	Moderate
239		Gora Bauram	Tisi Dih	Moderate
240		Gora Bauram	Badri	Moderate
241		Gora Bauram	Chandauna	Moderate
242		Gora Bauram	Kardahuli	Moderate
243		Hanumannagar	Katai	Moderate
244		Hanumannagar	Lalpur	Moderate
245		Jale	Bansara	Moderate
246		Jale	Behta	Moderate
247		Jale	Belauna	Moderate
248		Jale	Binwara	Moderate
249		Jale	Birkha	Moderate
250		Keotiranway	Chakka	Moderate
251		Keotiranway	Chatra	Moderate
252		Keotiranway	Dhuria Chhaunia	Moderate
253		Keotiranway	Dhuria Daharia	Moderate
254		Keotiranway	Dome	Moderate
255		Keotiranway	Hajipur	Moderate
256		Keotiranway	Kasma Balbhadar	Moderate
257		Keotiranway	Kheraj Mardan Singh	Moderate
258		Keotiranway	Kopgarh	Moderate

S.No	District Name	Block Name	Village Name	Flood Hazard Category
259		Keotiranway	Ladari	Moderate
260		Keotiranway	Nonaura	Moderate
261		Keotiranway	Para	Moderate
262		Keotiranway	Samaila	Moderate
263		Keotiranway	Shekhpatti	Moderate
264		Keotiranway	Dhangha	Moderate
265		Keotiranway	Jagson	Moderate
266		Keotiranway	Jhagarua	Moderate
267		Keotiranway	Khaisa	Moderate
268		Keotiranway	Kubaul	Moderate
269		Keotiranway	Tatari	Moderate
270		Keotiranway	Asman	Moderate
271		Kiratpur	Ghorsar	Moderate
272		Kiratpur	Ladiami	Moderate
273		Kiratpur	Mahri Dih	Moderate
274		Kiratpur	Itahar	Moderate
275		Kiratpur	Chak Milki	Moderate
276		Kiratpur	Balaha	Moderate
277		Kusheshwar Asthan	Birdipur	Moderate
278		Kusheshwar Asthan	Chak Dargah	Moderate
279		Kusheshwar Asthan	Harakh	Moderate
280		Kusheshwar Asthan	Harpur	Moderate
281		Kusheshwar Asthan Purbi	Sabaul	Moderate
282		Manigachhi	Barhmotar	Moderate
283		Singhwara	Kurson	Moderate
284		Singhwara	Sidhi Tajpur	Moderate
285		Singhwara	Siranpur	Moderate
286		Singhwara	Sotharia	Moderate
287		Areraj	Bahadurpur	Moderate
288		Areraj	Chandi Asthan	Moderate
289		Banjaria	Ghormarwa	Moderate
290		Banjaria	Loknath Pur	Moderate
291		Banjaria	Phulwar	Moderate
292		Bankatwa	Chandri	Moderate
293		Bankatwa	Kudarkat	Moderate
294		Bankatwa	Majhar Khap	Moderate
295		Chirai	Babhnaula Urf Phulwar Khurd	Moderate
296		Chirai	Bela	Moderate
297		Chirai	Bhaluahi	Moderate
298		Chirai	Khartari	Moderate
299		Chirai	Mahuawa	Moderate
300		Chirai	Raghopur	Moderate
301		Chirai	Sharaun Garh	Moderate
302		Chirai	Sital Patti	Moderate
303		Chirai	Sopgarha	Moderate
304		Dhaka	Bahlolpur	Moderate
305	East Champaran	Dhaka	Basahia	Moderate
306		Dhaka	Bhawanipur	Moderate
307		Dhaka	Jadipur Nankar	Moderate
308		Dhaka	Kusmahwa	Moderate
309		Dhaka	Masaurha	Moderate
310		Dhaka	Sisahni	Moderate
311		Dhaka	Turkauliya	Moderate
312		Ghorasahan	Singhrahya	Moderate
313		Kalyanpur	Gawandri	Moderate
314		Kesaria	Baisakhwa Khap	Moderate
315		Kesaria	Khap Tajpur Patkhaulia	Moderate
316		Kesaria	Lohar Gawan	Moderate
317		Motihari	Chhatauni Ram Singh	Moderate
318		Motihari	Gamhariya	Moderate
319		Motihari	Jhitkahiya	Moderate
320		Motihari	Karmaula	Moderate
321		Motihari	Mahangua	Moderate
322		Motihari	Ratra Chaunr	Moderate
323		Motihari	Semra	Moderate

S.No	District Name	Block Name	Village Name	Flood Hazard Category
324		Narkatia	Bathuahiya	Moderate
325		Narkatia	Kataharia	Moderate
326		Narkatia	Murli	Moderate
327		Narkatia	Narkatia	Moderate
328		Narkatia	Pakariya	Moderate
329		Narkatia	Ajgari	Moderate
330		Pakhri Dayal	Shekhpurwa	Moderate
331		Pakhri Dayal	Rajpur Kawal Nankar	Moderate
332		Phenhara	Bheriharwa	Moderate
333		Ramgarhwa	Garhwa	Moderate
334		Ramgarhwa	Jaitapur	Moderate
335		Ramgarhwa	Mura	Moderate
336		Ramgarhwa	Murla	Moderate
337		Ramgarhwa	Sakrar	Moderate
338		Ramgarhwa	Unchibhatiya	Moderate
339		Ramgarhwa	Purandra	Moderate
340		Ramgarhwa	Saunaha	Moderate
341		Raxaul	Senuaria	Moderate
342		Raxaul	Bishrampur Dubauliya	Moderate
343		Raxaul	Baghi	Moderate
344		Raxaul	Bahuari	Moderate
345		Sangrampur	Hathiahiya	Moderate
346		Sugauli	Ledihar	Moderate
347		Sugauli	Madhopurkaramwa	Moderate
348		Sugauli	Madhopurnizamat	Moderate
349		Sugauli	Pachbhirwa	Moderate
350		Sugauli	Parsauna	Moderate
351		Sugauli	Raghunathpur	Moderate
352		Sugauli	Sukul Pakar Urf Belwalia	Moderate
353		Gopalganj	Semra	Moderate
354		Kuchaikote	Belwa Birt	Moderate
355		Kuchaikote	Belwa Tiwari	Moderate
356		Kuchaikote	Chauranw	Moderate
357		Kuchaikote	Diara Bijaypur Hissa	Moderate
358	Gopalganj	Kuchaikote	Khutwanian Chaube	Moderate
359		Kuchaikote	Lal Begi	Moderate
360		Kuchaikote	Parsauni Panre	Moderate
361		Kuchaikote	Raghu Patti	Moderate
362		Kuchaikote	Sherpur	Moderate
363		Kuchaikote	Uchka Ganw	Moderate
364	Jehanabad	Modanganj	Masarh Nisf	Moderate
365		Azamnagar	Asalatganj	Moderate
366		Azamnagar	Bairia	Moderate
367		Azamnagar	Bishunpur	Moderate
368		Azamnagar	Chaulhar Milik	Moderate
369		Azamnagar	Gaighatta	Moderate
370		Azamnagar	Garhbaghua	Moderate
371		Azamnagar	Garhbainan	Moderate
372		Azamnagar	Gogra	Moderate
373		Azamnagar	Harnagar	Moderate
374		Azamnagar	Imamnagar	Moderate
375		Azamnagar	Kanharia Kamat	Moderate
376		Azamnagar	Lalgaon	Moderate
377		Azamnagar	Mahadeo Bhita	Moderate
378	Katihar	Azamnagar	Mahadipara	Moderate
379		Azamnagar	Manharpara	Moderate
380		Azamnagar	Rohia	Moderate
381		Azamnagar	Rupaili	Moderate
382		Azamnagar	Sirmatpur	Moderate
383		Azamnagar	Sitalmani	Moderate
384		Azamnagar	Tilas	Moderate
385		Balrampur	Datian	Moderate
386		Balrampur	Jaipura	Moderate
387		Balrampur	Milikpur Milik	Moderate
388		Balrampur	Moralbadh	Moderate
389		Balrampur	Sahasara Mal	Moderate
390		Balrampur	Sihagaon	Moderate

S.No	District Name	Block Name	Village Name	Flood Hazard Category
391		Balrampur	Sirpatol	Moderate
392		Balrampur	Thakurbari	Moderate
393		Barari	Baidanda	Moderate
394		Barari	Binodpur	Moderate
395		Barsoi	Belwa Dangi	Moderate
396		Barsoi	Saula	Moderate
397		Dandkhora	Bilaripari	Moderate
398		Dandkhora	Tikaili	Moderate
399		Hasanganj	Haripur	Moderate
400		Kadwa	Asiani	Moderate
401		Kadwa	Barahia	Moderate
402		Kadwa	Baura	Moderate
403		Kadwa	Bendhabari	Moderate
404		Kadwa	Bharri	Moderate
405		Kadwa	Bhikhanpur	Moderate
406		Kadwa	Chaunti	Moderate
407		Kadwa	Dalalpur	Moderate
408		Kadwa	Deorambari	Moderate
409		Kadwa	Deori	Moderate
410		Kadwa	Dhaparsia	Moderate
411		Kadwa	Dilarpur	Moderate
412		Kadwa	Harda	Moderate
413		Kadwa	Kachora	Moderate
414		Kadwa	Kanta	Moderate
415		Kadwa	Kolha	Moderate
416		Kadwa	Merhaul	Moderate
417		Kadwa	Mirzadpur	Moderate
418		Kadwa	Nikhra	Moderate
419		Kadwa	Ratni	Moderate
420		Kadwa	Sadeli	Moderate
421		Kadwa	Sahanpur	Moderate
422		Kadwa	Saranpur	Moderate
423		Kadwa	Tetalia Kasht	Moderate
424		Kadwa	Tarjana	Moderate
425		Katihar	Shahpur Dharmi	Moderate
426		Kursela	Kamalpur Orgaireh	Moderate
427		Manihari	Mohanpur	Moderate
428		Manihari	Nima	Moderate
429		Manihari	Chatra	Moderate
430		Pranpur	Gach Baghwa	Moderate
431		Pranpur	Gharail	Moderate
432		Pranpur	Kebala Milik	Moderate
433		Pranpur	Khusalpur	Moderate
434		Alauli	Ambaicharua	Moderate
435		Alauli	Badhchatar	Moderate
436		Alauli	Murli	Moderate
437		Alauli	Sanjhauti	Moderate
438		Beldaur	Balaita	Moderate
439		Beldaur	Beldaur	Moderate
440		Beldaur	Goas	Moderate
441		Beldaur	Kurman	Moderate
442		Beldaur	Mali	Moderate
443		Beldaur	Rohinwa	Moderate
444		Chautham	Rohiar	Moderate
445		Gogri	Bahadurpur	Moderate
446		Gogri	Baltara	Moderate
447		Gogri	Jargaon Patti	Moderate
448		Gogri	Khalifa Chak	Moderate
449		Gogri	Koila	Moderate
450		Gogri	Kulsara	Moderate
451		Gogri	Maira	Moderate
452		Gogri	Marachi	Moderate
453		Gogri	Mora	Moderate
454		Gogri	Patti Chitarsari	Moderate
455		Gogri	Pattilewa	Moderate
456		Gogri	Paura	Moderate
457		Gogri	Ragdhan Karari	Moderate

S.No	District Name	Block Name	Village Name	Flood Hazard Category
458		Gogri	Siromanharpur	Moderate
459		Khagaria	Bachhauta	Moderate
460		Khagaria	Durgapur	Moderate
461		Khagaria	Durgapur Barari	Moderate
462		Khagaria	Madhua	Moderate
463		Khagaria	Rahimpur	Moderate
464		Khagaria	Sahuria	Moderate
465		Parbatta	Arazi Patpar	Moderate
466		Parbatta	Bharson	Moderate
467		Parbatta	Chak Paryag	Moderate
468		Parbatta	Gaura	Moderate
469		Parbatta	Khajraitha	Moderate
470		Parbatta	Madhopur Patpar	Moderate
471		Parbatta	Saurh	Moderate
472		Parbatta	Temtha Arazia Patpar	Moderate
473		Parbatta	Udaipur	Moderate
474		Parbatta	Zorawarpur	Moderate
475		Lakhisarai	Amahara	Moderate
476		Lakhisarai	Babhanganwan	Moderate
477		Lakhisarai	Chak Tahir	Moderate
478		Lakhisarai	Dugai	Moderate
479		Lakhisarai	Kesaura	Moderate
480		Lakhisarai	Khirho	Moderate
481		Lakhisarai	Nimchak	Moderate
482		Lakhisarai	Tilo Khar	Moderate
483		Pipariya	Kasoi	Moderate
484		Pipariya	Paria	Moderate
485		Pipariya	Paria Nawabganj	Moderate
486		Pipariya	Rahatpur	Moderate
487		Pipariya	Surji Chak	Moderate
488		Surajgarha	Adupur	Moderate
489		Surajgarha	Jagdishpur	Moderate
490		Surajgarha	Mohammadpur	Moderate
491		Surajgarha	Nista	Moderate
492		Surajgarha	Rampur Thana Amanat Sarkar	Moderate
493		Surajgarha	Ratnupur	Moderate
494		Surajgarha	Samsa Athgawan	Moderate
495		Alamnagar	Hariharpur	Moderate
496		Alamnagar	Khaon	Moderate
497		Alamnagar	Sanoti Chak	Moderate
498		Chausa	Chamru Hawaldar Jagir	Moderate
499		Chausa	Damar Singh Hawaldar Jagir	Moderate
500		Chausa	Din Mohammad Subedar Jagir	Moderate
501		Chausa	Kewat Ram Subedar Jagir	Moderate
502		Chausa	Khan Kumedan Jagir	Moderate
503		Chausa	Sardar Khan Sipahi Jagir	Moderate
504		Kumarkhand	Nawalganj Mainpur	Moderate
505		Puraini	Kanwanrahi	Moderate
506		Puraini	Mwghu Singh Hawaldar Jagir	Moderate
507		Puraini	Saparda	Moderate
508		Babu Barhi	Mafi Mahuahi	Moderate
509		Benipatti	Arazi Paraul	Moderate
510		Benipatti	Bagwasa	Moderate
511		Benipatti	Basaitha	Moderate
512		Benipatti	Bhagwatipur	Moderate
513		Benipatti	Chak Bhedi	Moderate
514		Benipatti	Chandpura	Moderate
515		Benipatti	Erua	Moderate
516		Benipatti	Jagat	Moderate
517		Benipatti	Jhonjhi	Moderate
518		Benipatti	Kataia	Moderate
519		Benipatti	Kusmaul	Moderate
520		Benipatti	Matrahari	Moderate
521		Benipatti	Meghban	Moderate
522		Benipatti	Nagwas	Moderate

S.No	District Name	Block Name	Village Name	Flood Hazard Category
523		Benipatti	Najira	Moderate
524		Benipatti	Pali	Moderate
525		Benipatti	Rajban	Moderate
526		Benipatti	Salha	Moderate
527		Benipatti	Shivnagar	Moderate
528		Benipatti	Uchaith	Moderate
529		Bisfi	Dudhail	Moderate
530		Bisfi	Gorhaul	Moderate
531		Bisfi	Inamat	Moderate
532		Bisfi	Parohi	Moderate
533		Bisfi	Sibaul	Moderate
534		Bisfi	Singhaso	Moderate
535		Bisfi	Singhia	Moderate
536		Ghoghardiha	Balansher	Moderate
537		Ghoghardiha	Sahorwa	Moderate
538		Jhanjharpur	Badsangahi	Moderate
539		Jhanjharpur	Kishunpur Barsam	Moderate
540		Jhanjharpur	Parmanandpur	Moderate
541		Jhanjharpur	Sindurpura	Moderate
542		Jhanjharpur	Sirkharia	Moderate
543		Ladania	Bhutaha	Moderate
544		Lakhnaur	Baswa	Moderate
545		Lakhnaur	Biharpur	Moderate
546		Lakhnaur	Garha	Moderate
547		Lakhnaur	Sonre	Moderate
548		Lakhnaur	Auraha	Moderate
549		Laukahi	Kulhadia	Moderate
550		Laukahi	Az Rakbe Desam	Moderate
551		Laukahi	Az Rakbe Sidhi Tajpur	Moderate
552		Madhepur	Bath	Moderate
553		Madhepur	Bela	Moderate
554		Madhepur	Chandradip	Moderate
555		Madhepur	Doalakh	Moderate
556		Madhepur	Harshankri	Moderate
557		Madhepur	Khor	Moderate
558		Madhepur	Lilja	Moderate
559		Madhepur	Madanpur	Moderate
560		Madhepur	Mani Mahpatia	Moderate
561		Madhepur	Matras	Moderate
562		Madhepur	Pachahi	Moderate
563		Madhepur	Parsauni	Moderate
564		Madhepur	Rampur	Moderate
565		Madhepur	Tangraha	Moderate
566		Madhepur	Ijrapatti Jagat	Moderate
567		Madhepur	Jagatpur	Moderate
568		Madhubani	Karahuan	Moderate
569		Madhubani	Marwat Sobrauli	Moderate
570		Madhubani	Ram Nagar Kajra	Moderate
571		Madhwapur	Andah	Moderate
572		Madhwapur	Arazi Bhawanipur	Moderate
573		Madhwapur	Bishunpur Murliahi	Moderate
574		Pandaul	Lakshmipur	Moderate
575		Pandaul	Ramkhetari	Moderate
576		Pandaul	Shankarpur	Moderate
577		Asarganj	Chorgaon	Moderate
578		Asarganj	Dholpahari Milik	Moderate
579		Asarganj	Dholphari Mal	Moderate
580		Bariapur	Barail Arazi	Moderate
581		Bariapur	Bariapur	Moderate
582		Bariapur	Bhagalpur	Moderate
583	Munger	Bariapur	Bhatgawan	Moderate
584		Bariapur	Nirpur	Moderate
585		Bariapur	Paharpur Arazi	Moderate
586		Bariapur	Paria	Moderate
587		Bariapur	Jagatpur	Moderate
588		Dharhara	Banaudhi	Moderate
589		Dharhara	Itahri	Moderate

S.No	District Name	Block Name	Village Name	Flood Hazard Category
590		Jamalpur	Telia	Moderate
591		Jamalpur	Nankar	Moderate
592		Khargpur	Sultanpur	Moderate
593		Aurai	Anandpur Ghani	Moderate
594		Aurai	Bahuara	Moderate
595		Aurai	Bara Khurd	Moderate
596		Aurai	Basant Urf Bishunpur Umapat	Moderate
597		Aurai	Bharospatti Urf Bharathpatti	Moderate
598		Aurai	Bhawanipur	Moderate
599		Aurai	Inglish Chak	Moderate
600		Aurai	Jonkikhurd Urf Mathurapurkhurd	Moderate
601		Aurai	Kiratpur	Moderate
602		Aurai	Madhuban Besi	Moderate
603		Aurai	Madhuban Partap	Moderate
604		Aurai	Matihani	Moderate
605		Aurai	Pakjaul	Moderate
606		Aurai	Partapur	Moderate
607		Aurai	Pitaunjhia Jagarnath	Moderate
608		Aurai	Shahila Balli	Moderate
609		Aurai	Sundarkhuli	Moderate
610		Bochaha	Alahdadpur	Moderate
611		Bochaha	Basauli Babu Ram	Moderate
612		Bochaha	Basauli Himat Singh	Moderate
613		Bochaha	Basauli Himatsingh	Moderate
614		Bochaha	Basauli Jagarnath	Moderate
615		Bochaha	Basauli Nankar	Moderate
616		Bochaha	Berai Hardas	Moderate
617		Bochaha	Bishunpur Harnarayan	Moderate
618		Bochaha	Borwara	Moderate
619		Bochaha	Chak Achhe	Moderate
620		Bochaha	Chak Helal	Moderate
621		Bochaha	Chak Jamaluddin	Moderate
622		Bochaha	Dahi Ban	Moderate
623	Muzaffarpur	Bochaha	Jagarnathpur	Moderate
624		Bochaha	Lalanua Urf Deogan Lalanua	Moderate
625		Bochaha	Lalpur	Moderate
626		Bochaha	Madarpur Jairam	Moderate
627		Bochaha	Majhauri Jagai	Moderate
628		Bochaha	Manpur Jahangirpur	Moderate
629		Bochaha	Muradpur Kashi	Moderate
630		Bochaha	Raghopatti	Moderate
631		Bochaha	Raghunathpur Gurguja	Moderate
632		Bochaha	Ratanpura	Moderate
633		Bochaha	Rudha	Moderate
634		Bochaha	Senghauri	Moderate
635		Bochaha	Tambolia	Moderate
636		Bochaha	Turki	Moderate
637		Bochaha	Unsar	Moderate
638		Bochaha	Yusufpatti	Moderate
639		Bochaha	Boaridih	Moderate
640		Gaighat	Chiraila	Moderate
641		Gaighat	Ghyasuddinpur	Moderate
642		Gaighat	Harpur Urfkamalpurbhadwaradih	Moderate
643		Gaighat	Kutubpur Urf Rosara	Moderate
644		Gaighat	Lohbandra	Moderate
645		Gaighat	Madhura Patti Urfmanorathpatti	Moderate
646		Gaighat	Mahwara	Moderate
647		Gaighat	Makrandpur Urf Makrampur	Moderate
648		Gaighat	Ramauli	Moderate
649		Gaighat	Rona	Moderate
650		Gaighat	Tal Boari	Moderate
651		Gaighat	Suratpur	Moderate
652		Kanti	Bardwara	Moderate
653		Katra	Bishunpur	Moderate

S.No	District Name	Block Name	Village Name	Flood Hazard Category
654		Katra	Changel Urf Madhurapur	Moderate
655		Katra	Ikri	Moderate
656		Katra	Katai	Moderate
657		Katra	Madhopur	Moderate
658		Katra	Madhopur Nankar	Moderate
659		Katra	Raj Khand	Moderate
660		Katra	Ram Khangura	Moderate
661		Katra	Harshankarpur Maniari	Moderate
662		Kurhani	Paharpur	Moderate
663		Kurhani	Chaka Chhapra	Moderate
664		Minapur	Sukimath	Moderate
665		Minapur	Mohamadpur Paru	Moderate
666		Paroo	Pichpura	Moderate
667		Paroo	Teja Dumri 4 Annas	Moderate
668		Paroo	Nawada	Moderate
669		Sahebganj	Balurampur Urf Tilak Pakri	Moderate
670		Asthawan	Andi	Moderate
671		Asthawan	Desna	Moderate
672		Asthawan	Dhobi Bigha	Moderate
673		Asthawan	Gong Chak	Moderate
674		Asthawan	Khaje Ahmadpur	Moderate
675		Asthawan	Nerut	Moderate
676		Asthawan	Onda	Moderate
677		Bind	Ahia Chak	Moderate
678		Bind	Bind	Moderate
679		Bind	Chhachhu Bigha	Moderate
680		Bind	Chhatarpur	Moderate
681		Bind	Daridapur	Moderate
682		Bind	Jakki	Moderate
683		Bind	Jamsari	Moderate
684		Bind	Kathrahi	Moderate
685		Bind	Lachhmipur Bagulwa	Moderate
686		Bind	Madan Chak	Moderate
687		Bind	Mahmudabad	Moderate
688		Bind	Masia	Moderate
689		Bind	Nauranga	Moderate
690		Bind	Nirpur Khalsa	Moderate
691		Bind	Rajupur	Moderate
692		Bind	Rampur	Moderate
693		Chandi	Bheria	Moderate
694		Chandi	Daulatpur Milki	Moderate
695	Nalanda	Chandi	Manshapur	Moderate
696		Chandi	Mohsinpur	Moderate
697		Chandi	Narsanda	Moderate
698		Chandi	Raitha	Moderate
699		Harnaut	Abu Mohammadpur	Moderate
700		Harnaut	Bazidpur	Moderate
701		Harnaut	Bhojpur	Moderate
702		Harnaut	Bhupatpur	Moderate
703		Harnaut	Chak Hanifa	Moderate
704		Harnaut	Chauria	Moderate
705		Harnaut	Chhatiana	Moderate
706		Harnaut	Daili	Moderate
707		Harnaut	Faizabad	Moderate
708		Harnaut	Gokhulpur	Moderate
709		Harnaut	Gonawan	Moderate
710		Harnaut	Kolawan	Moderate
711		Harnaut	Mohammadpur Dhimoe	Moderate
712		Harnaut	Pakar	Moderate
713		Harnaut	Rustamtal	Moderate
714		Harnaut	Sanalpur	Moderate
715		Harnaut	Telmar	Moderate
716		Harnaut	Bamhanthan Malawan	Moderate
717		Harnaut	Ganipur	Moderate
718		Hilsa	Kawa	Moderate
719		Hilsa	Maranchi	Moderate
720		Hilsa	Renri	Moderate

S.No	District Name	Block Name	Village Name	Flood Hazard Category
721		Hilsa	Asia	Moderate
722		Hilsa	Binsa	Moderate
723		Hilsa	Chhitar Bigha	Moderate
724		Karai Parsurai	Jalalpur	Moderate
725		Karai Parsurai	Kamarthu	Moderate
726		Karai Parsurai	Khokhna	Moderate
727		Karai Parsurai	Makhdumpur	Moderate
728		Karai Parsurai	Makrauta	Moderate
729		Karai Parsurai	Malikpur	Moderate
730		Karai Parsurai	Milik Hunrari	Moderate
731		Karai Parsurai	Niria	Moderate
732		Karai Parsurai	Sab chak	Moderate
733		Karai Parsurai	Salempur	Moderate
734		Karai Parsurai	Sandh	Moderate
735		Karai Parsurai	Bardiha	Moderate
736		Karai Parsurai	Ghoraha	Moderate
737		Karai Parsurai	Hayatpur	Moderate
738		Nagar Nausa	Muniampur	Moderate
739		Nagar Nausa	Abdulhai Chak	Moderate
740		Nagar Nausa	Bhinda	Moderate
741		Nagar Nausa	Chandaura	Moderate
742		Nagar Nausa	Gobaria	Moderate
743		Rahui	Habanpura	Moderate
744		Rahui	Indwas	Moderate
745		Rahui	Kutubpura	Moderate
746		Rahui	Majidpur	Moderate
747		Rahui	Mararpura	Moderate
748		Rahui	Najai	Moderate
749		Rahui	Phatakpura	Moderate
750		Rahui	Sulemanpur	Moderate
751		Rahui	Susandi	Moderate
752		Rahui	Uphraul	Moderate
753		Rahui	Dhanawan	Moderate
754		Rahui	Fatehpur Dumra	Moderate
755		Rahui	Husena	Moderate
756		Rahui	Kazi Chak	Moderate
757		Sarmera	Malawan	Moderate
758		Sarmera	Misia	Moderate
759		Sarmera	Rupaspur	Moderate
760		Sarmera	Sarmera	Moderate
761		Sarmera	Sekhra	Moderate
762		Sarmera	Tora	Moderate
763		Athmalgola	Asawan	Moderate
764		Athmalgola	Chanda	Moderate
765		Athmalgola	Daulatpur	Moderate
766		Athmalgola	Fatehpur	Moderate
767		Athmalgola	Jamalpur Barhia	Moderate
768		Athmalgola	Kalianpur	Moderate
769		Athmalgola	Karjan	Moderate
770		Athmalgola	Mahuli	Moderate
771		Athmalgola	Phulelpur	Moderate
772		Athmalgola	Sabnima	Moderate
773		Athmalgola	Shahistapur	Moderate
774		Athmalgola	Usmanpur	Moderate
775	Patna	Bakhtiarapur	Aidal Chak	Moderate
776		Bakhtiarapur	Bahadurpur	Moderate
777		Bakhtiarapur	Basawanpur	Moderate
778		Bakhtiarapur	Benipur Diara	Moderate
779		Bakhtiarapur	Geruari	Moderate
780		Bakhtiarapur	Jagdishpur	Moderate
781		Bakhtiarapur	Karanauti	Moderate
782		Bakhtiarapur	Masudpur Diara	Moderate
783		Bakhtiarapur	Misi	Moderate
784		Bakhtiarapur	Salimpur	Moderate
785		Barh	Bahrawan	Moderate
786		Barh	Bariapur	Moderate
787		Barh	Bhatgawan	Moderate

S.No	District Name	Block Name	Village Name	Flood Hazard Category
788		Barh	Birhana	Moderate
789		Barh	Burhanpur	Moderate
790		Barh	Danisman Chak	Moderate
791		Barh	Dhanwan	Moderate
792		Barh	Dumaria	Moderate
793		Barh	Goar	Moderate
794		Barh	Hasan Chak	Moderate
795		Barh	Itawa	Moderate
796		Barh	Masatthu	Moderate
797		Barh	Pura	Moderate
798		Barh	Saidpur	Moderate
799		Barh	Sikandra	Moderate
800		Barh	Soima	Moderate
801		Belchhi	Barah	Moderate
802		Belchhi	Bisunpur Malchak	Moderate
803		Belchhi	Chak Rukmuddin	Moderate
804		Belchhi	Dallu Chak	Moderate
805		Belchhi	Dammarkhandha	Moderate
806		Belchhi	Darweshpur	Moderate
807		Belchhi	Gadanpura	Moderate
808		Belchhi	Gopai Chak	Moderate
809		Belchhi	Kabir Chak	Moderate
810		Belchhi	Kaima	Moderate
811		Belchhi	Korari	Moderate
812		Belchhi	Kumhraura	Moderate
813		Belchhi	Mohammadpur Nawa Bigha	Moderate
814		Belchhi	Saksohara	Moderate
815		Belchhi	Beni Bigha	Moderate
816		Bikram	Beri	Moderate
817		Bikram	Jamalpur	Moderate
818		Bikram	Aiman Bigha	Moderate
819		Daniawan	Barki Kewai	Moderate
820		Daniawan	Chhotki Kewai	Moderate
821		Daniawan	Dost Muhammadpur	Moderate
822		Daniawan	Erai	Moderate
823		Daniawan	Ghoranpura	Moderate
824		Daniawan	Kanchanpur	Moderate
825		Daniawan	Kharbhaiya	Moderate
826		Daniawan	Masudpur	Moderate
827		Daniawan	Nimi	Moderate
828		Daniawan	Sarthua	Moderate
829		Daniawan	Shahjahanpur	Moderate
830		Daniawan	Sikandarpur	Moderate
831		Daniawan	Singriawan	Moderate
832		Daniawan	Top	Moderate
833		Daniawan	Warispur	Moderate
834		Daniawan	Zohra Chak	Moderate
835		Daniawan	Bhakhri	Moderate
836		Daniawan	Jalalpur	Moderate
837		Dhanarua	Nanauri	Moderate
838		Dhanarua	Raipura	Moderate
839		Dhanarua	Rupaspur	Moderate
840		Dhanarua	Safipur	Moderate
841		Dhanarua	Semhari Khurd	Moderate
842		Dhanarua	Ziauddin Chak	Moderate
843		Dhanarua	Bhadsara	Moderate
844		Dhanarua	Bharathpura	Moderate
845		Dhanarua	Dorwan	Moderate
846		Dulhin Bazar	Gulal Chak	Moderate
847		Dulhin Bazar	Koraiya	Moderate
848		Dulhin Bazar	Mahabalipur	Moderate
849		Dulhin Bazar	Narhi	Moderate
850		Dulhin Bazar	Sabazpura	Moderate
851		Dulhin Bazar	Sarkuna	Moderate
852		Dulhin Bazar	Sherpura	Moderate
853		Dulhin Bazar	Sorampur	Moderate
854		Dulhin Bazar	Abdullah Chak	Moderate

S.No	District Name	Block Name	Village Name	Flood Hazard Category
855		Dulhin Bazar	Ainio	Moderate
856		Dulhin Bazar	Baria Kalan	Moderate
857		Fatwah	Bariakhurd	Moderate
858		Fatwah	Bendauli	Moderate
859		Fatwah	Bibipur	Moderate
860		Fatwah	Bikrampur Aima	Moderate
861		Fatwah	Bikrampur Zabti	Moderate
862		Fatwah	Dalanpur	Moderate
863		Fatwah	Gauri Punda	Moderate
864		Fatwah	Kharphar	Moderate
865		Fatwah	Kiamuddin Chak	Moderate
866		Fatwah	Kutubpur	Moderate
867		Fatwah	Mansinghpur	Moderate
868		Fatwah	Masarhi	Moderate
869		Fatwah	Maujipur	Moderate
870		Fatwah	Muhammadpur	Moderate
871		Fatwah	Murajpur	Moderate
872		Fatwah	Najibullah Chak	Moderate
873		Fatwah	Narwan	Moderate
874		Fatwah	Nasirpur Balwa	Moderate
875		Fatwah	Pitambarpur	Moderate
876		Fatwah	Raipur Balua	Moderate
877		Fatwah	Sahora	Moderate
878		Fatwah	Saidanpur	Moderate
879		Fatwah	Satauli Buzurg	Moderate
880		Fatwah	Satauli Khurd	Moderate
881		Fatwah	Shahpur	Moderate
882		Fatwah	Sirampur	Moderate
883		Fatwah	Sirpatpur	Moderate
884		Fatwah	Usfa	Moderate
885		Fatwah	Chak Lodi	Moderate
886		Fatwah	Samaya No 2 (Kurmi Chaksamaya)	Moderate
887		Fatwah	Abdul Rahmanpur	Moderate
888		Fatwah	Erai Benipur	Moderate
889		Ghoshwari	Hasanpura	Moderate
890		Ghoshwari	Ismailpur	Moderate
891		Khusrupur	Kohawan	Moderate
892		Khusrupur	Malpur	Moderate
893		Khusrupur	Mustafapur	Moderate
894		Khusrupur	Nuruddinpur	Moderate
895		Khusrupur	Rasulpur	Moderate
896		Khusrupur	Balua	Moderate
897		Khusrupur	Katautia	Moderate
898		Khusrupur	Alawalpur	Moderate
899		Khusrupur	Bahuara	Moderate
900		Maner	Bara	Moderate
901		Maner	Baruna	Moderate
902		Naubatpur	Bela	Moderate
903		Naubatpur	Dhobiakalapur	Moderate
904		Naubatpur	Guah	Moderate
905		Naubatpur	Haipatpur	Moderate
906		Naubatpur	Jittu Chak	Moderate
907		Naubatpur	Kardaha	Moderate
908		Naubatpur	Khaira	Moderate
909		Naubatpur	Khajuri	Moderate
910		Naubatpur	Khatun Chak	Moderate
911		Naubatpur	Malahi Khandha	Moderate
912		Naubatpur	Mitan Chak	Moderate
913		Naubatpur	Painapur	Moderate
914		Naubatpur	Sabar Chak	Moderate
915		Naubatpur	Salarpur	Moderate
916		Naubatpur	Shekhpura	Moderate
917		Naubatpur	Arari	Moderate
918		Naubatpur	Hardia Bidauli	Moderate
919		Naubatpur	Ijarta	Moderate
920		Naubatpur	Karanpura	Moderate

S.No	District Name	Block Name	Village Name	Flood Hazard Category
921		Paliganj	Parsaunra	Moderate
922		Paliganj	Rampur Nagwan	Moderate
923		Paliganj	Baruane	Moderate
924		Paliganj	Chak Jagmal	Moderate
925		Paliganj	Chak Jalal	Moderate
926		Paliganj	Kazi Chak	Moderate
927		Pandarakh	Kundi	Moderate
928		Pandarakh	Mobarakpur	Moderate
929		Pandarakh	Pitaunjia	Moderate
930		Pandarakh	Rampur	Moderate
931		Pandarakh	Sadikpur	Moderate
932		Pandarakh	Sahebpur Chaturbhujpur	Moderate
933		Pandarakh	Shahzadpur Bathoi	Moderate
934		Pandarakh	Chhitman	Moderate
935		Pandarakh	Gyan Chak	Moderate
936		Pandarakh	Khaspur	Moderate
937		Pandarakh	Mircha	Moderate
938		Pandarakh	Mirchi	Moderate
939		Patna Rural	Mirzapur	Moderate
940		Patna Rural	Bitaura	Moderate
941		Patna Rural	Hinduni	Moderate
942		Patna Rural	Kurkuri	Moderate
943		Patna Rural	Abdalpur Pipra	Moderate
944		Patna Rural	Baisa	Moderate
945		Patna Rural	Barawan	Moderate
946		Phulwari	Barhaiya Kol	Moderate
947		Phulwari	Bazidpur	Moderate
948		Phulwari	Chande Dih	Moderate
949		Punpun	Ghordaur	Moderate
950		Punpun	Gulam Muhammad	Moderate
951		Punpun	Jol Bigha	Moderate
952		Punpun	Lahladpur	Moderate
953		Punpun	Lakhanpur	Moderate
954		Punpun	Lakhna	Moderate
955		Punpun	Mahamda	Moderate
956		Punpun	Mir Haji Chak	Moderate
957		Punpun	Mohanpur	Moderate
958		Punpun	Mundi Chak	Moderate
959		Punpun	Nima	Moderate
960		Punpun	Nuri Chak	Moderate
961		Punpun	Pachasa	Moderate
962		Punpun	Paikauli	Moderate
963		Punpun	Palaki	Moderate
964		Punpun	Pipra	Moderate
965		Punpun	Sabalpur	Moderate
966		Punpun	Sonbarsa	Moderate
967		Amour	Antarsola	Moderate
968		Amour	Banbhag	Moderate
969		Amour	Halalpur	Moderate
970		Amour	Nitandar	Moderate
971		Amour	Raili	Moderate
972		Amour	Rangrailal Toli	Moderate
973		Amour	Sahalo	Moderate
974		Baisi	Balia	Moderate
975		Baisi	Chiraia	Moderate
976		Baisi	Dumra	Moderate
977		Baisi	Garkaili	Moderate
978		Baisi	Goagaon	Moderate
979		Baisi	Jahanpur	Moderate
980		Baisi	Kathaul	Moderate
981		Baisi	Kathaul Milik	Moderate
982		Baisi	Khutia	Moderate
983		Baisi	Kochagaon	Moderate
984		Baisi	Leluka	Moderate
985		Baisi	Majhok	Moderate
986		Baisi	Marua	Moderate
987		Baisi	Minapur	Moderate

S.No	District Name	Block Name	Village Name	Flood Hazard Category
988		Baisi	Parant	Moderate
989		Baisi	Phulbhasa	Moderate
990		Baisi	Rupauli	Moderate
991		Baisi	Sathiana	Moderate
992		Baisi	Sathiara	Moderate
993		Baisi	Simalbari	Moderate
994		Baisi	Surigaon	Moderate
995		Baisi	Talbari Sathiara	Moderate
996		Baisi	Telgawa	Moderate
997		Dagarua	Maranga	Moderate
998		Jalalgarh	Bharaili	Moderate
999		Jalalgarh	Dimia	Moderate
1000		Kasba	Bhamra	Moderate
1001		Kasba	Saraunchia	Moderate
1002		Rupauli	Bijaithana	Moderate
1003	Saharsa	Banma Itahri	Afzalpur	Moderate
1004		Banma Itahri	Badshah Nagar	Moderate
1005		Banma Itahri	Deokal	Moderate
1006		Banma Itahri	Itahri	Moderate
1007		Banma Itahri	Maharas	Moderate
1008		Banma Itahri	Rasalpur	Moderate
1009		Banma Itahri	Sarbela	Moderate
1010		Banma Itahri	Shamsuddinpur	Moderate
1011		Banma Itahri	Sugma	Moderate
1012		Mahishi	Ara	Moderate
1013		Mahishi	Baghwa Hat Abad	Moderate
1014		Mahishi	Bahrampur	Moderate
1015		Mahishi	Bhelahi Kalan Khurd	Moderate
1016		Mahishi	Dhanauj	Moderate
1017		Mahishi	Dhapari	Moderate
1018		Mahishi	Dharampur	Moderate
1019		Mahishi	Dumri	Moderate
1020		Mahishi	Garaul	Moderate
1021		Mahishi	Kargaon	Moderate
1022		Mahishi	Rajhanpur	Moderate
1023		Mahishi	Rakhti	Moderate
1024		Mahishi	Sahorwa	Moderate
1025		Mahishi	Samani	Moderate
1026		Mahishi	Semar	Moderate
1027		Mahishi	Thanwar	Moderate
1028		Nauhatta	Barhara	Moderate
1029		Nauhatta	Bhelahi	Moderate
1030		Nauhatta	Darhar	Moderate
1031		Nauhatta	Mahua	Moderate
1032		Nauhatta	Narainpur	Moderate
1033		Nauhatta	Partaha	Moderate
1034		Salkhua	Chiraia	Moderate
1035		Salkhua	Gurganwan	Moderate
1036		Salkhua	Haransari	Moderate
1037		Salkhua	Harewa	Moderate
1038		Salkhua	Koparia	Moderate
1039		Salkhua	Sahoria	Moderate
1040		Salkhua	Sahuria	Moderate
1041		Salkhua	Salkhua	Moderate
1042		Salkhua	Situahi	Moderate
1043		Salkhua	Utesra	Moderate
1044		Simri Bakhtiarpur	Ghoghsan	Moderate
1045	Simri Bakhtiarpur	Sukhasan	Moderate	
1046	Sonbarsa	Baisa	Moderate	
1047	Samastipur	Bithan	Subhaul	Moderate
1048		Kalyanpur	Dharampur	Moderate
1049		Kalyanpur	Gopalpur Chaki Dhab	Moderate
1050		Kalyanpur	Rakba Arari Belsandi	Moderate
1051		Mohanpur	Bingawan	Moderate
1052		Mohanpur	Madhopur	Moderate
1053		Mohiuddinagar	Dharahra	Moderate
1054		Mohiuddinagar	Mohiuddinagar (NP)	Moderate

S.No	District Name	Block Name	Village Name	Flood Hazard Category
1055		Mohiuddinagar	Naraenpur	Moderate
1056		Mohiuddinagar	Rahepur	Moderate
1057		Patori	Lodipur	Moderate
1058		Patori	Rupauli Chausima	Moderate
1059		Patori	Rupauli Chausiwa	Moderate
1060		Patori	Sarhad Madho	Moderate
1061		Patori	Sultanpur Chhaurahi	Moderate
1062		Rosera	Mohammadpur Allaudin	Moderate
1063		Shivaji Nagar	Parwana	Moderate
1064		Shivaji Nagar	Punwa	Moderate
1065		Shivaji Nagar	Uti Bariar	Moderate
1066		Singhia	Basudewa	Moderate
1067		Singhia	Pararia Bherhar	Moderate
1068		Singhia	Pato Bilahi	Moderate
1069		Tajpur Morwa	Indar Wara	Moderate
1070		Tajpur Morwa	Sarangpur	Moderate
1071		Warisnagar	Ratras	Moderate
1072		Amnour	Chandpura	Moderate
1073		Amnour	Harpur	Moderate
1074		Amnour	Katsa	Moderate
1075		Amnour	Khas Patti	Moderate
1076		Amnour	Shikarpur	Moderate
1077		Amnour	Tarwar	Moderate
1078		Chapra	Barhampur	Moderate
1079		Chapra	Naini	Moderate
1080		Chapra	Ratanpura	Moderate
1081		Chapra	Sidhwalia	Moderate
1082		Chapra	Turkaulia	Moderate
1083		Dariapur	Admapur	Moderate
1084		Dariapur	Banwaripur	Moderate
1085		Dariapur	Bedaulia	Moderate
1086		Dariapur	Bhaw Chak	Moderate
1087		Dariapur	Chak Jalal	Moderate
1088		Dariapur	Chak Ruddi	Moderate
1089		Dariapur	Chaubhaia	Moderate
1090		Dariapur	Daluwa Chak	Moderate
1091		Dariapur	Darihara Chaturbhu	Moderate
1092		Dariapur	Dhanuki	Moderate
1093		Dariapur	Dharam Chak	Moderate
1094		Dariapur	Dhongaha Fatuh	Moderate
1095		Dariapur	Fursatpur	Moderate
1096		Dariapur	Gay Ghat	Moderate
1097		Dariapur	Hukraha	Moderate
1098		Dariapur	Inglish	Moderate
1099		Dariapur	Jaduwa Chak	Moderate
1100		Dariapur	Jalalpur	Moderate
1101		Dariapur	Kamalpur	Moderate
1102		Dariapur	Khajauta	Moderate
1103		Dariapur	Khajuhta	Moderate
1104		Dariapur	Khushihal Pur	Moderate
1105		Dariapur	Lachhmanpur	Moderate
1106		Dariapur	Lohchha-Kapurtal	Moderate
1107		Dariapur	Majauna Mahartha	Moderate
1108		Dariapur	Manika Chak	Moderate
1109		Dariapur	Manupur	Moderate
1110		Dariapur	Panch Bhaia	Moderate
1111		Dariapur	Partappur	Moderate
1112		Dariapur	Pitu Chak	Moderate
1113		Dariapur	Purdilpur	Moderate
1114		Dariapur	Rampur Aanant	Moderate
1115		Dariapur	Ranipur	Moderate
1116		Dariapur	Sahay Chak	Moderate
1117		Dariapur	Salempur	Moderate
1118		Dariapur	Tinbhaia	Moderate
1119		Dariapur	Ubhwa	Moderate
1120		Dariapur	Yar Mohammadpur	Moderate
1121		Dariapur	Basti Jalal	Moderate

S.No	District Name	Block Name	Village Name	Flood Hazard Category
1122		Dighwara	Rampur Ami	Moderate
1123		Dighwara	Yusufpur	Moderate
1124		Dighwara	Bajraha	Moderate
1125		Garkha	Bishamharpur	Moderate
1126		Garkha	Chhot Jhaua	Moderate
1127		Garkha	Deuria	Moderate
1128		Garkha	Fatanpur	Moderate
1129		Garkha	Filkabad	Moderate
1130		Garkha	Gajauwa	Moderate
1131		Garkha	Gopalpur	Moderate
1132		Garkha	Goraipur	Moderate
1133		Garkha	Haquiatpur	Moderate
1134		Garkha	Hasanpura	Moderate
1135		Garkha	Hasanpura Dakhli Chirand	Moderate
1136		Garkha	Itwa	Moderate
1137		Garkha	Jigna	Moderate
1138		Garkha	Khadaha	Moderate
1139		Garkha	Kothia	Moderate
1140		Garkha	Kudar Bandha	Moderate
1141		Garkha	Maddupur	Moderate
1142		Garkha	Mainpuri	Moderate
1143		Garkha	Maricha	Moderate
1144		Garkha	Mirpurjuara	Moderate
1145		Garkha	Mirzapur	Moderate
1146		Garkha	Mura	Moderate
1147		Garkha	Muraudpur	Moderate
1148		Garkha	Narawn	Moderate
1149		Garkha	Pachbhiria	Moderate
1150		Garkha	Panapur	Moderate
1151		Garkha	Panchpatia	Moderate
1152		Garkha	Parsa	Moderate
1153		Garkha	Pindari	Moderate
1154		Garkha	Pithaghat	Moderate
1155		Garkha	Ram Kola	Moderate
1156		Garkha	Salaha	Moderate
1157		Garkha	Sirpal Basant	Moderate
1158		Garkha	Tahirpur	Moderate
1159		Garkha	Borian	Moderate
1160		Garkha	Chaukhara	Moderate
1161		Garkha	Kakarhat	Moderate
1162		Jalalpur	Kotea	Moderate
1163		Jalalpur	Majlispur	Moderate
1164		Jalalpur	Paraskhan	Moderate
1165		Jalalpur	Pirari	Moderate
1166		Jalalpur	Rewari	Moderate
1167		Jalalpur	Baikunthpur	Moderate
1168		Jalalpur	Bariyarpur	Moderate
1169		Jalalpur	Bagahi	Moderate
1170		Maker	Bataraha	Moderate
1171		Maker	Chephul	Moderate
1172		Manjhi	Kawwal	Moderate
1173		Manjhi	Manjhi Khap	Moderate
1174		Manjhi	Natwar Parsaram	Moderate
1175		Manjhi	Sabdara	Moderate
1176		Manjhi	Sadhpur	Moderate
1177		Manjhi	Hariharpur	Moderate
1178		Manjhi	Barki Sirsia	Moderate
1179		Manjhi	Auli	Moderate
1180		Nagra	Chakia	Moderate
1181		Parsa	Dhelahari Buzurg	Moderate
1182		Revelganj	Jakhua	Moderate
1183		Revelganj	Mahammadpur	Moderate
1184		Revelganj	Raghopur	Moderate
1185		Revelganj	Rajmalpirari	Moderate
1186		Revelganj	Shekhpura	Moderate
1187		Revelganj	Apsaid	Moderate
1188		Revelganj	Baijalpur Fakir	Moderate

S.No	District Name	Block Name	Village Name	Flood Hazard Category
1189		Revelganj	Baijalpur Jamuni	Moderate
1190		Revelganj	Chitarsenpur	Moderate
1191		Sonepur	Dumari Buzurg	Moderate
1192		Sonepur	Faqrabad	Moderate
1193		Sonepur	Hasanpur	Moderate
1194		Sonepur	Ismail Chak	Moderate
1195		Sonepur	Kasturi Chak	Moderate
1196		Sonepur	Khemi Chak	Moderate
1197		Sonepur	Makhdumpur	Moderate
1198		Sonepur	Rajapur	Moderate
1199		Sonepur	Sobhepur	Moderate
1200		Ghat Kusumbha	Alapur	Moderate
1201		Ghat Kusumbha	Bhadausi	Moderate
1202		Ghat Kusumbha	Dumri	Moderate
1203		Ghat Kusumbha	Gangaur	Moderate
1204		Ghat Kusumbha	Jagdispur	Moderate
1205		Ghat Kusumbha	Kusmha	Moderate
1206		Ghat Kusumbha	Mahamadpur	Moderate
1207		Ghat Kusumbha	Panapur	Moderate
1208		Ghat Kusumbha	Raghunathpur	Moderate
1209	Sheikhpura	Sheikpura	Bagola	Moderate
1210	Sheikhpura	Sheikpura	Garaia	Moderate
1211	Sheikhpura	Sheikpura	Kurauni	Moderate
1212	Sheikhpura	Sheikpura	Mahsar	Moderate
1213	Sheikhpura	Sheikpura	Puraina	Moderate
1214		Sheohar	Az Rakba Kursahar	Moderate
1215		Sheohar	Kursahar	Moderate
1216	Sheohar	Tariani Chowk	Gularia	Moderate
1217	Sheohar	Tariani Chowk	Kasturia	Moderate
1218	Sheohar	Tariani Chowk	Lalpur	Moderate
1219	Sheohar	Tariani Chowk	Rupwara	Moderate
1220		Bairgania	Kurwa Fatehpur Chhapra	Moderate
1221		Bajpatti	Baburban	Moderate
1222		Bajpatti	Bari Phulwaria	Moderate
1223		Bajpatti	Pharuha Bhawani	Moderate
1224		Bajpatti	Piprarhi	Moderate
1225		Bajpatti	Raghunathpur	Moderate
1226		Bajpatti	Rudauli	Moderate
1227		Bajpatti	Saura	Moderate
1228		Bathnaha	Dighi	Moderate
1229		Bathnaha	Madanpatti	Moderate
1230		Bathnaha	Sonbarsa Kumhra Sumer	Moderate
1231		Bathnaha	Warlahia	Moderate
1232		Bokhra	Barhmotar	Moderate
1233		Bokhra	Chak Bhoj	Moderate
1234		Bokhra	Dhankaul Khurd	Moderate
1235		Bokhra	Moraon	Moderate
1236		Bokhra	Rohua	Moderate
1237		Bokhra	Az Rakbe Balsa	Moderate
1238	Sitamarhi	Charaut	Dumarbana	Moderate
1239	Sitamarhi	Charaut	Bahurar	Moderate
1240	Sitamarhi	Nanpur	Barhmaul	Moderate
1241	Sitamarhi	Nanpur	Nawadih	Moderate
1242	Sitamarhi	Nanpur	Pipra Bishunpur	Moderate
1243	Sitamarhi	Nanpur	Rambhelahi	Moderate
1244	Sitamarhi	Parihar	Bahilwara	Moderate
1245	Sitamarhi	Parihar	Jalalpur Bangri	Moderate
1246	Sitamarhi	Pupri	Mahima Rasulpur	Moderate
1247	Sitamarhi	Pupri	Nihsa	Moderate
1248	Sitamarhi	Pupri	Pupri	Moderate
1249	Sitamarhi	Pupri	Barheta	Moderate
1250	Sitamarhi	Pupri	Bhada	Moderate
1251	Sitamarhi	Runisaidpur	Deona Buzurg	Moderate
1252	Sitamarhi	Runisaidpur	Hajipur Basantpur	Moderate
1253	Sitamarhi	Runisaidpur	Kadampur	Moderate
1254	Sitamarhi	Runisaidpur	Mahesha Farrukhpur	Moderate
1255	Sitamarhi	Runisaidpur	Mahimapur	Moderate

S.No	District Name	Block Name	Village Name	Flood Hazard Category
1256		Runisaidpur	Rampur	Moderate
1257		Runisaidpur	Rupauli	Moderate
1258		Runisaidpur	Thuma	Moderate
1259		Runisaidpur	Tikauli	Moderate
1260		Runisaidpur	Umarpur	Moderate
1261		Runisaidpur	Phulkaha	Moderate
1262		Runisaidpur	Az Rakbe Piprarhi	Moderate
1263		Sonbarsa	Baghari	Moderate
1264		Sursand	Chakni	Moderate
1265		Sursand	Darha Bari	Moderate
1266		Sursand	Maruki	Moderate
1267		Sursand	Parri	Moderate
1268		Sursand	Pikdharpur	Moderate
1269		Sursand	Radhau	Moderate
1270		Andar	Pipra	Moderate
1271		Barharia	Mathia Patarhatha	Moderate
1272		Barharia	Sanwalhata	Moderate
1273		Darauli	Agsara	Moderate
1274		Darauli	Basuapur	Moderate
1275		Darauli	Belaon	Moderate
1276		Darauli	Gopalpur	Moderate
1277		Darauli	Parmanandpur	Moderate
1278		Darauli	Rampur	Moderate
1279		Daraundha	Bhadia	Moderate
1280		Guthani	Pataua Khurd	Moderate
1281		Hasanpura	Chakiya	Moderate
1282		Raghunathpur	Chak Daula	Moderate
1283		Raghunathpur	Chaksultanpur	Moderate
1284		Raghunathpur	Dilawarpur	Moderate
1285		Raghunathpur	Mahendar Buzurg	Moderate
1286		Raghunathpur	Phulwaria	Moderate
1287		Siswan	Dhorhahi	Moderate
1288		Siswan	Jhotpur	Moderate
1289		Siswan	Kolhua	Moderate
1290		Siswan	Mahanagar	Moderate
1291		Siswan	Mathia	Moderate
1292		Siswan	Mura Parsotim	Moderate
1293		Siswan	Nawalpur	Moderate
1294		Siswan	Sonbarsa	Moderate
1295		Ziradei	Banthu Sriram	Moderate
1296		Marauna	Gamharia	Moderate
1297		Marauna	Rataho	Moderate
1298		Nirmali	Kamalpur	Moderate
1299		Bidupur	Mohanpur Isar Chak Khusro	Moderate
1300		Bidupur	Mohanpur Ishar Chak Khusro	Moderate
1301		Bidupur	Rahimapur	Moderate
1302		Desri	Bishunpur Parsi	Moderate
1303		Desri	Chak Partap	Moderate
1304		Desri	Jazira Sarkari Mahzi Ghataro	Moderate
1305		Desri	Kuatpur	Moderate
1306		Hajipur	Akilabad	Moderate
1307		Hajipur	Chak Nayamat	Moderate
1308		Hajipur	Harauli Fatehpur	Moderate
1309		Hajipur	Karanpur	Moderate
1310		Hajipur	Rampur Dumri	Moderate
1311		Hajipur	Shaikhra Urf Shalkhwa	Moderate
1312		Hajipur	Salahpur	Moderate
1313		Lalganj	Warispur	Moderate
1314		Lalganj	Gorgawan	Moderate
1315		Mahnar	Lawapur Harnarayan	Moderate
1316		Mahnar	Panapur Pehni	Moderate
1317		Mahnar	Shahpur	Moderate
1318		Mahnar	Bishunpur Jainarayan Urf Cham.	Moderate
1319		Patepur	Ashpatpur Singhia Urf Latiahi	Moderate
1320		Raghopur	Ganiari	Moderate

S.No	District Name	Block Name	Village Name	Flood Hazard Category
1321	West_Champaran	Jogapatti	Dhabia	Moderate
1322		Jogapatti	Manopatti	Moderate
1323		Majhaulia	Sirkohiya	Moderate
1324		Narkatiaganj	Khap Katarhi	Moderate
1325		Sikta	Bishunpurwa	Moderate
1326		Sikta	Gamharia Birnagar	Moderate
1327		Sikta	Gamharia Jainagar	Moderate
1328		Sikta	Indarwa	Moderate
1329		Sikta	Majharia	Moderate
1330		Sikta	Maswas	Moderate
1331		Sikta	Mujauna	Moderate
1332		Sikta	Nonia Tola	Moderate
1333		Sikta	Sirsiya	Moderate
1334		Sikta	Siswania	Moderate
1335		Sikta	Sugaha	Moderate
1336		Sikta	Tola Gularia	Moderate